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# Title 14—Aeronautics and Space

(This book contains parts 60 to 109)

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# SUBCHAPTER D—AIRMEN

## PART 60—FLIGHT SIMULATION TRAINING DEVICE INITIAL AND CONTINUING QUALIFICATION AND USE

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AUTHORITY: 49 U.S.C. 106(g), 40113, and 44701.

SOURCE: Docket No. FAA–2002–12461, 71 FR 63426, Oct. 30, 2006, unless otherwise noted.

### § 60.1 Applicability.

(a) This part prescribes the rules governing the initial and continuing qualification and use of all aircraft flight simulation training devices (FSTD) used for meeting training, evaluation, or flight experience requirements of this chapter for flight crewmember certification or qualification.

(b) The rules of this part apply to each person using or applying to use an FSTD to meet any requirement of this chapter.

(c) The requirements of § 60.33 regarding falsification of applications, records, or reports also apply to each person who uses an FSTD for training, evaluation, or obtaining flight experience required for flight crewmember certification or qualification under this chapter.

### § 60.2 Applicability of sponsor rules to persons who are not sponsors and who are engaged in certain unauthorized activities.

(a) The rules of this part that are directed to a sponsor of an FSTD also apply to any person who uses or causes the use of an FSTD when—

(1) That person knows that the FSTD does not have an FAA-approved sponsor; and

(2) The use of the FSTD by that person is nonetheless claimed for purposes of meeting any requirement of this chapter or that person knows or should have known that the person's acts or omissions would cause another person to mistakenly credit use of the FSTD for purposes of meeting any requirement of this chapter.

(b) A situation in which paragraph (a) of this section would not apply to a

person would be when each of the following conditions are met:

(1) The person sold or leased the FSTD and merely represented to the purchaser or lessee that the FSTD is in a condition in which it should be able to obtain FAA approval and qualification under this part;

(2) The person does not falsely claim to be the FAA-approved sponsor for the FSTD;

(3) The person does not falsely make representations that someone else is the FAA-approved sponsor of the FSTD at a time when that other person is not the FAA-approved sponsor of the FSTD; and

(4) The person's acts or omissions do not cause another person to detrimentally rely on such acts or omissions for the mistaken conclusion that the FSTD is FAA-approved and qualified under this part at the time the FSTD is sold or leased.

### § 60.3 Definitions.

In addition to the definitions in part 1 of this chapter, other terms and definitions applicable to this part are found in appendix F of this part.

### § 60.4 Qualification Performance Standards.

The Qualification Performance Standards (QPS) are published in appendices to this part as follows:

(a) Appendix A contains the QPS for Airplane Flight Simulators.

(b) Appendix B contains the QPS for Airplane Flight Training Devices.

(c) Appendix C contains the QPS for Helicopter Flight Simulators.

(d) Appendix D contains the QPS for Helicopter Flight Training Devices.

(e) Appendix E contains the QPS for Quality Management Systems for FSTDs.

(f) Appendix F contains the QPS for Definitions and Abbreviations for FSTDs.

### § 60.5 Quality management system.

(a) After May 30, 2010, no sponsor may use or allow the use of or offer the use of an FSTD for flight crewmember training or evaluation or for obtaining flight experience to meet any requirement of this chapter unless the sponsor has established and follows a quality management system (QMS), currently approved by the National Simulator Program Manager (NSPM), for the continuing surveillance and analysis of the sponsor's performance and effectiveness in providing a satisfactory FSTD for use on a regular basis as described in QPS appendix E of this part.

(b) The QMS program must provide a process for identifying deficiencies in the program and for documenting how the program will be changed to address these deficiencies.

(c) Whenever the NSPM finds that the QMS program does not adequately address the procedures necessary to meet the requirements of this part, the sponsor must, after notification by the NSPM, change the program so the procedures meet the requirements of this part. Each such change must be approved by the NSPM prior to implementation.

(d) Within 30 days after the sponsor receives a notice described in paragraph (c) of this section, the sponsor may file a petition with the Director of Flight Standards Service (the Director) for reconsideration of the NSPM finding. The sponsor must address its petition to the Director, Flight Standards Service, AFS–1, Federal Aviation Administration, 800 Independence Ave., SW., Washington, DC 20591. The filing of such a petition to reconsider stays the notice pending a decision by the Director. However, if the Director finds that there is a situation that requires immediate action in the interest of safety in air commerce, he may, upon a statement of the reasons, require a change effective without stay.

[Doc. No. FAA–2002–12461, 71 FR 63426, Oct. 30, 2006; Amdt. 60–2, 72 FR 59599, Oct. 22, 2007]

### § 60.7 Sponsor qualification requirements.

(a) A person is eligible to apply to be a sponsor of an FSTD if the following conditions are met:

(1) The person holds, or is an applicant for, a certificate under part 119, 141, or 142 of this chapter; or holds, or is an applicant for, an approved flight engineer course in accordance with part 63 of this chapter.

(2) The FSTD will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for

the aircraft being simulated as evidenced in a request for evaluation submitted to the NSPM.

(b) A person is a sponsor if the following conditions are met:

(1) The person is a certificate holder under part 119, 141, or 142 of this chapter or has an approved flight engineer course in accordance with part 63 of this chapter.

(2) The person has—

(i) Operations specifications authorizing the use of the specific aircraft or set of aircraft and has an FAA-approved training program under which at least one FSTD, simulating the aircraft or set of aircraft and for which the person is the sponsor, is used by the sponsor as described in paragraphs (b)(5) or (b)(6) of this section; or

(ii) Training specifications or an FAA-approved course of training under which at least one FSTD, simulating that aircraft or set of aircraft and for which the person is the sponsor, is used by the sponsor as described in paragraphs (b)(5) or (b)(6) of this section.

(3) The person has a quality management system currently approved by the NSPM in accordance with § 60.5.

(4) The NSPM has accepted the person as the sponsor of the FSTD and that acceptance has not been withdrawn by the FAA.

(5) At least one FSTD (as referenced in paragraph (b)(2)(i) or (b)(2)(ii) of this section) that is initially qualified on or after May 30, 2008, is used within the sponsor's FAA-approved flight training program for the aircraft or set of aircraft at least once within the 12-month period following the initial/upgrade evaluation, and at least once within each subsequent 12-month period thereafter.

(6) At least one FSTD (as referenced in paragraph (b)(2)(i) or (b)(2)(ii) of this section) that was qualified before May 30, 2008, is used within the sponsor's FAA-approved flight training program for the aircraft or set of aircraft at least once within the 12-month period following the first continuing qualification evaluation conducted by the NSPM after May 30, 2008 and at least once within each subsequent 12-month period thereafter.

(c) If the use requirements of paragraphs (b)(2) and either (b)(5) or (b)(6) of this section are not met, the person will forfeit the right to sponsor that FSTD and that person will not be eligible to apply to sponsor that FSTD for at least 12 calendar months following the expiration of the qualification status.

(d) In addition to the FSTD described in paragraph (b) of this section, an FSTD sponsor may sponsor any number of other FSTDs regardless of specific aircraft or set of aircraft provided either—

(1) During the preceding 12-month period, all of the other FSTDs are used within the sponsor's or another certificate holder's FAA-approved flight training program for the aircraft or set of aircraft simulated; or

(2) The sponsor obtains a written statement at least annually from a qualified pilot who has flown the aircraft or set of aircraft (as appropriate) during the preceding 12-month period stating that the subject FSTD's performance and handling qualities, within the normal operating envelope, represent the aircraft or set of aircraft described in the FAA Type Certificate and the type data sheet, if appropriate. The sponsor must retain the two most current written statements for review by the NSPM.

[Doc. No. FAA–2002–12461, 71 FR 63426, Oct. 30, 2006; Amdt. 60–2, 72 FR 59599, Oct. 22, 2007]

### § 60.9 Additional responsibilities of the sponsor.

(a) The sponsor must allow the NSPM upon request to inspect the FSTD as soon as practicable. This inspection may include all records and documents relating to the FSTD, to determine its compliance with this part.

(b) The sponsor must do the following for each FSTD:

(1) Establish a mechanism to receive written comments regarding the FSTD and its operation in accordance with the QPS appendix E of this part.

(2) Post in or adjacent to the FSTD the Statement of Qualification issued by the NSPM. An electronic copy of the Statement of Qualification that may be accessed by an appropriate terminal or display in or adjacent to the FSTD is satisfactory.

(c) Each sponsor of an FSTD must identify to the NSPM by name, one individual to be the management representative (MR).

(1) One person may serve as an MR for more than one FSTD, but one FSTD must not have more than one person serving in this capacity.

(2) Each MR must be an employee of the sponsor with the responsibility and authority to—

(i) Monitor the on-going qualification of assigned FSTDs to ensure that all matters regarding FSTD qualification are being carried out as provided for in this part;

(ii) Ensure that the QMS is properly established, implemented, and maintained by overseeing the structure (and modifying where necessary) of the QMS policies, practices, and procedures; and

(iii) Regularly brief sponsor's management on the status of the on-going FSTD qualification program and the effectiveness and efficiency of the QMS.

(3) The MR serves as the primary contact point for all matters between the sponsor and the NSPM regarding the qualification of that FSTD as provided for in this part.

(4) The MR may delegate the duties described in paragraph (c)(2) and (c)(3) of this section to an individual at each of the sponsor's locations.

### § 60.11 FSTD use.

No person may use or allow the use of or offer the use of an FSTD for flight crewmember training or evaluation or for obtaining flight experience to meet any of the requirements under this chapter unless, in accordance with the QPS for the specific device, the FSTD meets all of the following:

(a) Has a single sponsor who is qualified under § 60.7. The sponsor may arrange with another person for services of document preparation and presentation, as well as FSTD inspection, maintenance, repair, and servicing; however, the sponsor remains responsible for ensuring that these functions are conducted in a manner and with a result of continually meeting the requirements of this part.

(b) Is qualified as described in the Statement of Qualification.

(c) Remains qualified, through satisfactory inspection, continuing qualification evaluations, appropriate maintenance, and use requirements in accordance with this part and the applicable QPS.

(d) Functions during day-to-day training, evaluation, or flight experience activities with the software and hardware that was evaluated as satisfactory by the NSPM and, if modified, modified only in accordance with the provisions of this part. However, this section does not apply to routine software or hardware changes that do not fall under the requirements of § 60.23.

(e) Is operated in accordance with the provisions and limitations of § 60.25.

### § 60.13 FSTD objective data requirements.

(a) Except as provided in paragraph (b) and (c) of this section, for the purposes of validating FSTD performance and handling qualities during evaluation for qualification, the data made available to the NSPM (the validation data package) must include the aircraft manufacturer's flight test data and all relevant data developed after the type certificate was issued (*e.g.*, data developed in response to an airworthiness directive) if such data results from a change in performance, handling qualities, functions, or other characteristics of the aircraft that must be considered for flight crewmember training, evaluation, or for meeting experience requirements of this chapter.

(b) The validation data package may contain flight test data from a source in addition to or independent of the aircraft manufacturer's data in support of an FSTD qualification, but only if this data is gathered and developed by that source in accordance with flight test methods, including a flight test plan, as described in the applicable QPS.

(c) The validation data package may also contain predicted data, engineering simulation data, data from pilot owner or pilot operating manuals, or data from public domain sources, provided this data is acceptable to the NSPM. If found acceptable the data may then be used in particular applications for FSTD qualification.

(d) Data or other material or elements must be submitted in a form and manner acceptable to the NSPM.

(e) The NSPM may require additional objective data, which may include flight testing if necessary, if the validation data package does not support FSTD qualification requirements as described in this part and the applicable QPS appendix.

(f) When an FSTD sponsor learns, or is advised by an aircraft manufacturer or other data provider, that an addition to, an amendment to, or a revision of data that may relate to FSTD performance or handling characteristics is available, the sponsor must notify the NSPM as described in the applicable QPS.

### § 60.14 Special equipment and personnel requirements for qualification of the FSTD.

When notified by the NSPM, the sponsor must make available all special equipment and qualified personnel needed to accomplish or assist in the accomplishment of tests during initial qualification, continuing qualification, or special evaluations.

### § 60.15 Initial qualification requirements.

(a) For each FSTD, the sponsor must submit a request to the NSPM to evaluate the FSTD for initial qualification at a specific level and simultaneously request the Training Program Approval Authority (TPAA) forward a concurring letter to the NSPM. The request must be submitted in the form and manner described in the applicable QPS.

(b) The management representative described in § 60.9(c) must sign a statement (electronic signature is acceptable for electronic transmissions) after confirming the following:

(1) The performance and handling qualities of the FSTD represent those of the aircraft or set of aircraft within the normal operating envelope. This determination must be made by a pilot(s) meeting the requirements of paragraph (d) of this section after having flown all of the Operations Tasks listed in the applicable QPS appendix relevant to the qualification level of the FSTD. Exceptions, if any, must be noted. The name of the person(s) making this determination must be available to the NSPM upon request.

(2) The FSTD systems and sub-systems (including the simulated aircraft systems) functionally represent those in the aircraft or set of aircraft. This determination must be made by the pilot(s) described in paragraph (b)(1) of this section, or by a person(s) trained on simulator systems/sub-systems and trained on the operation of the simulated aircraft systems, after having exercised the operation of the FSTD and the pertinent functions available through the Instructor Operating Station(s). Exceptions, if any, must be noted. The name of the person(s) making this determination must be available to the NSPM upon request.

(3) The cockpit represents the configuration of the specific type; or aircraft make, model, and series aircraft being simulated, as appropriate. This determination must be made by the pilot(s) described in paragraph (b)(1) of this section, or by a person(s) trained on the configuration and operation of the aircraft simulated. Exceptions, if any, must be noted. The name of the person(s) making this determination must be available to the NSPM upon request.

(c) Except for those FSTDs previously qualified and described in § 60.17, each FSTD evaluated for initial qualification must meet the standard that is in effect at the time of the evaluation. However—

(1) If the FAA publishes a change to the existing standard or publishes a new standard for the evaluation for initial qualification, a sponsor may request that the NSPM apply the standard that was in effect when an FSTD was ordered for delivery if the sponsor—

(i) Within 30 days of the publication of the change to the existing standard or publication of the new standard, notifies the NSPM that an FSTD has been ordered;

(ii) Within 90 days of the NSPM notification described in paragraph (c)(1)(i) of this section, requests that the standard in effect at the time the order was placed be used for the evaluation for initial qualification; and

(iii) The evaluation is conducted within 24 months following the publication of the change to the existing standard or publication of the new standard.

(2) This notification must include a description of the FSTD; the anticipated qualification level of the FSTD; the make, model, and series of aircraft simulated; and any other pertinent information.

(3) Any tests, tolerances, or other requirements that are current at the time of the evaluation may be used during the initial evaluation, at the request of the sponsor, if the sponsor provides acceptable updates to the required qualification test guide.

(4) The standards used for the evaluation for initial qualification will be used for all subsequent evaluations of the FSTD.

(d) The pilot(s) who contributes to the confirmation statement required by paragraph (b) of this section must—

(1) Be designated by the sponsor; and

(2) Be qualified in—

(i) The aircraft or set of aircraft being simulated; or

(ii) For aircraft not yet issued a type certificate, or aircraft not previously operated by the sponsor or not having previous FAA-approved training programs conducted by the sponsor, an aircraft similar in size and configuration.

(e) The subjective tests that form the basis for the statements described in paragraph (b) of this section and the objective tests referenced in paragraph (f) of this section must be accomplished at the sponsor's training facility, except as provided for in the applicable QPS.

(f) The person seeking to qualify the FSTD must provide the NSPM access to the FSTD for the length of time necessary for the NSPM to complete the required evaluation of the FSTD for initial qualification, which includes the conduct and evaluation of objective and subjective tests, including general FSTD requirements, as described in the applicable QPS, to determine that the FSTD meets the standards in that QPS.

(g) When the FSTD passes an evaluation for initial qualification, the NSPM issues a Statement of Qualification that includes all of the following:

(1) Identification of the sponsor.

(2) Identification of the make, model, and series of the aircraft or set of aircraft being simulated.

(3) Identification of the configuration of the aircraft or set of aircraft being simulated (*e.g.*, engine model or models, flight instruments, or navigation or other systems).

(4) A statement that the FSTD is qualified as either a full flight simulator or a flight training device.

(5) Identification of the qualification level of the FSTD.

(6) A statement that (with the exception of the noted exclusions for which the FSTD has not been subjectively tested by the sponsor or the NSPM and for which qualification is not sought) the qualification of the FSTD includes the tasks set out in the applicable QPS appendix relevant to the qualification level of the FSTD.

(h) After the NSPM completes the evaluation for initial qualification, the sponsor must update the Qualification Test Guide (QTG), with the results of the FAA-witnessed tests together with the results of all the objective tests described in the applicable QPS.

(i) Upon issuance of the Statement of Qualification the updated QTG becomes the Master Qualification Test Guide (MQTG). The MQTG must be made available to the NSPM upon request.

### § 60.16 Additional qualifications for a currently qualified FSTD.

(a) A currently qualified FSTD is required to undergo an additional qualification process if a user intends to use the FSTD for meeting training, evaluation, or flight experience requirements of this chapter beyond the qualification issued for that FSTD. This process consists of the following:

(1) The sponsor:

(i) Must submit to the NSPM all modifications to the MQTG that are required to support the additional qualification.

(ii) Must describe to the NSPM all modifications to the FSTD that are required to support the additional qualification.

(iii) Must submit to the NSPM a confirmation statement as described in § 60.15(c) that a pilot, designated by the sponsor in accordance with § 60.15(d), has subjectively evaluated the FSTD in those areas not previously evaluated.

(2) The FSTD must successfully pass an evaluation—

(i) Consisting of all the elements of an initial evaluation for qualification in those circumstances where the NSPM has determined that all the elements of an initial evaluation for qualification is necessary; or

(ii) Consisting of those elements of an initial evaluation for qualification designated as necessary by the NSPM.

(b) In making the determinations described in paragraph (a)(2) of this section, the NSPM considers factors including the existing qualification of the FSTD, any modifications to the FSTD hardware or software that are involved, and any additions or modifications to the MQTG.

(c) The FSTD is qualified for the additional uses when the NSPM issues an amended Statement of Qualification in accordance with § 60.15(h).

(d) The sponsor may not modify the FSTD except as described in § 60.23.

### § 60.17 Previously qualified FSTDs.

(a) Unless otherwise specified by an FSTD Directive, further referenced in the applicable QPS, or as specified in paragraph (e) of this section, an FSTD qualified before May 30, 2008 will retain its qualification basis as long as it continues to meet the standards, including the objective test results recorded in the MQTG and subjective tests, under which it was originally evaluated, regardless of sponsor. The sponsor of such an FSTD must comply with the other applicable provisions of this part.

(b) For each FSTD qualified before May 30, 2008, no sponsor may use or allow the use of or offer the use of such an FSTD after May 30, 2014 for flight crewmember training, evaluation or flight experience to meet any of the requirements of this chapter, unless that FSTD has been issued a Statement of Qualification, including the Configuration List and the List of Qualified Tasks in accordance with the procedures set out in the applicable QPS.

(c) If the FSTD qualification is lost under § 60.27 and—

(i) Restored under § 60.27 in less than (2) years, then the qualification basis (in terms of objective tests and subjective tests) for the re-qualification will be those against which the FSTD was originally evaluated and qualified.

(ii) Not restored under § 60.27 for two (2) years or more, then the qualification basis (in terms of objective tests and subjective tests) for the re-qualification will be those standards in effect and current at the time of re-qualification application.

(d) Except as provided in paragraph (e) of this section, any change in FSTD qualification level initiated on or after May 30, 2008 requires an evaluation for initial qualification in accordance with this part.

(e) A sponsor may request that an FSTD be permanently downgraded. In such a case, the NSPM may downgrade a qualified FSTD without requiring and without conducting an initial evaluation for the new qualification level. Subsequent continuing qualification evaluations will use the existing MQTG, modified as necessary to reflect the new qualification level.

(f) When the sponsor has appropriate validation data available and receives approval from the NSPM, the sponsor may adopt tests and associated tolerances described in the current qualification standards as the tests and tolerances applicable for the continuing qualification of a previously qualified FSTD. The updated test(s) and tolerance(s) must be made a permanent part of the MQTG.

[Doc. No. FAA–2002–12461, 71 FR 63426, Oct. 30, 2006; Amdt. 60–2, 72 FR 59599, Oct. 22, 2007]

### § 60.19 Inspection, continuing qualification evaluation, and maintenance requirements.

(a) *Inspection.* No sponsor may use or allow the use of or offer the use of an FSTD for flight crewmember training, evaluation, or flight experience to meet any of the requirements of this chapter unless the sponsor does the following:

(1) Accomplishes all appropriate objective tests each year as specified in the applicable QPS.

(2) Completes a functional preflight check within the preceding 24 hours.

(b) *Continuing qualification evaluation.* (1) This evaluation consists of objective tests, and subjective tests, including general FSTD requirements, as described in the applicable QPS or as may be amended by an FSTD Directive.

(2) The sponsor must contact the NSPM to schedule the FSTD for continuing qualification evaluations not later than 60 days before the evaluation is due.

(3) The sponsor must provide the NSPM access to the objective test results in the MQTG and access to the FSTD for the length of time necessary for the NSPM to complete the required continuing qualification evaluations.

(4) The frequency of NSPM-conducted continuing qualification evaluations for each FSTD will be established by the NSPM and specified in the MQTG.

(5) Continuing qualification evaluations conducted in the calendar month before or after the calendar month in which these continuing qualification evaluations are required will be considered to have been conducted in the calendar month in which they were required.

(6) No sponsor may use or allow the use of or offer the use of an FSTD for flight crewmember training or evaluation or for obtaining flight experience for the flight crewmember to meet any requirement of this chapter unless the FSTD has passed an NSPM-conducted continuing qualification evaluation within the time frame specified in the MQTG or within the grace period as described in paragraph (b)(5) of this section.

(c) *Maintenance.* The sponsor is responsible for continuing corrective and preventive maintenance on the FSTD to ensure that it continues to meet the requirements of this part and the applicable QPS appendix. No sponsor may use or allow the use of or offer the use of an FSTD for flight crewmember training, evaluation, or flight experience to meet any of the requirements of this chapter unless the sponsor does the following:

(1) Maintains a discrepancy log.

(2) Ensures that, when a discrepancy is discovered, the following requirements are met:

(i) A description of each discrepancy is entered in the log and remains in the log until the discrepancy is corrected as specified in § 60.25(b).

(ii) A description of the corrective action taken for each discrepancy, the identity of the individual taking the action, and the date that action is taken is entered in the log.

(iii) The discrepancy log is kept in a form and manner acceptable to the Administrator and is kept in or adjacent to the FSTD. An electronic log that may be accessed by an appropriate terminal or display in or adjacent to the FSTD is satisfactory.

### § 60.20 Logging FSTD discrepancies.

Each instructor, check airman, or representative of the Administrator conducting training, evaluation, or flight experience, and each person conducting the preflight inspection who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the FSTD, must write or cause to be written a description of that discrepancy into the discrepancy log at the end of the FSTD preflight or FSTD use session.

### § 60.21 Interim qualification of FSTDs for new aircraft types or models.

(a) A sponsor may apply for and the NSPM may issue an interim qualification level for an FSTD for a new type or model of aircraft, even though the aircraft manufacturer's aircraft data package is preliminary, if the sponsor provides the following to the satisfaction of the NSPM—

(1) The aircraft manufacturer's data, which consists of at least predicted data, validated by a limited set of flight test data;

(2) The aircraft manufacturer's description of the prediction methodology used to develop the predicted data; and

(3) The QTG test results.

(b) An FSTD that has been issued interim qualification is deemed to have been issued initial qualification unless the NSPM rescinds the qualification. Interim qualification terminates two years after its issuance, unless the

NSPM determines that specific conditions warrant otherwise.

(c) Within twelve months of the release of the final aircraft data package by the aircraft manufacturer, but no later than two years after the issuance of the interim qualification status, the sponsor must apply for initial qualification in accordance with § 60.15 based on the final aircraft data package approved by the aircraft manufacturer, unless the NSPM determines that specific conditions warrant otherwise.

(d) An FSTD with interim qualification may be modified only in accordance with § 60.23.

### § 60.23 Modifications to FSTDs.

(a) *Description of a modification.* For the purposes of this part, an FSTD is said to have been modified when:

(1) Equipment or devices intended to simulate aircraft appliances are added to or removed from FSTD, which change the Statement of Qualification or the MQTG; or

(2) Changes are made to either software or hardware that are intended to impact flight or ground dynamics; changes are made that impact performance or handling characteristics of the FSTD (including motion, visual, control loading, or sound systems for those FSTD levels requiring sound tests and measurements); or changes are made to the MQTG.

(b) *FSTD Directive.* When the FAA determines that FSTD modification is necessary for safety of flight reasons, the sponsor of each affected FSTD must ensure that the FSTD is modified according to the FSTD Directive regardless of the original qualification standards applicable to any specific FSTD.

(c) *Using the modified FSTD.* The sponsor may not use, or allow the use of, or offer the use of, the FSTD with the proposed modification for flight crewmember training or evaluation or for obtaining flight experience for the flight crewmember to meet any requirement of this chapter unless:

(1) The sponsor has notified the NSPM and the TPAA of their intent to incorporate the proposed modification, and one of the following has occurred;

(i) Twenty-one days have passed since the sponsor notified the NSPM and the TPAA of the proposed modification and the sponsor has not received any response from either the NSPM or the TPAA;

(ii) Twenty-one days have passed since the sponsor notified the NSPM and the TPAA of the proposed modification and one has approved the proposed modification and the other has not responded;

(iii) Fewer than twenty-one days have passed since the sponsor notified the NSPM and the TPAA of the proposed modification and the NSPM and TPAA both approve the proposed modification;

(iv) The sponsor has successfully completed any evaluation the NSPM may require in accordance with the standards for an evaluation for initial qualification or any part thereof before the modified FSTD is placed in service.

(2) The notification is submitted with the content as, and in a form and manner as, specified in the applicable QPS.

(d) *User notification.* When a modification is made to an FSTD that affects the Statement of Qualification, the sponsor must post an addendum to the Statement of Qualification until such time as a permanent, updated statement is posted.

(e) *MQTG update.* The MQTG must be updated with current objective test results in accordance with § 60.15(h) and (i) and appropriate objective data in accordance with § 60.13, each time an FSTD is modified and an objective test or other MQTG section is affected by the modification. If an FSTD Directive is the cause of this update, the direction to make the modification and the record of the modification completion must be filed in the MQTG.

### § 60.25 Operation with missing, malfunctioning, or inoperative components.

(a) No person may knowingly use or allow the use of or misrepresent the capability of an FSTD for any maneuver, procedure, or task that is to be accomplished to meet training, evaluation, or flight experience requirements of this chapter for flight crewmember certification or qualification when there is a

missing, malfunctioning, or inoperative (MMI) component that is required to be present and correctly operate for the satisfactory completion of that maneuver, procedure, or task.

(b) Each MMI component as described in paragraph (a) of this section, or any MMI component installed and required to operate correctly to meet the current Statement of Qualification, must be repaired or replaced within 30 calendar days, unless otherwise required or authorized by the NSPM.

(c) A list of the current MMI components must be readily available in or adjacent to the FSTD for review by users of the device. Electronic access to this list via an appropriate terminal or display in or adjacent to the FSTD is satisfactory. The discrepancy log may be used to satisfy this requirement provided each currently MMI component is listed in the discrepancy log.

### § 60.27 Automatic loss of qualification and procedures for restoration of qualification.

(a) An FSTD qualification is automatically lost when any of the following occurs:

(1) The FSTD is not used in the sponsor's FAA-approved flight training program in accordance with § 60.7(b)(5) or (b)(6) and the sponsor does not obtain and maintain the written statement as described in § 60.7(d)(2).

(2) The FSTD is not inspected in accordance with § 60.19.

(3) The FSTD is physically moved from one location and installed in a different location, regardless of distance.

(4) The MQTG is missing or otherwise not available and a replacement is not made within 30 days.

(b) If FSTD qualification is lost under paragraph (a) of this section, qualification is restored when either of the following provisions is met:

(1) The FSTD successfully passes an evaluation:

(i) For initial qualification, in accordance with §§ 60.15 and 60.17(c) in those circumstances where the NSPM has determined that a full evaluation for initial qualification is necessary; or

(ii) For those elements of an evaluation for initial qualification, in accordance with §§ 60.15 and 60.17(c), as determined to be necessary by the NSPM.

(2) The NSPM advises the sponsor that an evaluation is not necessary.

(c) In making the determinations described in paragraph (b) of this section, the NSPM considers factors including the number of continuing qualification evaluations missed, the number of sponsor-conducted quarterly inspections missed, and the care that had been taken of the device since the last evaluation.

### § 60.29 Other losses of qualification and procedures for restoration of qualification.

(a) Except as provided in paragraph (c) of this section, when the NSPM determines that the FSTD no longer meets qualification standards, the following procedure applies:

(1) The NSPM notifies the sponsor in writing that the FSTD no longer meets some or all of its qualification standards.

(2) The NSPM sets a reasonable period (but not less than 7 days) within which the sponsor may submit written information, views, and arguments on the FSTD qualification.

(3) After considering all material presented, the NSPM notifies the sponsor about the determination with regard to the qualification of the FSTD.

(4) When the NSPM notifies the sponsor that some or all of the FSTD is no longer qualified, the action described in the notification becomes effective not less than 30 days after the sponsor receives that notice unless—

(i) The NSPM finds under paragraph (c) of this section that there is an emergency requiring immediate action with respect to safety in air commerce; or

(ii) The sponsor petitions the Director of Flight Standards Service for reconsideration of the NSPM finding under paragraph (b) of this section.

(b) When a sponsor seeks reconsideration of a decision from the NSPM concerning the FSTD qualification, the following procedure applies:

(1) The sponsor must petition for reconsideration of that decision within 30 days of the date that the sponsor receives a notice that some or all of the FSTD is no longer qualified.

(2) The sponsor must address its petition to the Director, Flight Standards Service, AFS–1, Federal Aviation Administration, 800 Independence Ave., SW., Washington, DC 20591.

(3) A petition for reconsideration, if filed within the 30-day period, suspends the effectiveness of the determination by the NSPM that the FSTD is no longer qualified unless the NSPM has found, under paragraph (c) of this section, that an emergency exists requiring immediate action with respect to safety in air commerce.

(c) If the NSPM find that an emergency exists requiring immediate action with respect to safety in air commerce that makes the procedures set out in this section impracticable or contrary to the public interest:

(1) The NSPM withdraws qualification of some or all of the FSTD and makes the withdrawal of qualification effective on the day the sponsor receives notice of it.

(2) In the notice to the sponsor, the NSPM articulates the reasons for its finding that an emergency exists requiring immediate action with respect to safety in air transportation or air commerce or that makes it impracticable or contrary to the public interest to stay the effectiveness of the finding.

(d) FSTD qualification lost under paragraph (a) or (c) of this section may be restored when either of the following provisions are met:

(1) The FSTD successfully passes an evaluation for initial qualification, in accordance with §§ 60.15 and 60.17(c) in those circumstances where the NSPM has determined that a full evaluation for initial qualification is necessary; or

(2) The FSTD successfully passes an evaluation for those elements of an initial qualification evaluation, in accordance with §§ 60.15 and 60.17(c), as determined to be necessary by the NSPM.

(e) In making the determinations described in paragraph (d) of this section, the NSPM considers factors including the reason for the loss of qualification, any repairs or replacements that may have to have been completed, the number of continuing qualification evaluations missed, the number of sponsor-conducted quarterly inspections missed, and the care that had been taken of the device since the loss of qualification.

### § 60.31 Recordkeeping and reporting.

(a) The FSTD sponsor must maintain the following records for each FSTD it sponsors:

(1) The MQTG and each amendment thereto.

(2) A record of all FSTD modifications affected under § 60.23 since the issuance of the original Statement of Qualification.

(3) A copy of all of the following:

(i) Results of the qualification evaluations (initial and each upgrade) since the issuance of the original Statement of Qualification.

(ii) Results of the objective tests conducted in accordance with § 60.19(a) for a period of 2 years.

(iii) Results of the previous three continuing qualification evaluations, or the continuing qualification evaluations from the previous 2 years, whichever covers a longer period.

(iv) Comments obtained in accordance with § 60.9(b) for a period of at least 90 days.

(4) A record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following:

(i) A list of the components or equipment that were or are missing, malfunctioning, or inoperative.

(ii) The action taken to correct the discrepancy.

(iii) The date the corrective action was taken.

(iv) The identity of the person determining that the discrepancy has been corrected.

(b) The records specified in this section must be maintained in plain language form or in coded form if the coded form provides for the preservation and retrieval of information in a manner acceptable to the NSPM.

### § 60.33 Applications, logbooks, reports, and records: Fraud, falsification, or incorrect statements.

(a) No person may make, or cause to be made, any of the following:

(1) A fraudulent or intentionally false statement in any application or any

amendment thereto, or any other report or test result required by this part.

(2) A fraudulent or intentionally false statement in or a known omission from any record or report that is kept, made, or used to show compliance with this part, or to exercise any privileges under this chapter.

(3) Any reproduction or alteration, for fraudulent purpose, of any report, record, or test result required under this part.

(b) The commission by any person of any act prohibited under paragraph (a) of this section is a basis for any one or any combination of the following:

(1) A civil penalty.

(2) Suspension or revocation of any certificate held by that person that was issued under this chapter.

(3) The removal of FSTD qualification and approval for use in a training program.

(c) The following may serve as a basis for removal of qualification of an FSTD including the withdrawal of approval for use of an FSTD; or denying an application for a qualification:

(1) An incorrect statement, upon which the FAA relied or could have relied, made in support of an application for a qualification or a request for approval for use.

(2) An incorrect entry, upon which the FAA relied or could have relied, made in any logbook, record, or report that is kept, made, or used to show compliance with any requirement for an FSTD qualification or an approval for use.

### § 60.35 Specific full flight simulator compliance requirements.

(a) No device will be eligible for initial or upgrade qualification to a FFS at Level C or Level D under this part unless it includes the equipment and appliances installed and operating to the extent necessary for the issuance of an airman certificate or rating.

(b) No device will be eligible for initial or upgrade qualification to a FFS at Level A or Level B under this part unless it includes the equipment and appliances installed and operating to the extent necessary for the training, testing, and/or checking that comprise the simulation portion of the requirements for issuance of an airman certificate or rating.

### § 60.37 FSTD qualification on the basis of a Bilateral Aviation Safety Agreement (BASA).

(a) The evaluation and qualification of an FSTD by a contracting State to the Convention on International Civil Aviation for the sponsor of an FSTD located in that contracting State may be used as the basis for issuing a U.S. statement of qualification (see applicable QPS, attachment 4, figure 4) by the NSPM to the sponsor of that FSTD in accordance with—

(1) A BASA between the United States and the Contracting State that issued the original qualification; and

(2) A Simulator Implementation Procedure (SIP) established under the BASA.

(b) The SIP must contain any conditions and limitations on validation and issuance of such qualification by the U.S.

## APPENDIX A TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR AIRPLANE FULL FLIGHT SIMULATORS

BEGIN INFORMATION

This appendix establishes the standards for Airplane FFS evaluation and qualification. The NSPM is responsible for the development, application, and implementation of the standards contained within this appendix. The procedures and criteria specified in this appendix will be used by the NSPM, or a person assigned by the NSPM, when conducting airplane FFS evaluations.

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Attachment 6 to Appendix A to Part 60—FSTD Directives Applicable to Airplane Flight Simulators.

END INFORMATION

## 1. INTRODUCTION

BEGIN INFORMATION

a. This appendix contains background information as well as regulatory and informative material as described later in this section. To assist the reader in determining what areas are required and what areas are permissive, the text in this appendix is divided into two sections: ''QPS Requirements'' and ''Information.'' The QPS Requirements sections contain details regarding compliance with the part 60 rule language. These details are regulatory, but are found only in this appendix. The Information sections contain material that is advisory in nature, and designed to give the user general information about the regulation.

b. Questions regarding the contents of this publication should be sent to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Service, National Simulator Program Staff, AFS–205, 100 Hartsfield Centre Parkway, Suite 400, Atlanta, Georgia 30354. Telephone contact numbers for the NSP are: Phone, 404–832–4700; fax, 404–761–8906. The general e-mail address for the NSP office is: *9-aso-avr-sim-team@faa.gov*. The NSP Internet Web site address is: *http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/nsp/*. On this Web site you will find an NSP personnel list with telephone and e-mail contact information for each NSP staff member, a list of qualified flight simulation devices, advisory circulars (ACs), a description of the qualification process, NSP policy, and an NSP ''In-Works'' section. Also linked from this site are additional information sources, handbook bulletins, frequently asked questions, a listing and text of the Federal Aviation Regulations, Flight Standards Inspector's handbooks, and other FAA links.

c. The NSPM encourages the use of electronic media for all communication, including any record, report, request, test, or statement required by this appendix. The electronic media used must have adequate security provisions and be acceptable to the NSPM. The NSPM recommends inquiries on system compatibility, and minimum system requirements are also included on the NSP Web site.

d. Related Reading References.

(1) 14 CFR part 60.
(2) 14 CFR part 61.
(3) 14 CFR part 63.
(4) 14 CFR part 119.
(5) 14 CFR part 121.
(6) 14 CFR part 125.
(7) 14 CFR part 135.
(8) 14 CFR part 141.
(9) 14 CFR part 142.
(10) AC 120–28, as amended, Criteria for Approval of Category III Landing Weather Minima.
(11) AC 120–29, as amended, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
(12) AC 120–35, as amended, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.
(13) AC 120–40, as amended, Airplane Simulator Qualification.
(14) AC 120–41, as amended, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.
(15) AC 120–57, as amended, Surface Movement Guidance and Control System (SMGCS).
(16) AC 150/5300–13, as amended, Airport Design.

(17) AC 150/5340–1, as amended, Standards for Airport Markings.
(18) AC 150/5340–4, as amended, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.
(19) AC 150/5340–19, as amended, Taxiway Centerline Lighting System.
(20) AC 150/5340–24, as amended, Runway and Taxiway Edge Lighting System.
(21) AC 150/5345–28, as amended, Precision Approach Path Indicator (PAPI) Systems.
(22) International Air Transport Association document, ''Flight Simulator Design and Performance Data Requirements,'' as amended.
(23) AC 25–7, as amended, Flight Test Guide for Certification of Transport Category Airplanes.
(24) AC 23–8, as amended, Flight Test Guide for Certification of Part 23 Airplanes.
(25) International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, as amended.
(26) Airplane Flight Simulator Evaluation Handbook, Volume I, as amended and Volume II, as amended, The Royal Aeronautical Society, London, UK.
(27) FAA Publication FAA–S–8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).
(28) The FAA Aeronautical Information Manual (AIM). An electronic version of the AIM is on the Internet at *http://www.faa.gov/atpubs*.
(29) Aeronautical Radio, Inc. (ARINC) document number 436, titled *Guidelines For Electronic Qualification Test Guide* (as amended).
(30) Aeronautical Radio, Inc. (ARINC) document 610, *Guidance for Design and Integration of Aircraft Avionics Equipment in Simulators* (as amended).

END INFORMATION

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2. APPLICABILITY (§§ 60.1 AND 60.2)

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BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.1, Applicability, or to § 60.2, Applicability of sponsor rules to persons who are not sponsors and who are engaged in certain unauthorized activities.

END INFORMATION

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3. DEFINITIONS (§ 60.3)

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BEGIN INFORMATION

See Appendix F of this part for a list of definitions and abbreviations from part 1 and part 60, including the appropriate appendices of part 60.

END INFORMATION

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4. QUALIFICATION PERFORMANCE STANDARDS (§ 60.4)

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BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.4, Qualification Performance Standards.

END INFORMATION

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5. QUALITY MANAGEMENT SYSTEM (§ 60.5)

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BEGIN INFORMATION

See Appendix E of this part for additional regulatory and informational material regarding Quality Management Systems.

END INFORMATION

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6. SPONSOR QUALIFICATION REQUIREMENTS (§ 60.7)

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BEGIN INFORMATION

a. The intent of the language in § 60.7(b) is to have a specific FFS, identified by the sponsor, used at least once in an FAA-approved flight training program for the airplane simulated during the 12-month period described. The identification of the specific FFS may change from one 12-month period to the next 12-month period as long as the sponsor sponsors and uses at least one FFS at least once during the prescribed period. No minimum number of hours or minimum FFS periods are required.

b. The following examples describe acceptable operational practices:

(1) Example One.

(a) A sponsor is sponsoring a single, specific FFS for its own use, in its own facility or elsewhere—this single FFS forms the basis for the sponsorship. The sponsor uses that FFS at least once in each 12-month period in the sponsor's FAA-approved flight training program for the airplane simulated. This 12-month period is established according to the following schedule:

(i) If the FFS was qualified prior to May 30, 2008, the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with § 60.19 after May 30, 2008, and continues for each subsequent 12-month period;

(ii) A device qualified on or after May 30, 2008, will be required to undergo an initial or upgrade evaluation in accordance with §60.15. Once the initial or upgrade evaluation is complete, the first continuing qualification evaluation will be conducted within 6 months. The 12-month continuing qualification evaluation cycle begins on that date and continues for each subsequent 12-month period.

(b) There is no minimum number of hours of FFS use required.

(c) The identification of the specific FFS may change from one 12-month period to the next 12-month period as long as the sponsor sponsors and uses at least one FFS at least once during the prescribed period.

(2) Example Two.

(a) A sponsor sponsors an additional number of FFSs, in its facility or elsewhere. Each additionally sponsored FFS must be—

(i) Used by the sponsor in the sponsor's FAA-approved flight training program for the airplane simulated (as described in §60.7(d)(1));

OR

(ii) Used by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the airplane simulated (as described in §60.7(d)(1)). This 12-month period is established in the same manner as in example one;

OR

(iii) Provided a statement each year from a qualified pilot (after having flown the airplane, not the subject FFS or another FFS, during the preceding 12-month period), stating that the subject FFS's performance and handling qualities represent the airplane (as described in §60.7(d)(2)). This statement is provided at least once in each 12-month period established in the same manner as in example one.

(b) No minimum number of hours of FFS use is required.

(3) Example Three.

(a) A sponsor in New York (in this example, a Part 142 certificate holder) establishes ''satellite'' training centers in Chicago and Moscow.

(b) The satellite function means that the Chicago and Moscow centers must operate under the New York center's certificate (in accordance with all of the New York center's practices, procedures, and policies; e.g., instructor and/or technician training/checking requirements, record keeping, QMS program).

(c) All of the FFSs in the Chicago and Moscow centers could be dry-leased (i.e., the certificate holder does not have and use FAA-approved flight training programs for the FFSs in the Chicago and Moscow centers) because—

(i) Each FFS in the Chicago center and each FFS in the Moscow center is used at least once each 12-month period by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the airplane (as described in §60.7(d)(1));

OR

(ii) A statement is obtained from a qualified pilot (having flown the airplane, not the subject FFS or another FFS, during the preceding 12-month period) stating that the performance and handling qualities of each FFS in the Chicago and Moscow centers represents the airplane (as described in §60.7(d)(2)).

END INFORMATION

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7. ADDITIONAL RESPONSIBILITIES OF THE SPONSOR (§60.9)

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BEGIN INFORMATION

The phrase ''as soon as practicable'' in §60.9(a) means without unnecessarily disrupting or delaying beyond a reasonable time the training, evaluation, or experience being conducted in the FFS.

END INFORMATION

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8. FFS USE (§60.11)

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BEGIN INFORMATION

No additional regulatory or informational material applies to §60.11, Simulator Use.

END INFORMATION

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9. FFS OBJECTIVE DATA REQUIREMENTS (§60.13)

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BEGIN QPS REQUIREMENTS

a. Flight test data used to validate FFS performance and handling qualities must have been gathered in accordance with a flight test program containing the following:

(1) A flight test plan consisting of:

(a) The maneuvers and procedures required for aircraft certification and simulation programming and validation.

(b) For each maneuver or procedure—

(i) The procedures and control input the flight test pilot and/or engineer used.

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

(iv) The airplane configuration, including weight and center of gravity.

(v) The data to be gathered.

(vi) All other information necessary to recreate the flight test conditions in the FFS.

(2) Appropriately qualified flight test personnel.

(3) An understanding of the accuracy of the data to be gathered using appropriate alternative data sources, procedures, and instrumentation that is traceable to a recognized standard as described in Attachment 2, Table A2E of this appendix.

(4) Appropriate and sufficient data acquisition equipment or system(s), including appropriate data reduction and analysis methods and techniques, as would be acceptable to the FAA's Aircraft Certification Service.

b. The data, regardless of source, must be presented as follows:

(1) In a format that supports the FFS validation process.

(2) In a manner that is clearly readable and annotated correctly and completely.

(3) With resolution sufficient to determine compliance with the tolerances set forth in Attachment 2, Table A2A of this appendix.

(4) With any necessary instructions or other details provided, such as yaw damper or throttle position.

(5) Without alteration, adjustments, or bias. Data may be corrected to address known data calibration errors provided that an explanation of the methods used to correct the errors appears in the QTG. The corrected data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation.

c. After completion of any additional flight test, a flight test report must be submitted in support of the validation data. The report must contain sufficient data and rationale to support qualification of the FFS at the level requested.

d. As required by §60.13(f), the sponsor must notify the NSPM when it becomes aware that an addition to, an amendment to, or a revision of data that may relate to FFS performance or handling characteristics is available. The data referred to in this paragraph is data used to validate the performance, handling qualities, or other characteristics of the aircraft, including data related to any relevant changes occurring after the type certificate was issued. The sponsor must—

(1) Within 10 calendar days, notify the NSPM of the existence of this data; and

(2) Within 45 calendar days, notify the NSPM of—

(a) The schedule to incorporate this data into the FFS; or

(b) The reason for not incorporating this data into the FFS.

e. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot tests'' results in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snapshot.

END QPS REQUIREMENTS

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BEGIN INFORMATION

f. The FFS sponsor is encouraged to maintain a liaison with the manufacturer of the aircraft being simulated (or with the holder of the aircraft type certificate for the aircraft being simulated if the manufacturer is no longer in business), and, if appropriate, with the person having supplied the aircraft data package for the FFS in order to facilitate the notification required by §60.13(f).

g. It is the intent of the NSPM that for new aircraft entering service, at a point well in advance of preparation of the Qualification Test Guide (QTG), the sponsor should submit to the NSPM for approval, a descriptive document (see Table A2C, Sample Validation Data Roadmap for Airplanes) containing the plan for acquiring the validation data, including data sources. This document should clearly identify sources of data for all required tests, a description of the validity of these data for a specific engine type and thrust rating configuration, and the revision levels of all avionics affecting the performance or flying qualities of the aircraft. Additionally, this document should provide other information, such as the rationale or explanation for cases where data or data parameters are missing, instances where engineering simulation data are used or where flight test methods require further explanations. It should also provide a brief narrative describing the cause and effect of any deviation from data requirements. The aircraft manufacturer may provide this document.

h. There is no requirement for any flight test data supplier to submit a flight test plan or program prior to gathering flight test data. However, the NSPM notes that inexperienced data gatherers often provide data that is irrelevant, improperly marked, or lacking adequate justification for selection. Other problems include inadequate information regarding initial conditions or test maneuvers. The NSPM has been forced to refuse these data submissions as validation data for an FFS evaluation. It is for this reason that the NSPM recommends that any data supplier not previously experienced in this area review the data necessary for programming and for validating the performance of the FFS, and discuss the flight test plan anticipated for acquiring such data with the NSPM well in advance of commencing the flight tests.

i. The NSPM will consider, on a case-by-case basis, whether to approve supplemental

validation data derived from flight data recording systems, such as a Quick Access Recorder or Flight Data Recorder.

END INFORMATION

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10. SPECIAL EQUIPMENT AND PERSONNEL REQUIREMENTS FOR QUALIFICATION OF THE FFSs (§60.14)

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BEGIN INFORMATION

a. In the event that the NSPM determines that special equipment or specifically qualified persons will be required to conduct an evaluation, the NSPM will make every attempt to notify the sponsor at least one (1) week, but in no case less than 72 hours, in advance of the evaluation. Examples of special equipment include spot photometers, flight control measurement devices, and sound analyzers. Examples of specially qualified personnel include individuals specifically qualified to install or use any special equipment when its use is required.

b. Examples of a special evaluation include an evaluation conducted after an FFS is moved, at the request of the TPAA, or as a result of comments received from users of the FFS that raise questions about the continued qualification or use of the FFS.

END INFORMATION

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11. INITIAL (AND UPGRADE) QUALIFICATION REQUIREMENTS (§60.15)

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BEGIN QPS REQUIREMENTS

a. In order to be qualified at a particular qualification level, the FFS must:

(1) Meet the general requirements listed in Attachment 1 of this appendix;

(2) Meet the objective testing requirements listed in Attachment 2 of this appendix; and

(3) Satisfactorily accomplish the subjective tests listed in Attachment 3 of this appendix.

b. The request described in §60.15(a) must include all of the following:

(1) A statement that the FFS meets all of the applicable provisions of this part and all applicable provisions of the QPS.

(2) A confirmation that the sponsor will forward to the NSPM the statement described in §60.15(b) in such time as to be received no later than 5 business days prior to the scheduled evaluation and may be forwarded to the NSPM via traditional or electronic means.

(3) A QTG, acceptable to the NSPM, that includes all of the following:

(a) Objective data obtained from traditional aircraft testing or another approved source.

(b) Correlating objective test results obtained from the performance of the FFS as prescribed in the appropriate QPS.

(c) The result of FFS subjective tests prescribed in the appropriate QPS.

(d) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

c. The QTG described in paragraph (a)(3) of this section, must provide the documented proof of compliance with the simulator objective tests in Attachment 2, Table A2A of this appendix.

d. The QTG is prepared and submitted by the sponsor, or the sponsor's agent on behalf of the sponsor, to the NSPM for review and approval, and must include, for each objective test:

(1) Parameters, tolerances, and flight conditions;

(2) Pertinent and complete instructions for the conduct of automatic and manual tests;

(3) A means of comparing the FFS test results to the objective data;

(4) Any other information as necessary, to assist in the evaluation of the test results;

(5) Other information appropriate to the qualification level of the FFS.

e. The QTG described in paragraphs (a)(3) and (b) of this section, must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 4, Figure A4C, of this appendix for a sample QTG cover page).

(2) A continuing qualification evaluation requirements page. This page will be used by the NSPM to establish and record the frequency with which continuing qualification evaluations must be conducted and any subsequent changes that may be determined by the NSPM in accordance with §60.19. See Attachment 4, Figure A4G, of this appendix for a sample Continuing Qualification Evaluation Requirements page.

(3) An FFS information page that provides the information listed in this paragraph (see Attachment 4, Figure A4B, of this appendix for a sample FFS information page). For convertible FFSs, the sponsor must submit a separate page for each configuration of the FFS.

(a) The sponsor's FFS identification number or code.

(b) The airplane model and series being simulated.

(c) The aerodynamic data revision number or reference.

(d) The source of the basic aerodynamic model and the aerodynamic coefficient data used to modify the basic model.

(e) The engine model(s) and its data revision number or reference.

(f) The flight control data revision number or reference.
(g) The flight management system identification and revision level.
(h) The FFS model and manufacturer.
(i) The date of FFS manufacture.
(j) The FFS computer identification.
(k) The visual system model and manufacturer, including display type.
(l) The motion system type and manufacturer, including degrees of freedom.
(4) A Table of Contents.
(5) A log of revisions and a list of effective pages.
(6) A list of all relevant data references.
(7) A glossary of terms and symbols used (including sign conventions and units).
(8) Statements of Compliance and Capability (SOCs) with certain requirements.
(9) Recording procedures or equipment required to accomplish the objective tests.
(10) The following information for each objective test designated in Attachment 2, Table A2A, of this appendix as applicable to the qualification level sought:
(a) Name of the test.
(b) Objective of the test.
(c) Initial conditions.
(d) Manual test procedures.
(e) Automatic test procedures (if applicable).
(f) Method for evaluating FFS objective test results.
(g) List of all relevant parameters driven or constrained during the automatically conducted test(s).
(h) List of all relevant parameters driven or constrained during the manually conducted test(s).
(i) Tolerances for relevant parameters.
(j) Source of Validation Data (document and page number).
(k) Copy of the Validation Data (if located in a separate binder, a cross reference for the identification and page number for pertinent data location must be provided).
(l) Simulator Objective Test Results as obtained by the sponsor. Each test result must reflect the date completed and must be clearly labeled as a product of the device being tested.

f. A convertible FFS is addressed as a separate FFS for each model and series airplane to which it will be converted and for the FAA qualification level sought. If a sponsor seeks qualification for two or more models of an airplane type using a convertible FFS, the sponsor must submit a QTG for each airplane model, or a QTG for the first airplane model and a supplement to that QTG for each additional airplane model. The NSPM will conduct evaluations for each airplane model.

g. Form and manner of presentation of objective test results in the QTG:

(1) The sponsor's FFS test results must be recorded in a manner acceptable to the NSPM, that allows easy comparison of the FFS test results to the validation data (e.g., use of a multi-channel recorder, line printer, cross plotting, overlays, transparencies).

(2) FFS results must be labeled using terminology common to airplane parameters as opposed to computer software identifications.

(3) Validation data documents included in a QTG may be photographically reduced only if such reduction will not alter the graphic scaling or cause difficulties in scale interpretation or resolution.

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in Attachment 2, Table A2A of this appendix.

(5) Tests involving time histories, data sheets (or transparencies thereof) and FFS test results must be clearly marked with appropriate reference points to ensure an accurate comparison between the FFS and the airplane with respect to time. Time histories recorded via a line printer are to be clearly identified for cross plotting on the airplane data. Over-plots must not obscure the reference data.

h. The sponsor may elect to complete the QTG objective and subjective tests at the manufacturer's facility or at the sponsor's training facility. If the tests are conducted at the manufacturer's facility, the sponsor must repeat at least one-third of the tests at the sponsor's training facility in order to substantiate FFS performance. The QTG must be clearly annotated to indicate when and where each test was accomplished. Tests conducted at the manufacturer's facility and at the sponsor's training facility must be conducted after the FFS is assembled with systems and sub-systems functional and operating in an interactive manner. The test results must be submitted to the NSPM.

i. The sponsor must maintain a copy of the MQTG at the FFS location.

j. All FFSs for which the initial qualification is conducted after May 30, 2014, must have an electronic MQTG (eMQTG) including all objective data obtained from airplane testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the FFS (reformatted or digitized) as prescribed in this appendix. The eMQTG must also contain the general FFS performance or demonstration results (reformatted or digitized) prescribed in this appendix, and a description of the equipment necessary to perform the initial qualification evaluation and the continuing qualification evaluations. The eMQTG must include the original validation data used to validate FFS performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the

original time-history plots that were provided by the data supplier. A copy of the eMQTG must be provided to the NSPM.

k. All other FFSs not covered in subparagraph ''j'' must have an electronic copy of the MQTG by May 30, 2014. An electronic copy of the MQTG must be provided to the NSPM. This may be provided by an electronic scan presented in a Portable Document File (PDF), or similar format acceptable to the NSPM.

l. During the initial (or upgrade) qualification evaluation conducted by the NSPM, the sponsor must also provide a person who is a user of the device (e.g., a qualified pilot or instructor pilot with flight time experience in that aircraft) and knowledgeable about the operation of the aircraft and the operation of the FFS.

END QPS REQUIREMENTS

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BEGIN INFORMATION

m. Only those FFSs that are sponsored by a certificate holder as defined in Appendix F of this part will be evaluated by the NSPM. However, other FFS evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

n. The NSPM will conduct an evaluation for each configuration, and each FFS must be evaluated as completely as possible. To ensure a thorough and uniform evaluation, each FFS is subjected to the general simulator requirements in Attachment 1 of this appendix, the objective tests listed in Attachment 2 of this appendix, and the subjective tests listed in Attachment 3 of this appendix. The evaluations described herein will include, but not necessarily be limited to the following:

(1) Airplane responses, including longitudinal and lateral-directional control responses (see Attachment 2 of this appendix);

(2) Performance in authorized portions of the simulated airplane's operating envelope, to include tasks evaluated by the NSPM in the areas of surface operations, takeoff, climb, cruise, descent, approach, and landing as well as abnormal and emergency operations (see Attachment 2 of this appendix);

(3) Control checks (see Attachment 1 and Attachment 2 of this appendix);

(4) Flight deck configuration (see Attachment 1 of this appendix);

(5) Pilot, flight engineer, and instructor station functions checks (see Attachment 1 and Attachment 3 of this appendix);

(6) Airplane systems and sub-systems (as appropriate) as compared to the airplane simulated (see Attachment 1 and Attachment 3 of this appendix);

(7) FFS systems and sub-systems, including force cueing (motion), visual, and aural (sound) systems, as appropriate (see Attachment 1 and Attachment 2 of this appendix); and

(8) Certain additional requirements, depending upon the qualification level sought, including equipment or circumstances that may become hazardous to the occupants. The sponsor may be subject to Occupational Safety and Health Administration requirements.

o. The NSPM administers the objective and subjective tests, which includes an examination of functions. The tests include a qualitative assessment of the FFS by an NSP pilot. The NSP evaluation team leader may assign other qualified personnel to assist in accomplishing the functions examination and/or the objective and subjective tests performed during an evaluation when required.

(1) Objective tests provide a basis for measuring and evaluating FFS performance and determining compliance with the requirements of this part.

(2) Subjective tests provide a basis for:

(a) Evaluating the capability of the FFS to perform over a typical utilization period;

(b) Determining that the FFS satisfactorily simulates each required task;

(c) Verifying correct operation of the FFS controls, instruments, and systems; and

(d) Demonstrating compliance with the requirements of this part.

p. The tolerances for the test parameters listed in Attachment 2 of this appendix reflect the range of tolerances acceptable to the NSPM for FFS validation and are not to be confused with design tolerances specified for FFS manufacture. In making decisions regarding tests and test results, the NSPM relies on the use of operational and engineering judgment in the application of data (including consideration of the way in which the flight test was flown and the way the data was gathered and applied), data presentations, and the applicable tolerances for each test.

q. In addition to the scheduled continuing qualification evaluation, each FFS is subject to evaluations conducted by the NSPM at any time without prior notification to the sponsor. Such evaluations would be accomplished in a normal manner (i.e., requiring exclusive use of the FFS for the conduct of objective and subjective tests and an examination of functions) if the FFS is not being used for flight crewmember training, testing, or checking. However, if the FFS were being used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the FFS evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the FFS along with the student(s) and observing the operation of the FFS during the training, testing, or checking activities.

r. Problems with objective test results are handled as follows:

(1) If a problem with an objective test result is detected by the NSP evaluation team during an evaluation, the test may be repeated or the QTG may be amended.

(2) If it is determined that the results of an objective test do not support the level requested but do support a lower level, the NSPM may qualify the FFS at that lower level. For example, if a Level D evaluation is requested and the FFS fails to meet sound test tolerances, it could be qualified at Level C.

s. After an FFS is successfully evaluated, the NSPM issues a Statement of Qualification (SOQ) to the sponsor. The NSPM recommends the FFS to the TPAA, who will approve the FFS for use in a flight training program. The SOQ will be issued at the satisfactory conclusion of the initial or continuing qualification evaluation and will list the tasks for which the FFS is qualified, referencing the tasks described in Table A1B in Attachment 1 of this appendix. However, it is the sponsor's responsibility to obtain TPAA approval prior to using the FFS in an FAA-approved flight training program.

t. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within ten (10) working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made. A sponsor may schedule an evaluation date as early as 6 months in advance. However, there may be a delay of 45 days or more in rescheduling and completing the evaluation if the sponsor is unable to meet the scheduled date. See Attachment 4 of this appendix, Figure A4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation.

u. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in Attachment 2 of this appendix, FFS Objective Tests, Table A2A.

v. Contact the NSPM or visit the NSPM Web site for additional information regarding the preferred qualifications of pilots used to meet the requirements of §60.15(d).

w. Examples of the exclusions for which the FFS might not have been subjectively tested by the sponsor or the NSPM and for which qualification might not be sought or granted, as described in §60.15(g)(6), include windshear training and circling approaches.

END INFORMATION

## 12. ADDITIONAL QUALIFICATIONS FOR A CURRENTLY QUALIFIED FFS (§60.16)

BEGIN INFORMATION

No additional regulatory or informational material applies to §60.16, Additional Qualifications for a Currently Qualified FFS.

END INFORMATION

## 13. PREVIOUSLY QUALIFIED FFSS (§60.17)

BEGIN QPS REQUIREMENTS

a. In instances where a sponsor plans to remove an FFS from active status for a period of less than two years, the following procedures apply:

(1) The NSPM must be notified in writing and the notification must include an estimate of the period that the FFS will be inactive;

(2) Continuing Qualification evaluations will not be scheduled during the inactive period;

(3) The NSPM will remove the FFS from the list of qualified FSTDs on a mutually established date not later than the date on which the first missed continuing qualification evaluation would have been scheduled;

(4) Before the FFS is restored to qualified status, it must be evaluated by the NSPM. The evaluation content and the time required to accomplish the evaluation is based on the number of continuing qualification evaluations and sponsor-conducted quarterly inspections missed during the period of inactivity.

(5) The sponsor must notify the NSPM of any changes to the original scheduled time out of service;

b. Simulators qualified prior to May 30, 2008, are not required to meet the general simulation requirements, the objective test requirements or the subjective test requirements of attachments 1, 2, and 3 of this appendix as long as the simulator continues to meet the test requirements contained in the MQTG developed under the original qualification basis.

c. After May 30, 2009, each visual scene or airport model beyond the minimum required for the FFS qualification level that is installed in and available for use in a qualified FFS must meet the requirements described in attachment 3 of this appendix.

d. Simulators qualified prior to May 30, 2008, may be updated. If an evaluation is deemed appropriate or necessary by the NSPM after such an update, the evaluation will not require an evaluation to standards beyond those against which the simulator was originally qualified.

END QPS REQUIREMENTS

BEGIN INFORMATION

e. Other certificate holders or persons desiring to use an FFS may contract with FFS sponsors to use FFSs previously qualified at a particular level for an airplane type and approved for use within an FAA-approved flight training program. Such FFSs are not required to undergo an additional qualification process, except as described in §60.16.

f. Each FFS user must obtain approval from the appropriate TPAA to use any FFS in an FAA-approved flight training program.

g. The intent of the requirement listed in §60.17(b), for each FFS to have a SOQ within 6 years, is to have the availability of that statement (including the configuration list and the limitations to authorizations) to provide a complete picture of the FFS inventory regulated by the FAA. The issuance of the statement will not require any additional evaluation or require any adjustment to the evaluation basis for the FFS.

h. Downgrading of an FFS is a permanent change in qualification level and will necessitate the issuance of a revised SOQ to reflect the revised qualification level, as appropriate. If a temporary restriction is placed on an FFS because of a missing, malfunctioning, or inoperative component or ongoing repairs, the restriction is not a permanent change in qualification level. Instead, the restriction is temporary and is removed when the reason for the restriction has been resolved.

i. The NSPM will determine the evaluation criteria for an FFS that has been removed from active status. The criteria will be based on the number of continuing qualification evaluations and quarterly inspections missed during the period of inactivity. For example, if the FFS were out of service for a 1 year period, it would be necessary to complete the entire QTG, since all of the quarterly evaluations would have been missed. The NSPM will also consider how the FFS was stored, whether parts were removed from the FFS and whether the FFS was disassembled.

j. The FFS will normally be requalified using the FAA-approved MQTG and the criteria that was in effect prior to its removal from qualification. However, inactive periods of 2 years or more will require requalification under the standards in effect and current at the time of requalification.

END INFORMATION

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14. INSPECTION, CONTINUING QUALIFICATION EVALUATION, AND MAINTENANCE REQUIREMENTS (§60.19)

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BEGIN QPS REQUIREMENTS

a. The sponsor must conduct a minimum of four evenly spaced inspections throughout the year. The objective test sequence and content of each inspection must be developed by the sponsor and must be acceptable to the NSPM.

b. The description of the functional preflight check must be contained in the sponsor's QMS.

c. Record ''functional preflight'' in the FFS discrepancy log book or other acceptable location, including any item found to be missing, malfunctioning, or inoperative.

d. During the continuing qualification evaluation conducted by the NSPM, the sponsor must also provide a person knowledgeable about the operation of the aircraft and the operation of the FFS.

e. The NSPM will conduct continuing qualification evaluations every 12 months unless:

(1) The NSPM becomes aware of discrepancies or performance problems with the device that warrants more frequent evaluations; or

(2) The sponsor implements a QMS that justifies less frequent evaluations. However, in no case shall the frequency of a continuing qualification evaluation exceed 36 months.

END QPS REQUIREMENTS

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BEGIN INFORMATION

f. The sponsor's test sequence and the content of each quarterly inspection required in §60.19(a)(1) should include a balance and a mix from the objective test requirement areas listed as follows:

(1) Performance.
(2) Handling qualities.
(3) Motion system (where appropriate).
(4) Visual system (where appropriate).
(5) Sound system (where appropriate).
(6) Other FFS systems.

g. If the NSP evaluator plans to accomplish specific tests during a normal continuing qualification evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; but not less than 72 hours. Examples of such tests include latencies, control dynamics, sounds and vibrations, motion, and/or some visual system tests.

h. The continuing qualification evaluations, described in §60.19(b), will normally require 4 hours of FFS time. However, flexibility is necessary to address abnormal situations or situations involving aircraft with additional levels of complexity (e.g., computer controlled aircraft). The sponsor should anticipate that some tests may require additional time. The continuing qualification evaluations will consist of the following:

(1) Review of the results of the quarterly inspections conducted by the sponsor since

the last scheduled continuing qualification evaluation.

(2) A selection of approximately 8 to 15 objective tests from the MQTG that provide an adequate opportunity to evaluate the performance of the FFS. The tests chosen will be performed either automatically or manually and should be able to be conducted within approximately one-third (⅓) of the allotted FFS time.

(3) A subjective evaluation of the FFS to perform a representative sampling of the tasks set out in attachment 3 of this appendix. This portion of the evaluation should take approximately two-thirds (⅔) of the allotted FFS time.

(4) An examination of the functions of the FFS may include the motion system, visual system, sound system, instructor operating station, and the normal functions and simulated malfunctions of the airplane systems. This examination is normally accomplished simultaneously with the subjective evaluation requirements.

END INFORMATION

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15. LOGGING FFS DISCREPANCIES (§ 60.20)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.20. Logging FFS Discrepancies.

END INFORMATION

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16. INTERIM QUALIFICATION OF FFSS FOR NEW AIRPLANE TYPES OR MODELS (§ 60.21)

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BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.21, Interim Qualification of FFSs for New Airplane Types or Models.

END INFORMATION

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17. MODIFICATIONS TO FFSS (§ 60.23)

BEGIN QPS REQUIREMENTS

a. The notification described in § 60.23(c)(2) must include a complete description of the planned modification, with a description of the operational and engineering effect the proposed modification will have on the operation of the FFS and the results that are expected with the modification incorporated.

b. Prior to using the modified FFS:

(1) All the applicable objective tests completed with the modification incorporated, including any necessary updates to the MQTG (e.g., accomplishment of FSTD Directives) must be acceptable to the NSPM; and

(2) The sponsor must provide the NSPM with a statement signed by the MR that the factors listed in § 60.15(b) are addressed by the appropriate personnel as described in that section.

END QPS REQUIREMENTS

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BEGIN INFORMATION

FSTD Directives are considered modifications of an FFS. See Attachment 4 of this appendix for a sample index of effective FSTD Directives. See Attachment 6 of this appendix for a list of all effective FSTD Directives applicable to Airplane FFSs.

END INFORMATION

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18. OPERATION WITH MISSING, MALFUNCTIONING, OR INOPERATIVE COMPONENTS (§ 60.25)

BEGIN INFORMATION

a. The sponsor's responsibility with respect to § 60.25(a) is satisfied when the sponsor fairly and accurately advises the user of the current status of an FFS, including any missing, malfunctioning, or inoperative (MMI) component(s).

b. It is the responsibility of the instructor, check airman, or representative of the administrator conducting training, testing, or checking to exercise reasonable and prudent judgment to determine if any MMI component is necessary for the satisfactory completion of a specific maneuver, procedure, or task.

c. If the 29th or 30th day of the 30-day period described in § 60.25(b) is on a Saturday, a Sunday, or a holiday, the FAA will extend the deadline until the next business day.

d. In accordance with the authorization described in § 60.25(b), the sponsor may develop a discrepancy prioritizing system to accomplish repairs based on the level of impact on the capability of the FFS. Repairs having a larger impact on FFS capability to provide the required training, evaluation, or flight experience will have a higher priority for repair or replacement.

END INFORMATION

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19. AUTOMATIC LOSS OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§ 60.27)

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BEGIN INFORMATION

If the sponsor provides a plan for how the FFS will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FFS is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing required for requalification.

END INFORMATION

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20. OTHER LOSSES OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§ 60.29)

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BEGIN INFORMATION

If the sponsor provides a plan for how the FFS will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FFS is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing required for requalification.

END INFORMATION

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21. RECORDKEEPING AND REPORTING (§ 60.31)

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BEGIN QPS REQUIREMENTS

a. FFS modifications can include hardware or software changes. For FFS modifications involving software programming changes, the record required by § 60.31(a)(2) must consist of the name of the aircraft system software, aerodynamic model, or engine model change, the date of the change, a summary of the change, and the reason for the change.

b. If a coded form for record keeping is used, it must provide for the preservation and retrieval of information with appropriate security or controls to prevent the inappropriate alteration of such records after the fact.

END QPS REQUIREMENTS

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22. APPLICATIONS, LOGBOOKS, REPORTS, AND RECORDS: FRAUD, FALSIFICATION, OR INCORRECT STATEMENTS (§ 60.33)

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BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

23. SPECIFIC FFS COMPLIANCE REQUIREMENTS (§ 60.35)

No additional regulatory or informational material applies to § 60.35, Specific FFS Compliance Requirements.

24. [RESERVED]

25. FFS QUALIFICATION ON THE BASIS OF A BILATERAL AVIATION SAFETY AGREEMENT (BASA) (§ 60.37)

No additional regulatory or informational material applies to § 60.37, FFS Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).

END INFORMATION

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## ATTACHMENT 1 TO APPENDIX A TO PART 60—GENERAL SIMULATOR REQUIREMENTS

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Certain requirements included in this appendix must be supported with an SOC as defined in Appendix F, which may include objective and subjective tests. The requirements for SOCs are indicated in the ''General Simulator Requirements'' column in Table A1A of this appendix.

b. Table A1A describes the requirements for the indicated level of FFS. Many devices include operational systems or functions that exceed the requirements outlined in this section. However, all systems will be tested and evaluated in accordance with this appendix to ensure proper operation.

END QPS REQUIREMENTS

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BEGIN INFORMATION

2. DISCUSSION

a. This attachment describes the general simulator requirements for qualifying an airplane FFS. The sponsor should also consult the objective tests in Attachment 2 of this appendix and the examination of functions and subjective tests listed in Attachment 3 of this appendix to determine the complete requirements for a specific level simulator.

b. The material contained in this attachment is divided into the following categories:

(1) General flight deck configuration.

(2) Simulator programming.

(3) Equipment operation.

(4) Equipment and facilities for instructor/evaluator functions.

(5) Motion system.

(6) Visual system.

(7) Sound system.

c. Table A1A provides the standards for the General Simulator Requirements.

d. Table A1B provides the tasks that the sponsor will examine to determine whether the FFS satisfactorily meets the requirements for flight crew training, testing, and experience, and provides the tasks for which the simulator may be qualified.

e. Table A1C provides the functions that an instructor/check airman must be able to control in the simulator.

f. It is not required that all of the tasks that appear on the List of Qualified Tasks (part of the SOQ) be accomplished during the initial or continuing qualification evaluation.

END INFORMATION

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| **1. General Flight deck Configuration.** | | | | | | |
| 1.a. ..... | The simulator must have a flight deck that is a replica of the airplane simulated with controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the airplane. The direction of movement of controls and switches must be identical to the airplane. Pilot seats must allow the occupant to achieve the design ''eye position'' established for the airplane being simulated. Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Additional equipment such as fire axes, extinguishers, and spare light bulbs must be available in the FFS but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette. | X | X | X | X | For simulator purposes, the flight deck consists of all that space forward of a cross section of the flight deck at the most extreme aft setting of the pilots' seats, including additional required crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, and aircraft document pouches are not considered essential and may be omitted. |
| 1.b. ..... | Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate. | X | X | X | X | |
| **2. Programming.** | | | | | | |
| 2.a. ..... | A flight dynamics model that accounts for various combinations of drag and thrust normally encountered in flight must correspond to actual flight conditions, including the effect of change in airplane attitude, thrust, drag, altitude, temperature, gross weight, moments of inertia, center of gravity location, and configuration.<br>An SOC is required | X | X | X | X | |
| 2.b. ..... | The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought.<br>An SOC is required. | X | X | X | X | |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 2.c. ..... | Surface operations must be represented to the extent that allows turns within the confines of the runway and adequate controls on the landing and roll-out from a crosswind approach to a landing. | X | | | | |
| 2.d. ..... | Ground handling and aerodynamic programming must include the following: | | | | | |
| 2.d.1. ..... | Ground effect ..... | | X | X | X | Ground effect includes modeling that accounts for roundout, flare, touchdown, lift, drag, pitching moment, trim, and power while in ground effect. |
| 2.d.2. ..... | Ground reaction ..... | | X | X | X | Ground reaction includes modeling that accounts for strut deflections, tire friction, and side forces. This is the reaction of the airplane upon contact with the runway during landing, and may differ with changes in factors such as gross weight, airspeed, or rate of descent on touchdown. |
| 2.d.3. ..... | Ground handling characteristics, including aerodynamic and ground reaction modeling including steering inputs, operations with crosswind, braking, thrust reversing, deceleration, and turning radius. | | X | X | X | |
| 2.e. ..... | If the aircraft being simulated is one of the aircraft listed in §121.358, Low-altitude windshear system equipment requirements, the simulator must employ windshear models that provide training for recognition of windshear phenomena and the execution of recovery procedures. Models must be available to the instructor/evaluator for the following critical phases of flight:<br>(1) Prior to takeoff rotation.<br>(2) At liftoff.<br>(3) During initial climb.<br>(4) On final approach, below 500 ft AGL.<br>The QTG must reference the FAA Windshear Training Aid or present alternate airplane related data, including the implementation method(s) used. If the alternate method is selected, wind models from the Royal Aerospace Establishment (RAE), the Joint Airport Weather Studies (JAWS) Project and other recognized sources may be implemented, but must be supported and properly referenced in the QTG. Only those simulators meeting these requirements may be used to satisfy the training requirements of part 121 pertaining to a certificate holder's approved low-altitude windshear flight training program as described in §121.409. | | | X | X | If desired, Level A and B simulators may qualify for windshear training by meeting these standards; see Attachment 5 of this appendix. Windshear models may consist of independent variable winds in multiple simultaneous components. The FAA Windshear Training Aid presents one acceptable means of compliance with simulator wind model requirements. |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 2.f. ..... | The simulator must provide for manual and automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests as prescribed in Attachment 2 of this appendix.<br>An SOC is required. | | | X | X | Automatic ''flagging'' of out-of-tolerance situations is encouraged. |
| 2.g. ..... | Relative responses of the motion system, visual system, and flight deck instruments, measured by latency tests or transport delay tests. Motion onset should occur before the start of the visual scene change (the start of the scan of the first video field containing different information) but must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. Test results must be within the following limits: | | | | | The intent is to verify that the simulator provides instrument, motion, and visual cues that are, within the stated time delays, like the airplane responses. For airplane response, acceleration in the appropriate, corresponding rotational axis is preferred. |
| 2.g.1. ..... | 300 milliseconds of the airplane response. | X | X | | | |
| 2.g.2. ..... | 150 milliseconds of the airplane response. | | | X | X | |
| 2.h. ..... | The simulator must accurately reproduce the following runway conditions:<br>(1) Dry.<br>(2) Wet.<br>(3) Icy.<br>(4) Patchy Wet.<br>(5) Patchy Icy.<br>(6) Wet on Rubber Residue in Touchdown Zone.<br>An SOC is required. | | | X | X | |
| 2.i. ..... | The simulator must simulate:<br>(1) brake and tire failure dynamics, including antiskid failure.<br>(2) decreased brake efficiency due to high brake temperatures, if applicable.<br>An SOC is required. | | | X | X | Simulator pitch, side loading, and directional control characteristics should be representative of the airplane. |
| 2.j. ..... | The simulator must replicate the effects of airframe and engine icing. | | | X | X | |
| 2.k. ..... | The aerodynamic modeling in the simulator must include:<br>(1) Low-altitude level-flight ground effect;<br>(2) Mach effect at high altitude; .....<br>(3) Normal and reverse dynamic thrust effect on control surfaces;<br>(4) Aeroelastic representations; and<br>(5) Nonlinearities due to sideslip.<br>An SOC is required and must include references to computations of aeroelastic representations and of nonlinearities due to sideslip. | | | | X | See Attachment 2 of this appendix, paragraph 5, for further information on ground effect. |
| 2.l. ..... | The simulator must have aerodynamic and ground reaction modeling for the effects of reverse thrust on directional control, if applicable.<br>An SOC is required. | | X | X | X | |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| **3. Equipment Operation.** | | | | | | |
| 3.a. ..... | All relevant instrument indications involved in the simulation of the airplane must automatically respond to control movement or external disturbances to the simulated airplane; e.g., turbulence or windshear. Numerical values must be presented in the appropriate units. | X | X | X | X | |
| 3.b. ..... | Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the airplane. | X | X | X | X | See Attachment 3 of this appendix for further information regarding long-range navigation equipment. |
| 3.c. ..... | Simulated airplane systems must operate as the airplane systems operate under normal, abnormal, and emergency operating conditions on the ground and in flight. | X | X | X | X | |
| 3.d. ..... | The simulator must provide pilot controls with control forces and control travel that correspond to the simulated airplane. The simulator must also react in the same manner as in the airplane under the same flight conditions. | X | X | X | X | |
| 3.e. ..... | Simulator control feel dynamics must replicate the airplane. This must be determined by comparing a recording of the control feel dynamics of the simulator to airplane measurements. For initial and upgrade qualification evaluations, the control dynamic characteristics must be measured and recorded directly from the flight deck controls, and must be accomplished in takeoff, cruise, and landing flight conditions and configurations. | | | X | X | |
| **4. Instructor or Evaluator Facilities.** | | | | | | |
| 4.a. ..... | In addition to the flight crewmember stations, the simulator must have at least two suitable seats for the instructor/check airman and FAA inspector. These seats must provide adequate vision to the pilot's panel and forward windows. All seats other than flight crew seats need not represent those found in the airplane, but must be adequately secured to the floor and equipped with similar positive restraint devices. | X | X | X | X | The NSPM will consider alternatives to this standard for additional seats based on unique flight deck configurations. |
| 4.b. ..... | The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions into the simulated airplane systems as described in the sponsor's FAA-approved training program; or as described in the relevant operating manual as appropriate. | X | X | X | X | |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 4.c. ..... | The simulator must have instructor controls for all environmental effects expected to be available at the IOS; e.g., clouds, visibility, icing, precipitation, temperature, storm cells, and wind speed and direction. | X | X | X | X | |
| 4.d. ..... | The simulator must provide the instructor or evaluator the ability to present ground and air hazards. | | | X | X | For example, another airplane crossing the active runway or converging airborne traffic. |
| **5. Motion System.** | | | | | | |
| 5.a. ..... | The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in an airplane. | X | X | X | X | For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated airplane. |
| 5.b. ..... | The simulator must have a motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave).<br>An SOC is required. | X | X | | | |
| 5.c. ..... | The simulator must have a motion (force cueing) system that produces cues at least equivalent to those of a six-degrees-of-freedom, synergistic platform motion system (i.e., pitch, roll, yaw, heave, sway, and surge).<br>An SOC is required. | | | X | X | |
| 5.d. ..... | The simulator must provide for the recording of the motion system response time.<br>An SOC is required. | X | X | X | X | |
| 5.e. ..... | The simulator must provide motion effects programming to include: | | X | X | X | |
| | (1) Thrust effect with brakes set.<br>(2) Runway rumble, oleo deflections, effects of ground speed, uneven runway, centerline lights, and taxiway characteristics.<br>(3) Buffets on the ground due to spoiler/speedbrake extension and thrust reversal.<br>(4) Bumps associated with the landing gear.<br>(5 O='xl') Buffet during extension and retraction of landing gear..<br>(6) Buffet in the air due to flap and spoiler/speedbrake extension.<br>(7) Approach-to-Stall buffet.<br>(8) Representative touchdown cues for main and nose gear.<br>(9) Nosewheel scuffing, if applicable.<br>(10) Mach and maneuver buffet. | | | | | |
| 5.f. ..... | The simulator must provide characteristic motion vibrations that result from operation of the airplane if the vibration marks an event or airplane state that can be sensed in the flight deck. | | | | X | The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to airplane data. |
| **6. Visual System.** | | | | | | |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 6.a. ..... | The simulator must have a visual system providing an out-of-the-flight deck view. | X | X | X | X | |
| 6.b. ..... | The simulator must provide a continuous collimated field-of-view of at least 45° horizontally and 30° vertically per pilot seat or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. Both pilot seat visual systems must be operable simultaneously. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage.<br>An SOC is required and must explain the system geometry measurements including system linearity and field-of-view. | X | X | | | Additional field-of-view capability may be added at the sponsor's discretion provided the minimum fields of view are retained. |
| 6.c. ..... | (Reserved). | | | | | |
| 6.d. ..... | The simulator must provide a continuous collimated visual field-of-view of at least 176° horizontally and 36° vertically or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage.<br>An SOC is required and must explain the system geometry measurements including system linearity and field-of-view. | | | X | X | The horizontal field-of-view is traditionally described as a 180° field-of-view. However, the field-of-view is technically no less than 176°. Additional field-of-view capability may be added at the sponsor's discretion provided the minimum fields-of-view are retained. |
| 6.e. ..... | The visual system must be free from optical discontinuities and artifacts that create non-realistic cues. | X | X | X | X | Non-realistic cues might include image ''swimming'' and image ''roll-off,'' that may lead a pilot to make incorrect assessments of speed, acceleration, or situational awareness. |
| 6.f. ..... | The simulator must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights. | X | X | X | X | |
| 6.g. ..... | The simulator must have instructor controls for the following:<br>(1) Visibility in statute miles (km) and runway visual range (RVR) in ft. (m).<br>(2) Airport selection.<br>(3) Airport lighting. | X | X | X | X | |
| 6.h. ..... | The simulator must provide visual system compatibility with dynamic response programming. | X | X | X | X | |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 6.i. ..... | The simulator must show that the segment of the ground visible from the simulator flight deck is the same as from the airplane flight deck (within established tolerances) when at the correct airspeed, in the landing configuration, at the appropriate height above the touchdown zone, and with appropriate visibility. | X | X | X | X | This will show the modeling accuracy of RVR, glideslope, and localizer for a given weight, configuration, and speed within the airplane's operational envelope for a normal approach and landing. |
| 6.j. ..... | The simulator must provide visual cues necessary to assess sink rates (provide depth perception) during takeoffs and landings, to include:<br>(1) Surface on runways, taxiways, and ramps.<br>(2) Terrain features. | | X | X | X | |
| 6.k. ..... | The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude. | X | X | X | X | Visual attitude vs. simulator attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator. |
| 6.l. ..... | The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity.<br>An SOC is required. | | | X | X | |
| 6.m. ..... | The simulator must be capable of producing at least 10 levels of occulting. | | | X | X | |
| 6.n. ..... | Night Visual Scenes. When used in training, testing, or checking activities, the simulator must provide night visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights. | X | X | X | X | |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 6.o. ..... | Dusk (or Twilight) Visual Scenes. When used in training, testing, or checking activities, the simulator must provide dusk (or twilight) visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Dusk (or twilight) scenes, as a minimum, must provide full color presentations of reduced ambient intensity, sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage, to conduct a visual approach, landing and airport movement (taxi). Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights. If provided, directional horizon lighting must have correct orientation and be consistent with surface shading effects. Total night or dusk (twilight) scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 15,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects.<br>An SOC is required. | | | X | X | |
| 6.p. ..... | Daylight Visual Scenes. The simulator must provide daylight visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Any ambient lighting must not ''washout'' the displayed visual scene. Total daylight scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 6,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects. The visual display must be free of apparent and distracting quantization and other distracting visual effects while the simulator is in motion.<br>An SOC is required. | | | X | X | |
| 6.q. ..... | The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots. | | | X | X | For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features. |

TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| QPS requirements | | Simulator levels | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General simulator requirements | A | B | C | D | Notes |
| 6.r. ..... | The simulator must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff and during approach and landing. Representations need only be presented at and below an altitude of 2,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport. | | | X | X | |
| 6.s. ..... | The simulator must present visual scenes of wet and snow-covered runways, including runway lighting reflections for wet conditions, partially obscured lights for snow conditions, or suitable alternative effects. | | | X | X | |
| 6.t. ..... | The simulator must present realistic color and directionality of all airport lighting. | | | X | X | |
| **7. Sound System.** | | | | | | |
| 7.a. ..... | The simulator must provide flight deck sounds that result from pilot actions that correspond to those that occur in the airplane. | X | X | X | X | |
| 7.b. ..... | The volume control must have an indication of sound level setting which meets all qualification requirements.. | X | X | X | X | |
| 7.c. ..... | The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant airplane noises perceptible to the pilot during normal and abnormal operations, and include the sound of a crash (when the simulator is landed in an unusual attitude or in excess of the structural gear limitations); normal engine and thrust reversal sounds; and the sounds of flap, gear, and spoiler extension and retraction.<br>An SOC is required. | | | X | X | |
| 7.d. ..... | The simulator must provide realistic amplitude and frequency of flight deck noises and sounds. Simulator performance must be recorded, compared to amplitude and frequency of the same sounds recorded in the airplane, and be made a part of the QTG. | | | | X | |

TABLE A1B—TABLE OF TASKS VS. SIMULATOR LEVEL

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification. | Simulator levels | | | | Notes |
| | | A | B | C | D | |
| **1. Preflight Procedures** | | | | | | |
| 1.a. ..... | Preflight Inspection (flight deck only) ..... | X | X | X | X | |
| 1.b. ..... | Engine Start ..... | X | X | X | X | |

TABLE A1B—TABLE OF TASKS VS. SIMULATOR LEVEL—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification. | Simulator levels | | | | Notes |
| | | A | B | C | D | |
| 1.c. ..... | Taxiing ..... | | R | X | X | |
| 1.d. ..... | Pre-takeoff Checks ..... | X | X | X | X | |
| **2. Takeoff and Departure Phase** | | | | | | |
| 2.a. ..... | Normal and Crosswind Takeoff | | R | X | X | |
| 2.b. ..... | Instrument Takeoff ..... | X | X | X | X | |
| 2.c. ..... | Engine Failure During Takeoff ..... | A | X | X | X | |
| 2.d. ..... | Rejected Takeoff ..... | X | X | X | X | |
| 2.e. ..... | Departure Procedure ..... | X | X | X | X | |
| **3. Inflight Maneuvers** | | | | | | |
| 3.a. ..... | Steep Turns ..... | X | X | X | X | |
| 3.b. ..... | Approaches to Stalls ..... | X | X | X | X | |
| 3.c. ..... | Engine Failure—Multiengine Airplane ..... | X | X | X | X | |
| 3.d. ..... | Engine Failure—Single-Engine Airplane ..... | X | X | X | X | |
| 3.e. ..... | Specific Flight Characteristics incorporated into the user's FAA approved flight training program. | A | A | A | A | |
| 3.f. ..... | Recovery From Unusual Attitudes ..... | X | X | X | X | Within the normal flight envelope supported by applicable simulation validation data. |
| **4. Instrument Procedures** | | | | | | |
| 4.a. ..... | Standard Terminal Arrival/Flight Management System Arrivals Procedures. | X | X | X | X | |
| 4.b. ..... | Holding ..... | X | X | X | X | |
| 4.c. ..... | Precision Instrument. | | | | | |
| 4.c.1. ..... | All Engines Operating ..... | X | X | X | X | e.g., Autopilot, Manual (Flt. Dir. Assisted), Manual (Raw Data). |
| 4.c.2. ..... | One Engine Inoperative ..... | X | X | X | X | e.g., Manual (Flt. Dir. Assisted), Manual (Raw Data). |
| 4.d. ..... | Non-Precision Instrument Approach ..... | X | X | X | X | e.g., NDB, VOR, VOR/DME, VOR/TAC, RNAV, LOC, LOC/BC, ADF, and SDF. |
| 4.e. ..... | Circling Approach ..... | X | X | X | X | Specific authorization required. |
| 4.f. ..... | Missed Approach. | | | | | |
| 4.f.1. ..... | Normal ..... | X | X | X | X | |
| 4.f.2. ..... | One Engine Inoperative ..... | X | X | X | X | |
| **5. Landings and Approaches to Landings** | | | | | | |
| 5.a. ..... | Normal and Crosswind Approaches and Landings ..... | | R | X | X | |
| 5.b. ..... | Landing From a Precision/Non-Precision Approach ..... | | R | X | X | |

TABLE A1B—TABLE OF TASKS VS. SIMULATOR LEVEL—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification. | Simulator levels | | | | Notes |
| | | A | B | C | D | |
| 5.c. ..... | Approach and Landing with (Simulated) Engine Failure—Multiengine Airplane. | .... | R | X | X | |
| 5.d. ..... | Landing From Circling Approach ..... | | R | X | X | |
| 5.e. ..... | Rejected Landing ..... | X | X | X | X | |
| 5.f. ..... | Landing From a No Flap or a Nonstandard Flap Configuration Approach. | | R | X | X | |
| **6. Normal and Abnormal Procedures** | | | | | | |
| 6.a. ..... | Engine (including shutdown and restart) ..... | X | X | X | X | |
| 6.b. ..... | Fuel System ..... | X | X | X | X | |
| 6.c. ..... | Electrical System ..... | X | X | X | X | |
| 6.d. ..... | Hydraulic System ..... | X | X | X | X | |
| 6.e. ..... | Environmental and Pressurization Systems ..... | X | X | X | X | |
| 6.f. ..... | Fire Detection and Extinguisher Systems ..... | X | X | X | X | |
| 6.g. ..... | Navigation and Avionics Systems ..... | X | X | X | X | |
| 6.h. ..... | Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems. | X | X | X | X | |
| 6.i. ..... | Flight Control Systems ..... | X | X | X | X | |
| 6.j. ..... | Anti-ice and Deice Systems ..... | X | X | X | X | |
| 6.k. ..... | Aircraft and Personal Emergency Equipment ..... | X | X | X | X | |
| **7. Emergency Procedures** | | | | | | |
| 7.a. ..... | Emergency Descent (Max. Rate) ..... | X | X | X | X | |
| 7.b. ..... | Inflight Fire and Smoke Removal ..... | X | X | X | X | |
| 7.c. ..... | Rapid Decompression ..... | X | X | X | X | |
| 7.d. ..... | Emergency Evacuation ..... | X | X | X | X | |
| **8. Postflight Procedures** | | | | | | |
| 8.a. ..... | After-Landing Procedures ..... | X | X | X | X | |
| 8.b. ..... | Parking and Securing ..... | X | X | X | X | |

"A"—indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FSTD and is working properly.
"R"—indicates that the simulator may be qualified for this task for continuing qualification training.
"X"—indicates that the simulator must be able to perform this task for this level of qualification.

TABLE A1C—TABLE OF SIMULATOR SYSTEM TASKS

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification. | Simulator levels | | | | Notes |
| | | A | B | C | D | |
| **1. Instructor Operating Station (IOS), as appropriate** | | | | | | |
| 1.a. ..... | Power switch(es) ..... | X | X | X | X | |

TABLE A1C—TABLE OF SIMULATOR SYSTEM TASKS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification. | Simulator levels | | | | Notes |
| | | A | B | C | D | |
| 1.b. ..... | Airplane conditions ..... | X | X | X | X | e.g., GW, CG, Fuel loading and Systems. |
| 1.c. ..... | Airports/Runways ..... | X | X | X | X | e.g., Selection, Surface, Presets, Lighting controls. |
| 1.d. ..... | Environmental controls ..... | X | X | X | X | e.g., Clouds, Visibility, RVR, Temp, Wind, Ice, Snow, Rain, and Windshear. |
| 1.e. ..... | Airplane system malfunctions (Insertion/deletion) ..... | X | X | X | X | |
| 1.f. ..... | Locks, Freezes, and Repositioning ..... | X | X | X | X | |
| **2. Sound Controls** | | | | | | |
| 2.a. ..... | On/off/adjustment ..... | X | X | X | X | |
| **3. Motion/Control Loading System** | | | | | | |
| 3.a. ..... | On/off/emergency stop ..... | X | X | X | X | |
| **4. Observer Seats/Stations** | | | | | | |
| 4.a. ..... | Position/Adjustment/Positive restraint system ..... | X | X | X | X | |

ATTACHMENT 2 TO APPENDIX A TO PART 60—FFS OBJECTIVE TESTS

TABLE OF CONTENTS


| Paragraph No. | Title |
|---|---|
| 1. ..... | Introduction. |
| 2. ..... | Test Requirements. |
| | Table A2A, Objective Tests. |
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| 10. ..... | [Reserved] |
| 11. ..... | Validation Test Tolerances. |
| 12. ..... | Validation Data Roadmap. |
| 13. ..... | Acceptance Guidelines for Alternative Engines Data. |
| 14. ..... | Acceptance Guidelines for Alternative Avionics (Flight-Related Computers and Controllers). |
| 15. ..... | Transport Delay Testing. |
| 16. ..... | Continuing Qualification Evaluations—Validation Test Data Presentation. |
| 17. ..... | Alternative Data Sources, Procedures, and Instrumentation: Level A and Level B Simulators Only. |


BEGIN INFORMATION

1. INTRODUCTION

a. For the purposes of this attachment, the flight conditions specified in the Flight Conditions Column of Table A2A of this appendix, are defined as follows:

(1) Ground—on ground, independent of airplane configuration;

(2) Take-off—gear down with flaps/slats in any certified takeoff position;

(3) First segment climb—gear down with flaps/slats in any certified takeoff position (normally not above 50 ft AGL);

(4) Second segment climb—gear up with flaps/slats in any certified takeoff position (normally between 50 ft and 400 ft AGL);

(5) Clean—flaps/slats retracted and gear up;

(6) Cruise—clean configuration at cruise altitude and airspeed;

(7) Approach—gear up or down with flaps/slats at any normal approach position as recommended by the airplane manufacturer; and

(8) Landing—gear down with flaps/slats in any certified landing position.

b. The format for numbering the objective tests in Appendix A, Attachment 2, Table A2A, and the objective tests in Appendix B, Attachment 2, Table B2A, is identical. However, each test required for FFSs is not necessarily required for FTDs. Also, each test required for FTDs is not necessarily required for FFSs. Therefore, when a test number (or series of numbers) is not required, the term ''Reserved'' is used in the table at that location. Following this numbering format provides a degree of commonality between the two tables and substantially reduces the potential for confusion when referring to objective test numbers for either FFSs or FTDs.

c. The reader is encouraged to review the Airplane Flight Simulator Evaluation Handbook, Volumes I and II, published by the Royal Aeronautical Society, London, UK, and AC 25–7, as amended, Flight Test Guide for Certification of Transport Category Airplanes, and AC 23–8, as amended, Flight Test Guide for Certification of Part 23 Airplanes, for references and examples regarding flight testing requirements and techniques.

d. If relevant winds are present in the objective data, the wind vector should be clearly noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for the test.

END INFORMATION

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BEGIN QPS REQUIREMENTS

2. TEST REQUIREMENTS

a. The ground and flight tests required for qualification are listed in Table A2A, FFS Objective Tests. Computer generated simulator test results must be provided for each test except where an alternative test is specifically authorized by the NSPM. If a flight condition or operating condition is required for the test but does not apply to the airplane being simulated or to the qualification level sought, it may be disregarded (e.g., an engine out missed approach for a single-engine airplane or a maneuver using reverse thrust for an airplane without reverse thrust capability). Each test result is compared against the validation data described in §60.13 and in this appendix. Although use of a driver program designed to automatically accomplish the tests is encouraged for all simulators and required for Level C and Level D simulators, it must be possible to conduct each test manually while recording all appropriate parameters. The results must be produced on an appropriate recording device acceptable to the NSPM and must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the validation data. Time histories are required unless otherwise indicated in Table A2A. All results must be labeled using the tolerances and units given.

b. Table A2A in this attachment sets out the test results required, including the parameters, tolerances, and flight conditions for simulator validation. Tolerances are provided for the listed tests because mathematical modeling and acquisition and development of reference data are often inexact. All tolerances listed in the following tables are applied to simulator performance. When two tolerance values are given for a parameter, the less restrictive may be used unless otherwise indicated. In those cases where a tolerance is expressed only as a percentage, the tolerance percentage applies to the maximum value of that parameter within its normal operating range as measured from the neutral or zero position unless otherwise indicated.

c. Certain tests included in this attachment must be supported with an SOC. In Table A2A, requirements for SOCs are indicated in the ''Test Details'' column.

d. When operational or engineering judgment is used in making assessments for flight test data applications for simulator validity, such judgment must not be limited to a single parameter. For example, data that exhibit rapid variations of the measured parameters may require interpolations or a ''best fit'' data selection. All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match simulator to airplane data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

e. It is not acceptable to program the FFS so that the mathematical modeling is correct only at the validation test points. Unless otherwise noted, simulator tests must represent airplane performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation. If a test is supported by airplane data at one extreme weight or CG, another test supported by airplane data at mid-conditions or as close as possible to the other extreme must be included. Certain tests that are relevant only at one extreme CG or weight condition need not be repeated at the other extreme. Tests of handling qualities must include validation of augmentation devices.

f. When comparing the parameters listed to those of the airplane, sufficient data must also be provided to verify the correct flight condition and airplane configuration

changes. For example, to show that control force is within the parameters for a static stability test, data to show the correct airspeed, power, thrust or torque, airplane configuration, altitude, and other appropriate datum identification parameters must also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the airplane, but airspeed, altitude, control input, airplane configuration, and other appropriate data must also be given. If comparing landing gear change dynamics, pitch, airspeed, and altitude may be used to establish a match to the airplane, but landing gear position must also be provided. All airspeed values must be properly annotated (e.g., indicated versus calibrated). In addition, the same variables must be used for comparison (e.g., compare inches to inches rather than inches to centimeters).

g. The QTG provided by the sponsor must clearly describe how the simulator will be set up and operated for each test. Each simulator subsystem may be tested independently, but overall integrated testing of the simulator must be accomplished to assure that the total simulator system meets the prescribed standards. A manual test procedure with explicit and detailed steps for completing each test must also be provided.

h. For previously qualified simulators, the tests and tolerances of this attachment may be used in subsequent continuing qualification evaluations for any given test if the sponsor has submitted a proposed MQTG revision to the NSPM and has received NSPM approval.

i. Simulators are evaluated and qualified with an engine model simulating the airplane data supplier's flight test engine. For qualification of alternative engine models (either variations of the flight test engines or other manufacturer's engines) additional tests with the alternative engine models may be required. This attachment contains guidelines for alternative engines.

j. For testing Computer Controlled Aircraft (CCA) simulators, or other highly augmented airplane simulators, flight test data is required for the Normal (N) and/or Non-normal (NN) control states, as indicated in this attachment. Where test results are independent of control state, Normal or Non-normal control data may be used. All tests in Table A2A require test results in the Normal control state unless specifically noted otherwise in the Test Details section following the CCA designation. The NSPM will determine what tests are appropriate for airplane simulation data. When making this determination, the NSPM may require other levels of control state degradation for specific airplane tests. Where Non-normal control states are required, test data must be provided for one or more Non-normal control states, and must include the least augmented state. Where applicable, flight test data must record Normal and Non-normal states for:

(1) Pilot controller deflections or electronically generated inputs, including location of input; and

(2) Flight control surface positions unless test results are not affected by, or are independent of, surface positions.

k. Tests of handling qualities must include validation of augmentation devices. FFSs for highly augmented airplanes will be validated both in the unaugmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. Requirements for testing will be mutually agreed to between the sponsor and the NSPM on a case-by-case basis.

l. Some tests will not be required for airplanes using airplane hardware in the simulator flight deck (e.g., ''side stick controller''). These exceptions are noted in Section 2 ''Handling Qualities'' in Table A2A of this attachment. However, in these cases, the sponsor must provide a statement that the airplane hardware meets the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

m. For objective test purposes, see Appendix F of this part for the definitions of ''Near maximum,'' ''Light,'' and ''Medium'' gross weight.

END QPS REQUIREMENTS

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BEGIN INFORMATION

n. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot tests'' results in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition should exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

o. For references on basic operating weight, see AC 120–27, ''Aircraft Weight and Balance;'' and FAA–H–8083–1, ''Aircraft Weight and Balance Handbook.''

END INFORMATION

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TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| **1. Performance.** | | | | | | | | | |
| 1.a. ..... | Taxi. | | | | | | | | |
| 1.a.1. ..... | Minimum Radius Turn .... | ±3 ft (0.9m) or 20% of airplane turn radius. | Ground ..... | Record both Main and Nose gear turning radius. This test is to be accomplished without the use of brakes and only minimum thrust, except for airplanes requiring asymmetric thrust or braking to turn. | | X | X | X | |
| 1.a.2 ..... | Rate of Turn vs. Nosewheel Steering Angle (NWA). | ±10% or ±2°/sec. turn rate .. | Ground ..... | Record a minimum of two speeds, greater than minimum turning radius speed, with a spread of at least 5 knots groundspeed, in normal taxi speed conditions. | | X | X | X | |
| 1.b. ..... | Takeoff. | | | All commonly used takeoff flap settings are to be demonstrated at least once in the tests for minimum unstick (1.b.3.), normal takeoff (1.b.4.), critical engine failure on takeoff (1.b.5.), or crosswind takeoff (1.b.6.). | | | | | |
| 1.b.1. ..... | Ground Acceleration Time and Distance. | ±5% time and distance or ±5% time and ±200 ft (61 m) of distance. | Takeoff ..... | Record acceleration time and distance for a minimum of 80% of the time from brake release to $V_R$.<br>Preliminary aircraft certification data may be used. | X | X | X | X | May be combined with normal takeoff (1.b.4.) or rejected takeoff (1.b.7.). Plotted data should be shown using appropriate scales for each portion of the maneuver. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.b.2. ..... | Minimum Control Speed – ground ($V_{mcg}$) using aerodynamic controls only (per applicable airworthiness standard) or alternative low speed engine inoperative test to demonstrate ground control characteristics. | ±25% of maximum airplane lateral deviation or ±5 ft (1.5 m). Additionally, for those simulators of airplanes with reversible flight control systems: Rudder pedal force; ±10% or ±5 lb (2.2 daN). | Takeoff ..... | Engine failure speed must be within ±1 knot of airplane engine failure speed. Engine thrust decay must be that resulting from the mathematical model for the engine variant applicable to the FFS under test. If the modeled engine is not the same as the airplane manufacturer's flight test engine, a further test may be run with the same initial conditions using the thrust from the flight test data as the driving parameter. | X | | | | If a $V_{mcg}$ test is not available an acceptable alternative is a flight test snap engine deceleration to idle at a speed between $V_1$ and $V_1$ – 10 knots, followed by control of heading using aerodynamic control only. Recovery should be achieved with the main gear on the ground. To ensure only aerodynamic control is used, nosewheel steering should be disabled (i.e., castored) or the nosewheel held slightly off the ground. |
| 1.b.3. ..... | Minimum Unstick Speed ($V_{mu}$) or equivalent test to demonstrate early rotation takeoff characteristics. | ±3 kts airspeed ±1.5° pitch angle. | Takeoff ..... | Record main landing gear strut compression or equivalent air/ground signal. Record from 10 kt before start of rotation until at least 5 seconds after the occurrence of main gear lift-off. | X | X | X | X | $V_{mu}$ is defined as the minimum speed at which the last main landing gear leaves the ground. Main landing gear strut compression or equivalent air/ground signal should be recorded. If a $V_{mu}$ test is not available, alternative acceptable flight tests are a constant high-attitude take-off run through main gear lift-off or an early rotation take-off. |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 1.b.4. ..... | Normal Takeoff ..... | ±3 kts airspeed ±1.5° pitch angle ±1.5° angle of attack ±20 ft (6 m) height. Additionally, for those simulators of airplanes with reversible flight control systems: Stick/Column Force; ±10% or ±5 lb (2.2 daN). | Takeoff ..... | Record takeoff profile from brake release to at least 200 ft (61 m) above ground level (AGL). If the airplane has more than one certificated takeoff configurations, a different configuration must be used for each weight. Data are required for a takeoff weight at near maximum takeoff weight with a mid-center of gravity and for a light takeoff weight with an aft center of gravity, as defined in Appendix F of this part. | X | X | X | X | This test may be used for ground acceleration time and distance (1.b.1.). Plotted data should be shown using appropriate scales for each portion of the maneuver. |
| 1.b.5. ..... | Critical Engine Failure on Takeoff. | ±3 kts airspeed ±1.5° pitch angle, ±1.5° angle of attack, ±20 ft (6 m) height, ±3° heading angle, ±2° bank angle, ±2° sideslip angle. Additionally, for those simulators of airplanes with reversible flight control systems: Stick/Column Force; ±10% or ±5 lb (2.2 daN)); Wheel Force; ±10% or ±3 lb (1.3 daN); and Rudder Pedal Force; ±10% or ±5 lb (2.2 daN). | Takeoff ..... | Record takeoff profile at near maximum takeoff weight from prior to engine failure to at least 200 ft (61 m) AGL. Engine failure speed must be within ±3 kts of airplane data. | X | X | X | X | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.b.6. | Crosswind Takeoff | ±3 kts airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±20 ft (6 m) height, ±2° bank angle, ±2° sideslip angle; ±3° heading angle. Correct trend at groundspeeds below 40 kts. for rudder/pedal and heading. Additionally, for those simulators of airplanes with reversible flight control systems: ±10% or ±5 lb (2.2 daN) stick/column force, ±10% or ±3 lb (1.3 daN) wheel force, ±10% or ±5 lb (2.2 daN) rudder pedal force. | Takeoff | Record takeoff profile from brake release to at least 200 ft (61 m) AGL. Requires test data, including information on wind profile for a crosswind (expressed as direct head-wind and direct cross-wind components) of at least 60% of the maximum wind measured at 33 ft (10 m) above the runway. | X | X | X | X | In those situations where a maximum crosswind or a maximum demonstrated crosswind is not known, contact the NSPM. |
| 1.b.7. | Rejected Takeoff | ±5% time or ±1.5 sec ±7.5% distance or ±250 ft (±76 m). | Takeoff | Record time and distance from brake release to full stop. Speed for initiation of the reject must be at least 80% of $V_1$ speed. The airplane must be at or near the maximum takeoff gross weight. Use maximum braking effort, auto or manual. | X | X | X | X | Autobrakes will be used where applicable. |
| 1.b.8. | Dynamic Engine Failure After Takeoff. | ±20% or ±2°/sec body angular rates. | Takeoff | Engine failure speed must be within ±3 Kts of airplane data. Record Hands Off from 5 secs. before to at least 5 secs. after engine failure or 30° Bank, whichever occurs first. Engine failure may be a snap deceleration to idle. CCA: Test in Normal and Non-normal control state. | | X | X | X | For safety considerations, airplane flight test may be performed out of ground effect at a safe altitude, but with correct airplane configuration and airspeed. |
| 1.c. | Climb. | | | | | | | | |
| 1.c.1. | Normal Climb, all engines operating. | ±3 kts airspeed, ±5% or ±100 FPM (0.5 m/Sec.) climb rate. | Clean | Flight test data is preferred, however, airplane performance manual data is an acceptable alternative. Record at nominal climb speed and mid-initial climb altitude. Flight simulator performance must be recorded over an interval of at least 1,000 ft. (300 m). | X | X | X | X | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 1.c.2. ..... | One engine Inoperative .. | ±3 kts airspeed, ±5% or ±100 FPM (0.5 m/Sec.) climb rate, but not less than the climb gradient requirements of 14 CFR part 23 or part 25, as appropriate. | For part 23 airplanes, in accordance with part 23. For part 25 airplanes, Second Segment Climb. | Flight test data is preferred, however, airplane performance manual data is an acceptable alternative. Test at weight, altitude, or temperature limiting conditions. Record at nominal climb speed. Flight simulator performance must be recorded over an interval of at least 1,000 ft. (300 m). | X | X | X | X | |
| 1.c.3. ..... | One Engine Inoperative En route Climb. | ±10% time, ±10% distance, ±10% fuel used. | Clean ..... | Record results for at least a 5000 ft (1550 m) climb segment. Flight test data or airplane performance manual data may be used. | | | X | X | |
| 1.c.4. ..... | One Engine Inoperative Approach Climb (if operations in icing conditions are authorized). | ±3 kts airspeed, ±5% or ±100 FPM (0.5 m/Sec.) climb rate, but not less than the climb gradient requirements of 14 CFR parts 23 or 25 climb gradient, as appropriate. | Approach ..... | Record results at near maximum gross landing weight as defined in Appendix F of this part. Flight test data or airplane performance manual data may be used. Flight simulator performance must be recorded over an interval of at least 1,000 ft. (300 m). | X | X | X | X | The airplane should be configured with all anti-ice and de-ice systems operating normally, with the gear up and go-around flaps set. All icing accountability considerations should be applied in accordance with the aircraft certification or authorization for an approach in icing conditions. |
| 1.d. ..... | Cruise/Descent. | | | | | | | | |
| 1.d.1. ..... | Level flight acceleration .. | ±5% Time ..... | Cruise ..... | Record results for a minimum of 50 kts speed increase using maximum continuous thrust rating or equivalent. | X | X | X | X | |
| 1.d.2. ..... | Level flight deceleration .. | ±5% Time ..... | Cruise ..... | Record results for a minimum of 50 kts. speed decrease using idle power. | X | X | X | X | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.d.3. ..... | Cruise performance ..... | ±0.05 EPR or ±5% of $N_1$, or ±5% of Torque, ±5% of fuel flow. | Cruise ..... | May be a single snapshot showing instantaneous fuel flow or a minimum of 2 consecutive snapshots with a spread of at least 3 minutes in steady flight. | | | X | X | |
| 1.d.4. ..... | Idle descent ..... | ±3 kt airspeed, ±5% or ±200 ft/min (1.0m/sec) descent rate. | Clean ..... | Record a stabilized, idle power descent at normal descent speed at mid-altitude. Flight simulator performance must be recorded over an interval of at least 1,000 ft. (300 m). | X | X | X | X | |
| 1.d.5. ..... | Emergency descent ..... | ±5 kt airspeed, ±5% or ±300 ft/min (1.5m/s) descent rate. | N/A ..... | Performance must be recorded over an interval of at least 3,000 ft (900 m). | X | X | X | X | The stabilized descent should be conducted with speed brakes extended, if applicable, at mid-altitude and near $V_{mo}$ speed or in accordance with emergency descent procedures. |
| 1.e. ..... | Stopping. | | | | | | | | |
| 1.e.1. ..... | Stopping time and distance, using manual application of wheel brakes and no reverse thrust on a dry runway. | ±5% of time. For distance up to 4000 ft (1220 m): ±200 ft (61 m) or ±10%, whichever is smaller. For distance greater than 4000 ft (1220 m): ±5% of distance. | Landing ..... | Record time and distance for at least 80% of the total time from touch down to full stop. Data is required for weights at medium and near maximum landing weights. Data for brake system pressure and position of ground spoilers (including method of deployment, if used) must be provided. Engineering data may be used for the medium gross weight condition. | X | X | X | X | |
| 1.e.2. ..... | Stopping time and distance, using reverse thrust and no wheel brakes on a dry runway. | ±5% time and the smaller of ±10% or ±200 ft (61 m) of distance. | Landing ..... | Record time and distance for at least 80% of the total time from initiation of reverse thrust to the minimum operating speed with full reverse thrust. Data is required for medium and near maximum landing gross weights. Data on the position of ground spoilers, (including method of deployment, if used) must be provided. Engineering data may be used for the medium gross weight condition. | X | X | X | X | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 1.e.3. ..... | Stopping distance, using wheel brakes and no reverse thrust on a wet runway. | ±10% of distance or ±200 ft (61 m). | Landing ..... | Either flight test data or manufacturer's performance manual data must be used where available. Engineering data based on dry runway flight test stopping distance modified by the effects of contaminated runway braking coefficients are an acceptable alternative. | | | X | X | |
| 1.e.4. ..... | Stopping distance, using wheel brakes and no reverse thrust on an icy runway. | ±10% of distance or ±200 ft (61 m). | Landing ..... | Either flight test or manufacturer's performance manual data must be used, where available. Engineering data based on dry runway flight test stopping distance modified by the effects of contaminated runway braking coefficients are an acceptable alternative. | | | X | X | |
| 1.f. ..... | Engines. | | | | | | | | |
| 1.f.1. ..... | Acceleration ..... | (±10% $T_t$) and (±10% $T_i$, or ±0.25 sec.). | Approach or landing .... | Record engine power ($N_1$, $N_2$, EPR, Torque) from flight idle to go-around power for a rapid (slam) throttle movement. | X | X | X | X | See Appendix F of this part for definitions of $T_i$ and $T_t$. |
| 1.f.2. ..... | Deceleration ..... | (±10% $T_t$) and (±10% $T_i$, or ±0.25 sec.). | Ground ..... | Record engine power ($N_1$, $N_2$, EPR, Torque) from Max T/O power to 90% decay of Max T/O power for a rapid (slam) throttle movement. | X | X | X | X | See Appendix F of this part for definitions of $T_i$ and $T_t$. |
| **2. Handling Qualities.** | | | | | | | | | |
| ..... | For simulators requiring Static or Dynamic tests at the controls (i.e., column, wheel, rudder pedal), special test fixtures will not be required during initial or upgrade evaluations if the sponsor's QTG/MQTG shows both test fixture results *and* the results of an alternative approach, such as computer plots produced concurrently, that provide satisfactory agreement. Repeat of the alternative method during the initial or upgrade evaluation satisfies this test requirement. For initial and upgrade evaluations, the control dynamic characteristics must be measured at and recorded directly from the flight deck controls, and must be accomplished in takeoff, cruise, and landing flight conditions and configurations. Testing of position versus force is not applicable if forces are generated solely by use of airplane hardware in the FFS. | | | | | | | | Contact the NSPM for clarification of any issue regarding airplanes with reversible controls. |
| 2.a. ..... | Static Control Tests. | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.a.1.a. ..... | Pitch Controller Position vs. Force and Surface Position Calibration. | ±2 lb (0.9 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2° elevator. | Ground ..... | Record results for an uninterrupted control sweep to the stops. | X | X | X | X | Test results should be validated (where possible) with in-flight data from tests such as longitudinal static stability or stalls. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |
| 2.a.1.b. ..... | (Reserved) | | | | | | | | |
| 2.a.2.a. ..... | Roll Controller Position vs. Force and Surface Position Calibration. | ±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force, ±2° aileron, ±3° spoiler angle. | Ground ..... | Record results for an uninterrupted control sweep to the stops. | X | X | X | X | Test results should be validated with in-flight data from tests such as engine out trims, or steady state sideslips. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |
| 2.a.2.b. ..... | (Reserved) | | | | | | | | |
| 2.a.3.a. ..... | Rudder Pedal Position vs. Force and Surface Position Calibration. | ±5 lb (2.2 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2° rudder angle. | Ground ..... | Record results for an uninterrupted control sweep to the stops. | X | X | X | X | Test results should be validated with in-flight data from tests such as engine out trims, or steady state sideslips. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |
| 2.a.3.b. ..... | (Reserved) | | | | | | | | |
| 2.a.4. ..... | Nosewheel Steering Controller Force and Position Calibration. | ±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force, ±2° nosewheel angle. | Ground ..... | Record results of an uninterrupted control sweep to the stops. | X | X | X | X | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 2.a.5. ..... | Rudder Pedal Steering Calibration. | ±2° nosewheel angle ..... | Ground ..... | Record results of an uninterrupted control sweep to the stops. | X | X | X | X | |
| 2.a.6. ..... | Pitch Trim Indicator vs. Surface Position Calibration. | ±0.5° of computed trim surface angle. | Ground ..... | | X | X | X | X | The purpose of the test is to compare FFS against design data or equivalent. |
| 2.a.7. ..... | Pitch Trim Rate ..... | ±10% trim rate (°/sec) ..... | Ground and approach | The trim rate must be checked using the pilot primary trim (ground) and using the autopilot or pilot primary trim in flight at go-around flight conditions. | X | X | X | X | |
| 2.a.8. ..... | Alignment of Flight Deck Throttle Lever vs. Selected Engine Parameter. | ±5° of throttle lever angle, or ±3% N1, or ±.03 EPR, or ±3% maximum rated manifold pressure, or ±3% torque. For propeller-driven airplanes where the propeller control levers do not have angular travel, a tolerance of ±0.8 inch (±2 cm.) applies. | Ground ..... | Requires simultaneous recording for all engines. The tolerances apply against airplane data and between engines. In the case of propeller powered airplanes, if a propeller lever is present, it must also be checked. For airplanes with throttle "detents," all detents must be presented. May be a series of snapshot test results. | X | X | X | X | |
| 2.a.9. ..... | Brake Pedal Position vs. Force and Brake System Pressure Calibration. | ±5 lb (2.2 daN) or 10% force, ±150 psi (1.0 MPa) or ±10% brake system pressure. | Ground ..... | Hydraulic system pressure must be related to pedal position through a ground static test. | X | X | X | X | FFS computer output results may be used to show compliance. |
| 2.b. ..... | Dynamic Control Tests. | | | | | | | | |
| ..... | Tests 2.b.1., 2.b.2., and 2.b.3. are not applicable if dynamic response is generated solely by use of airplane hardware in the FFS. Power setting is that required for level flight unless otherwise specified. | | | | .... | .... | .... | .... | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.b.1. ..... | Pitch Control ..... | For underdamped systems: ±10% of time from 90% of initial displacement (0.9 $A_d$) to first zero crossing and ±10 (n + 1)% of period thereafter. ±10% amplitude of first overshoot applied to all overshoots greater than 5% of initial displacement (.05 $A_d$), ±1 overshoot (first significant overshoot must be matched). For overdamped systems: ±10% of time from 90% of initial displacement (0.9 $A_d$) to 10% of initial displacement (0.1 $A_d$). For the alternate method see paragraph 4 of this attachment. The slow sweep is the equivalent to the static test 2.a.1. For the moderate and rapid sweeps: ±2 lb (0.9 daN) or ±10% dynamic increment above the static force. | Takeoff, Cruise, and Landing. | Data must show normal control displacement in both directions. Tolerances apply against the absolute values of each period (considered independently). Normal control displacement for this test is 25% to 50% of full throw or 25% to 50% of the maximum allowable pitch controller deflection for flight conditions limited by the maneuvering load envelope. | | | X | X | "n" is the sequential period of a full cycle of oscillation. Refer to paragraph 4 of this attachment for more information. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 2.b.2. ..... | Roll Control ..... | For underdamped systems: ±10% of time from 90% of initial displacement (0.9 $A_d$) to first zero crossing, and ±10 (n + 1)% of period thereafter. ±10% amplitude of first overshoot, applied to all overshoots greater than 5% of initial displacement (.05 $A_d$), ±1 overshoot (first significant overshoot must be matched). For overdamped systems: ±10% of time from 90% of initial displacement (0.9 $A_d$) to 10% of initial displacement (0.1$A_d$). For the alternate method see paragraph 4 of this attachment. The slow sweep is the equivalent to the static test 2.a.2. For the moderate and rapid sweeps: ±2 lb (0.9 daN) or ±10% dynamic increment above the static force. | Takeoff, Cruise, and Landing. | Data must show normal control displacement in both directions. Tolerance applies against the absolute values of each period (considered independently). Normal control displacement for this test is 25% to 50% of the maximum allowable roll controller deflection for flight conditions limited by the maneuvering load envelope. | | | X | X | ''n'' is the sequential period of a full cycle of oscillation. Refer to paragraph 4 of this attachment for more information. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.b.3. ..... | Yaw Control ..... | For underdamped systems: ±10% of time from 90% of initial displacement (0.9 $A_d$) to first zero crossing, and ±10 (n + 1)% of period thereafter. ±10% amplitude of first overshoot applied to all overshoots greater than 5% of initial displacement (.05 $A_d$), ±1 overshoot (first significant overshoot must be matched). For overdamped systems: ±10% of time from 90% of initial displacement (0.9 $A_d$) to 10% of initial displacement (0.1 $A_d$). For the alternate method (see paragraph 4 of this attachment). The slow sweep is the equivalent to the static test 2.a.3. For the moderate and rapid sweeps: ±2 lb (0.9 daN) or ±10% dynamic increment above the static force. | Takeoff, Cruise, and Landing. | Data must show normal control displacement in both directions. Tolerance applies against the absolute values of each period (considered independently). Normal control displacement for this test is 25% to 50% of the maximum allowable yaw controller deflection for flight conditions limited by the maneuvering load envelope. | | | X | X | "n" is the sequential period of a full cycle of oscillation. Refer to paragraph 4 of this attachment for more information. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |
| 2.b.4. ..... | Small Control Inputs—Pitch. | ±0.15°/sec body pitch rate or ±20% of peak body pitch rate applied throughout the time history. | Approach or landing .... | Control inputs must be typical of minor corrections made while established on an ILS approach course, using from 0.5°/sec to 2°/sec pitch rate. The test must be in both directions, showing time history data from 5 seconds before until at least 5 seconds after initiation of control input.<br>CCA: Test in normal and non-normal control states. | | | X | X | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 2.b.5. ..... | Small Control Inputs—Roll. | ±0.15°/sec body roll rate or ±20% of peak body roll rate applied throughout the time history. | Approach or landing .... | Control inputs must be typical of minor corrections made while established on an ILS approach course, using from 0.5°/sec to 2°/sec roll rate. The test may be run in only one direction; however, for airplanes that exhibit non-symmetrical behavior, the test must include both directions. Time history data must be recorded from 5 seconds before until at least 5 seconds after initiation of control input. CCA: Test in normal and non-normal control states. | | | X | X | |
| 2.b.6. ..... | Small Control Inputs—Yaw. | ±0.15°/sec body yaw rate or ±20% of peak body yaw rate applied throughout the time history. | Approach or landing .... | Control inputs must be typical of minor corrections made while established on an ILS approach course, using from 0.5°/sec to 2°/sec yaw rate. The test may be run in only one direction; however, for airplanes that exhibit non-symmetrical behavior, the test must include both directions. Time history data must be recorded from 5 seconds before until at least 5 seconds after initiation of control input. CCA: Test in normal and non-normal control states. | | | X | X | |
| 2.c. ..... | Longitudinal Control Tests. | | | | | | | | |
| ..... | Power setting is that required for level flight unless otherwise specified. | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.c.1. ..... | Power Change Dynamics | ±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch angle. | Approach ..... | Power is changed from the thrust setting required for approach or level flight to maximum continuous thrust or go-around power setting. Record the uncontrolled free response from at least 5 seconds before the power change is initiated to 15 seconds after the power change is completed.<br>CCA: Test in normal and non-normal control states. | X | X | | X | |
| 2.c.2. ..... | Flap/Slat Change Dynamics. | ±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch angle. | Takeoff through initial flap retraction, and approach to landing. | Record the uncontrolled free response from at least 5 seconds before the configuration change is initiated to 15 seconds after the configuration change is completed.<br>CCA: Test in normal and non-normal control states. | X | X | X | X | |
| 2.c.3. ..... | Spoiler/Speedbrake Change Dynamics. | ±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch angle. | Cruise ..... | Record the uncontrolled free response from at least 5 seconds before the configuration change is initiated to 15 seconds after the configuration change is completed. Record results for both extension and retraction.<br>CCA: Test in normal and non-normal control states. | X | X | X | X | |
| 2.c.4. ..... | Gear Change Dynamics | ±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch angle. | Takeoff (retraction), and Approach (extension). | Record the time history of uncontrolled free response for a time increment from at least 5 seconds before the configuration change is initiated to 15 seconds after the configuration change is completed.<br>CCA: Test in normal and non-normal control states. | X | X | X | X | |
| 2.c.5. ..... | Longitudinal Trim ..... | ±0.5° trim surface angle, ±1° elevator, ±1° pitch angle, ±5% net thrust or equivalent. | Cruise, Approach, and Landing. | Record steady-state condition with wings level and thrust set for level flight. May be a series of snapshot tests.<br>CCA: Test in normal or non-normal control states. | X | X | X | X | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 2.c.6. ..... | Longitudinal Maneuvering Stability (Stick Force/g). | ±5 lb (±2.2 daN) or ±10% pitch controller force. Alternative method: ±1° or ±10% change of elevator. | Cruise, Approach, and Landing. | Continuous time history data or a series of snapshot tests may be used. Record results up to 30° of bank for approach and landing configurations. Record results for up to 45° of bank for the cruise configuration. The force tolerance is not applicable if forces are generated solely by the use of airplane hardware in the FFS. The alternative method applies to airplanes that do not exhibit "stick-force-per-g" characteristics.<br>CCA: Test in normal and non-normal control states. | X | X | X | X | |
| 2.c.7. ..... | Longitudinal Static Stability. | ±5 lb (±2.2 daN) or ±10% pitch controller force. Alternative method: ±1° or ±10% change of elevator. | Approach ..... | Record results for at least 2 speeds above and 2 speeds below trim speed. May be a series of snapshot test results. The force tolerance is not applicable if forces are generated solely by the use of airplane hardware in the FFS. The alternative method applies to airplanes that do not exhibit speed stability characteristics.<br>CCA: Test in normal or non-normal control states. | X | X | X | X | |
| 2.c.8. ..... | Stall Characteristics ..... | ±3 kt airspeed for initial buffet, stall warning, and stall speeds. ±2° bank for speeds greater than stick shaker or initial buffet. Additionally, for those simulators with reversible flight control systems: ±10% or ±5 lb (2.2 daN) Stick/Column force (prior to "g break" only). | Second Segment Climb, and Approach or Landing. | The stall maneuver must be entered with thrust at or near idle power and wings level (1g). Record the stall warning signal and initial buffet, if applicable. Time history data must be recorded for full stall and initiation of recovery. The stall warning signal must occur in the proper relation to buffet/stall. FFSs of airplanes exhibiting a sudden pitch attitude change or "g break" must demonstrate this characteristic.<br>CCA: Test in normal and non-normal control states. | X | X | X | X | |

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|---|---|---|---|---|---|---|---|---|---|---|
| 2.c.9. ..... | Phugoid Dynamics ..... | ±10% period, ±10% of time to ½ or double amplitude or ±.02 of damping ratio. | Cruise ..... | The test must include whichever is less of the following: Three full cycles (six overshoots after the input is completed), or the number of cycles sufficient to determine time to ½ or double amplitude.<br>CCA: Test in Non-normal control states | X | X | X | X | | |
| 2.c.10. ..... | Short Period Dynamics. .. | ±1.5° pitch angle or ±2°/sec pitch rate, ±0.10g acceleration. | Cruise ..... | CCA: Test in Normal and Non-normal control states. | X | X | X | X | | |
| 2.c.11. ..... | (Reserved) | | | | | | | | | |
| 2.d. ..... | Lateral Directional Tests. | | | | | | | | | |
| ..... | Power setting is that required for level flight unless otherwise specified. | | | | | | | | | |
| 2.d.1. ..... | Minimum Control Speed, Air ($V_{mca}$ or $V_{mci}$), per Applicable Airworthiness Standard or Low Speed Engine Inoperative Handling Characteristics in the Air. | ±3 kt airspeed. | Takeoff or Landing (whichever is most critical in the airplane). | Takeoff thrust must be used on the operating engine(s). A time history or a series of snapshot tests may be used.<br>CCA: Test in Normal or Non-normal control state. | X | X | X | X | Low Speed Engine Inoperative Handling may be governed by a performance or control limit that prevents demonstration of $V_{mca}$, or $V_{mci}$, in the conventional manner. |
| 2.d.2. ..... | Roll Response (Rate). .... | ±10% or ±2°/sec roll rate. Additionally, for those simulators of airplanes with reversible flight control systems: ±10% or ±3 lb (1.3 daN) wheel force. | Cruise, and Approach or Landing. | Record results for normal roll controller deflection (about one-third of maximum roll controller travel). May be combined with step input of flight deck roll controller test (2.d.3.). | X | X | X | X | | |
| 2.d.3. ..... | Roll Response to Flight Deck Roll Controller Step Input. | ±10% or ±2° bank angle ..... | Approach or Landing ... | Record from initiation of roll through 10 seconds after control is returned to neutral and released. May be combined with roll response (rate) test (2.d.2).<br>CCA: Test in Normal and Non-normal control states | X | X | X | X | With wings level, apply a step roll control input using approximately one-third of the roll controller travel. When reaching approximately 20° to 30° of bank, abruptly return the roll controller to neutral and allow approximately 10 seconds of airplane free response. |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 2.d.4. ..... | Spiral Stability ..... | Correct trend and ±2° or ±10% bank angle in 20 seconds. Alternate test requires correct trend and ±2° aileron. | Cruise, and Approach or Landing. | Record results for both directions. Airplane data averaged from multiple tests may be used. As an alternate test, demonstrate the lateral control required to maintain a steady turn with a bank angle of 28° to 32°.<br>CCA: Test in Non-normal control state | X | X | X | X | |
| 2.d.5. ..... | Engine Inoperative Trim | ±1° rudder angle or ±1° tab angle or equivalent pedal, ±2° sideslip angle. | Second Segment Climb, and Approach or Landing. | May be a series of snapshot tests ..... | X | X | X | X | The test should be performed in a manner similar to that for which a pilot is trained to trim an engine failure condition. Second segment climb test should be at takeoff thrust. Approach or landing test should be at thrust for level flight. |
| 2.d.6. ..... | Rudder Response ..... | ±2°/sec or ±10% yaw rate ... | Approach or Landing ... | Record results for stability augmentation system ON and OFF. A rudder step input of 20%–30% rudder pedal throw is used.<br>CCA: Test in Normal and Non-normal control states | X | X | X | X | |
| 2.d.7. ..... | Dutch Roll, (Yaw Damper OFF). | ±0.5 sec or ±10% of period, ±10% of time to ½ or double amplitude or ±.02 of damping ratio. ±20% or ±1 sec of time difference between peaks of bank and sideslip. | Cruise, and Approach or Landing. | Record results for at least 6 complete cycles with stability augmentation OFF.<br>CCA: Test in Non-normal control state. | | X | X | X | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.d.8. ..... | Steady State Sideslip .... | For given rudder position ±2° bank angle, ±1° sideslip angle, ±10% or ±2° aileron, ±10% or ±5° spoiler or equivalent roll, controller position or force. Additionally, for those simulators of airplanes with reversible flight control systems: ±10% or ±3 lb (1.3 daN) wheel force ±10% or ±5 lb (2.2 daN) rudder pedal force. | Approach or Landing ... | Use at least two rudder positions, one of which must be near maximum allowable rudder. Propeller driven airplanes must test in each direction. May be a series of snapshot test results. | X | X | X | X | |
| 2.e. ..... | Landings. | | | | | | | | |
| 2.e.1. ..... | Normal Landing ..... | ±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±10% or ±10 ft (3 m) height. Additionally, for those simulators of airplanes with reversible flight control systems: ±10% or ±5 lbs (±2.2 daN) stick/column force. | Landing ..... | Record results from a minimum of 200 ft (61 m) AGL to nosewheel touchdown. CCA: Test in Normal and Non-normal control states. | X | X | X | Tests should be conducted with two normal landing flap settings (if applicable). One should be at or near maximum certificated landing weight. The other should be at light or medium landing weight. |
| 2.e.2. ..... | Minimum Flap Landing ... | ±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±10% or ±10 ft (3 m) height. Additionally, for those simulators of airplanes with reversible flight control systems: ±10% or ±5 lbs (2.2 daN) stick/column force. | Minimum Certified Landing Flap Configuration. | Record results from a minimum of 200 ft (61 m) AGL to nosewheel touchdown with airplane at near Maximum Landing Weight. | | X | X | | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 2.e.3. ..... | Crosswind Landing ..... | ±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±10% or ±10 ft (3 m) height ±2° bank angle, ±2° sideslip angle ±3° heading angle. Additionally, for those simulators of airplanes with reversible flight control systems: ±10% or ±3 lb (1.3 daN) wheel force ±10% or ±5 lb (2.2 daN) rudder pedal force. | Landing ..... | Record results from a minimum of 200 ft (61 m) AGL, through nosewheel touch-down, to 50% decrease in main landing gear touchdown speed. Test data must include information on wind profile, for a crosswind (expressed as direct head-wind and direct cross-wind components) of 60% of the maximum wind measured at 33 ft (10 m) above the runway. | | X | X | X | In those situations where a maximum crosswind or a maximum demonstrated crosswind is not known, contact the NSPM. |
| 2.e.4. ..... | One Engine Inoperative Landing. | ±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±10% height or ±10 ft (3 m); ±2° bank angle, ±2° sideslip angle, ±3° heading. | Landing ..... | Record results from a minimum of 200 ft (61 m) AGL, through nosewheel touch-down, to 50% decrease in main landing gear touchdown speed or less. | | X | X | X | |
| 2.e.5. ..... | Autopilot landing (if applicable). | ±5 ft (1.5 m) flare height, ±0.5 sec $T_f$, or ±10%$T_f$, ±140 ft/min (0.7 m/sec) rate of descent at touchdown. ±10 ft (3 m) lateral deviation during rollout. | Landing ..... | If autopilot provides rollout guidance, record lateral deviation from touchdown to a 50% decrease in main landing gear touchdown speed or less. Time of autopilot flare mode engage and main gear touchdown must be noted. | | X | X | X | See Appendix F of this part for definition of $T_f$. |
| 2.e.6. ..... | All engines operating, autopilot, go around. | ±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack. | | Normal, all-engines-operating, go around with the autopilot engaged (if applicable) at medium landing weight.<br>CCA: Test in normal or non-normal control states. | | X | X | X | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.e.7. ..... | One engine inoperative go around. | ±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±2° bank angle, ±2° slideslip angle. | | The one engine inoperative go around is required at near maximum certificated landing weight with the critical engine inoperative using manual controls. If applicable, an additional engine inoperative go around test must be accomplished with the autopilot engaged.<br>CCA: Non-autopilot test in Non-normal control state. | X | X | X | | |
| 2.e.8. ..... | Directional control (rudder effectiveness) with symmetric reverse thrust. | ±2°/sec yaw rate. ±5 kts airspeed. | Landing ..... | Record results starting from a speed approximating touchdown speed to the minimum thrust reverser operation speed. With full reverse thrust, apply yaw control in both directions until reaching minimum thrust reverser operation speed. | X | X | X | | |
| 2.e.9. ..... | Directional control (rudder effectiveness) with asymmetric reverse thrust. | ±5 kt airspeed. ±3° heading angle. | Landing ..... | Maintain heading with yaw control with full reverse thrust on the operating engine(s). Record results starting from a speed approximating touchdown speed to a speed at which control of yaw cannot be maintained or until reaching minimum thrust reverser operation speed, whichever is higher. The tolerance applies to the low speed end of the data recording. | X | X | X | | |
| 2.f. ..... | Ground Effect. | | | | | | | | |
| ..... | Test to demonstrate Ground Effect. | ±1° elevator ±0.5° stabilizer angle, ±5% net thrust or equivalent, ±1° angle of attack, ±10% height or ±5 ft (1.5 m), ±3 kt airspeed, ±1° pitch angle. | Landing ..... | The Ground Effect model must be validated by the test selected and a rationale must be provided for selecting the particular test. | | X | X | X | See paragraph on Ground Effect in this attachment for additional information. |
| 2.g. ..... | Windshear. | | | | | | | | |
| ..... | Four tests, two takeoff and two landing, with one of each conducted in still air and the other with windshear active to demonstrate windshear models. | See Attachment 5 of this appendix. | Takeoff and Landing ... | Requires windshear models that provide training in the specific skills needed to recognize windshear phenomena and to execute recovery procedures. See Attachment 5 of this appendix for tests, tolerances, and procedures. | | | X | X | See Attachment 5 of this appendix for information related to Level A and B simulators. |
| 2.h. ..... | Flight Maneuver and Envelope Protection Functions. | | | | | | | | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| ..... | The requirements of tests h(1) through (6) of this attachment are applicable to computer controlled aircraft only. Time history results are required for simulator response to control inputs during entry into envelope protection limits including both normal and degraded control states if the function is different. Set thrust as required to reach the envelope protection function. | | | | | | | | |
| 2.h.1. ..... | Overspeed ..... | ±5 kt airspeed ..... | Cruise ..... | | | X | X | X | |
| 2.h.2. ..... | Minimum Speed ..... | ±3 kt airspeed ..... | Takeoff, Cruise, and Approach or Landing. | | | X | X | X | |
| 2.h.3. ..... | Load Factor ..... | ±0.1 g normal load factor .... | Takeoff, Cruise ..... | | | X | X | X | |
| 2.h.4. ..... | Pitch Angle ..... | ±1.5° pitch angle ..... | Cruise, Approach ..... | | | X | X | X | |
| 2.h.5. ..... | Bank Angle ..... | ±2° or ±10% bank angle ..... | Approach ..... | | | X | X | X | |
| 2.h.6. ..... | Angle of Attack ..... | ±1.5° angle of attack ..... | Second Segment Climb, and Approach or Landing. | | | X | X | X | |
| **3. Motion System.** | | | | | | | | | |
| 3.a. ..... | Frequency response. | | | | | | | | |
| ..... | | Based on Simulator Capability. | N/A ..... | Required as part of the MQTG. The test must demonstrate frequency response of the motion system. | X | X | X | X | |
| 3.b. ..... | Leg balance. | | | | | | | | |
| | | Based on Simulator Capability. | N/A ..... | Required as part of the MQTG. The test must demonstrate motion system leg balance as specified by the applicant for flight simulator qualification. | X | X | X | X | |
| 3.c. ..... | Turn-around check. | | | | | | | | |
| ..... | | Based on Simulator Capability. | N/A ..... | Required as part of the MQTG. The test must demonstrate a smooth turn-around (shift to opposite direction of movement) of the motion system as specified by the applicant for flight simulator qualification. | X | X | X | X | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.d. ..... | Motion system repeatability. | | | | | | | | |
| ..... | | With the same input signal, the test results must be repeatable to within ±0.05 g actual platform linear acceleration. | Accomplished in both the ''ground'' mode and in the ''flight'' mode of the motion system operation. | Required as part of the MQTG. The assessment procedures must be designed to ensure that the motion system hardware and software (in normal flight simulator operating mode) continue to perform as originally qualified. | X | X | X | X | This test ensures that motion system hardware and software (in normal flight simulator operating mode) continue to perform as originally qualified. Performance changes from the original baseline can be readily identified with this information. |
| 3.e. ..... | Motion cueing performance signature. Required as part of MQTG. For the following set of maneuvers record the relevant motion variables. | | | | | | | | These tests should be run with the motion buffet mode disabled. See paragraph 6.d., of this attachment, Motion cueing performance signature. |
| 3.e.1. ..... | Takeoff rotation ($V_R$ to $V_2$). | As specified by the sponsor for flight simulator qualification. | Ground ..... | Pitch attitude due to initial climb must dominate over cab tilt due to longitudinal acceleration. | X | X | X | X | Associated with test 1.b.4. |
| 3.e.2. ..... | Engine failure between $V_1$ and $V_R$. | As specified by the sponsor for flight simulator qualification. | Ground ..... | | X | X | X | X | Associated with test 1.b.5. |
| 3.e.3. ..... | Pitch change during go-around. | As specified by the sponsor for flight simulator qualification. | Flight ..... | | | X | X | X | Associated with test 2.e.6. |
| 3.e.4. ..... | Configuration changes .... | As specified by the sponsor for flight simulator qualification. | Flight ..... | | X | X | X | X | Associated with tests 2.c.2. and 2.c.4. |
| 3.e.5. ..... | Power change dynamics | As specified by the sponsor for flight simulator qualification. | Flight ..... | | X | X | X | X | Associated with test 2.c.1. |
| 3.e.6. ..... | Landing flare ..... | As specified by the sponsor for flight simulator qualification. | Flight ..... | | | X | X | X | Associated with test 2.e.1. |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 3.e.7. ..... | Touchdown bump ..... | As specified by the sponsor for flight simulator qualification. | Ground ..... | | | | X | X | Associated with test 2.e.1. |
| 3.f. ..... | Characteristic motion vibrations. The recorded test results for characteristic buffets must allow the comparison of relative amplitude versus frequency. | | | | | | | | |
| 3.f.1. ..... | Thrust effect with brakes set. | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency "spikes" being present within ±2 Hz. | Ground ..... | The test must be conducted within 5% of the maximum possible thrust with brakes set. | | | | X | |
| 3.f.2. ..... | Buffet with landing gear extended. | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency "spikes" being present within ±2 Hz. | Flight ..... | The test must be conducted at a nominal, mid-range airspeed; i.e., sufficiently below landing gear limiting airspeed to avoid inadvertently exceeding this limitation. | | | | X | |
| 3.f.3. ..... | Buffet with flaps extended. | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency "spikes" being present within ±2 Hz. | Flight ..... | The test must be conducted at a nominal, mid-range airspeed; i.e., sufficiently below flap extension limiting airspeed to avoid inadvertently exceeding this limitation. | | | | X | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.f.4. ..... | Buffet with speedbrakes deployed. | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency ''spikes'' being present within ±2 Hz. | Flight ..... | | | | | X | |
| 3.f.5. ..... | Buffet at approach-to-stall | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency ''spikes'' being present within ±2 Hz. | Flight ..... | The test must be conducted for approach to stall. Post stall characteristics are not required. | | | | X | |
| 3.f.6. ..... | Buffet at high airspeeds or high Mach. | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency ''spikes'' being present within ±2 Hz. | Flight ..... | | | | | X | The test may be conducted during either a high speed maneuver (e.g., ''wind-up'' turn) or at high Mach. |
| 3.f.7. ..... | In-flight vibrations for propeller driven airplanes. | Simulator test results must exhibit the overall appearance and trends of the airplane data, with at least three (3) of the predominant frequency ''spikes'' being present within ±2 Hz. | Flight (clean configuration). | | | | | X | |
| **4. Visual System.** | | | | | | | | | |
| 4.a. ..... | Visual System Response Time: (Choose either test 4.a.1. or 4.a.2. to satisfy test 4.a., Visual System Response Time Test. This test also suffices for motion system response timing and flight deck instrument response timing. Motion onset should occur before the start of the visual scene change (the start of the scan of the first video field containing different information) but must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. | | | | | | | | See additional information in this attachment; also see Table A1A, entry 2.g. |
| 4.a.1. ..... | Latency.. | | | | | | | | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| ..... | | 300 ms (or less) after airplane response. | Take-off, cruise, and approach or landing. | One test is required in each axis (pitch, roll and yaw) for each of the three conditions (take-off, cruise, and approach or landing). | X | X | | | The visual scene or test pattern used during the response testing should be representative of the system capacities required to meet the daylight, twilight (dusk/dawn) and/or night visual capability as appropriate. |
| ..... | | 150 ms (or less) after airplane response. | Take-off, cruise, and approach or landing. | One test is required in each axis (pitch, roll and yaw) for each of the three conditions (take-off, cruise, and approach or landing).. | | | X | X | |
| 4.a.2. ..... | Transport Delay. | | | | | | | | |
| ..... | | 300 ms (or less) after controller movement. | N/A ..... | A separate test is required in each axis (pitch, roll, and yaw). | X | X | | | If Transport Delay is the chosen method to demonstrate relative responses, the sponsor and the NSPM will use the latency values to ensure proper simulator response when reviewing those existing tests where latency can be identified (e.g., short period, roll response, rudder response) |
| ..... | | 150 ms (or less) after controller movement. | N/A ..... | A separate test is required in each axis (pitch, roll, and yaw). | | | X | X | |
| 4.b. ..... | Field-of-view. | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4.b.1. ..... | Continuous collimated visual field-of-view. | Continuous collimated field-of-view providing at least 45° horizontal and 30° vertical field-of-view for each pilot seat. Both pilot seat visual systems must be operable simultaneously. | N/A ..... | Required as part of MQTG but not required as part of continuing evaluations. | X | X | | | A vertical field-of-view of 30° may be insufficient to meet visual ground segment requirements. |
| 4.b.2. ..... | (Reserved) | | | | | | | | |
| 4.b.3. ..... | Continuous, collimated, field-of-view. | Continuous field-of-view of at least 176° horizontally and 36° vertically. | N/A ..... | An SOC is required and must explain the geometry of the installation. Horizontal field-of-view must be at least 176° (including not less than 88° either side of the center line of the design eye point). Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained. Vertical field-of-view must be at least 36° from each pilot's eye point. Required as part of MQTG but not required as part of continuing qualification evaluations. | | | X | X | The horizontal field-of-view is traditionally described as a 180° field-of-view. However, the field-of-view is technically no less than 176°. Field-of-view should be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. The installed alignment should be addressed in the SOC. |
| 4.c. ..... | System geometry. | | | | | | | | |
| ..... | | 5° even angular spacing within ±1° as measured from either pilot eye point and within 1.5° for adjacent squares. | N/A ..... | The angular spacing of any chosen 5° square and the relative spacing of adjacent squares must be within the stated tolerances. | X | X | X | X | The purpose of this test is to evaluate local linearity of the displayed image at either pilot eye point. System geometry should be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares with light points at the intersections. |
| 4.d. ..... | Surface contrast ratio. | | | | | | | | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| ..... | | Not less than 5:1. ..... | N/A ..... | The ratio is calculated by dividing the brightness level of the center, bright square (providing at least 2 foot-lamberts or 7 cd/m²) by the brightness level of any adjacent dark square. This requirement is applicable to any level of simulator equipped with a daylight visual system. | | | X | X | Measurements should be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5° per square, with a white square in the center of each channel. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.e. ..... | Highlight brightness. | | | | | | | | |
| ..... | | Not less than six (6) foot-lamberts (20 cd/m²). | N/A ..... | Measure the brightness of a white square while superimposing a highlight on that white square. The use of calligraphic capabilities to enhance the raster brightness is acceptable; however, measuring lightpoints is not acceptable. This requirement is applicable to any level of simulator equipped with a daylight visual system. | | | X | X | Measurements should be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5° per square, with a white square in the center of each channel. |
| 4.f. ..... | Surface resolution | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ..... | Not greater than two (2) arc minutes. | N/A ..... | An SOC is required and must include the relevant calculations and an explanation of those calculations. This requirement is applicable to any level of simulator equipped with a daylight visual system. | | | X | X | When the eye is positioned on a 3° glide slope at the slant range distances indicated with white runway markings on a black runway surface, the eye will subtend two (2) arc minutes: (1) A slant range of 6,876 ft with stripes 150 ft long and 16 ft wide, spaced 4 ft apart. (2) For Configuration A; a slant range of 5,157 feet with stripes 150 ft long and 12 ft wide, spaced 3 ft apart. (3) For Configuration B; a slant range of 9,884 feet, with stripes 150 ft long and 5.75 ft wide, spaced 5.75 ft apart. |
| 4.g. ..... | Light point size. | | | | | | | |
| ..... | Not greater than five (5) arc-minutes. | N/A ..... | An SOC is required and must include the relevant calculations and an explanation of those calculations. This requirement is applicable to any level of simulator equipped with a daylight visual system. | | | X | X | Light point size should be measured using a test pattern consisting of a centrally located single row of light points reduced in length until modulation is just discernible in each visual channel. A row of 48 lights will form a 4° angle or less. |
| 4.h. ..... | Light point contrast ratio. | | | | | | | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 4.h.1 | For Level A and B simulators. | Not less than 10:1 | N/A | An SOC is required and must include the relevant calculations. | X | X | | | A 1° spot photometer is used to measure a square of at least 1° filled with light points (where light point modulation is just discernible) and compare the results to the measured adjacent background. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.h.2 | For Level C and D simulators. | Not less than 25:1 | N/A | An SOC is required and must include the relevant calculations. | | | X | X | A 1° spot photometer is used to measure a square of at least 1° filled with light points (where light point modulation is just discernible) and compare the results to the measured adjacent background. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.i | Visual ground segment. | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ..... | The visible segment in the simulator must be ±20% of the segment computed to be visible from the airplane flight deck. This tolerance may be applied at the far end of the displayed segment. However, lights and ground objects computed to be visible from the airplane flight deck at the near end of the visible segment must be visible in the simulator. | Landing configuration, with the aircraft trimmed for the appropriate airspeed, where the MLG are at 100 ft (30 m) above the plane of the touchdown zone, while on the electronic glide slope with an RVR value set at 1,200 ft (350 m). | The QTG must contain appropriate calculations and a drawing showing the pertinent data used to establish the airplane location and the segment of the ground that is visible considering design eyepoint, the airplane attitude, flight deck cut-off angle, and a visibility of 1200 ft (350 m) RVR. Simulator performance must be measured against the QTG calculations. The data submitted must include at least the following:.<br>(1) Static airplane dimensions as follows:<br>(i) Horizontal and vertical distance from main landing gear (MLG) to glideslope reception antenna.<br>(ii) Horizontal and vertical distance from MLG to pilot's eyepoint.<br>(iii) Static flight deck cutoff angle.<br>(2) Approach data as follows:<br>(i) Identification of runway.<br>(ii) Horizontal distance from runway threshold to glideslope intercept with runway.<br>(iii) Glideslope angle.<br>(iv) Airplane pitch angle on approach.<br>(3) Airplane data for manual testing:<br>(i) Gross weight.<br>(ii) Airplane configuration.<br>(iii) Approach airspeed. If non-homogenous fog is used to obscure visibility, the vertical variation in horizontal visibility must be described and be included in the slant range visibility calculation used in the computations. | X | X | X | X | Pre-position for this test is encouraged but may be achieved via manual or autopilot control to the desired position. |
| **5. Sound System.** | | | | | | | | | |
| The sponsor will not be required to repeat the airplane tests (i.e., tests 5.a.1. through 5.a.8. (or 5.b.1. through 5.b.9.) and 5.c., as appropriate) during continuing qualification evaluations if frequency response and background noise test results are within tolerance when compared to the initial qualification evaluation results, and the sponsor shows that no software changes have occurred that will affect the airplane test results. If the frequency response test method is chosen and fails, the sponsor may elect to fix the frequency response problem and repeat the test or the sponsor may elect to repeat the airplane tests. If the airplane tests are repeated during continuing qualification evaluations, the results may be compared against initial qualification evaluation results or airplane master data. All tests in this section must be presented using an unweighted 1/3-octave band format from band 17 to 42 (50 Hz to 16 kHz). A minimum 20 second average must be taken at the location corresponding to the airplane data set. The airplane and flight simulator results must be produced using comparable data analysis techniques.. | | | | | | | | | |
| 5.a. ..... | Turbo-jet airplanes. | | | | | | | | |

TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance | Flight conditions | Test details | Simulator level | | | | Notes |
| Entry No. | Title | | | | A | B | C | D | |
| 5.a.1. | Ready for engine start | ±5 dB per 1/3 octave band | Ground | Normal conditions prior to engine start with the Auxiliary Power Unit operating, if appropriate. | | | | X | |
| 5.a.2. | All engines at idle. | ±5 dB per 1/3 octave band | Ground | Normal condition prior to takeoff | | | | X | |
| 5.a.3. | All engines at maximum allowable thrust with brakes set. | ±5 dB per 1/3 octave band | Ground | Normal condition prior to takeoff | | | | X | |
| 5.a.4. | Climb | ±5 dB per 1/3 octave band | En-route climb | Medium altitude | | | | X | |
| 5.a.5. | Cruise | ±5 dB per 1/3 octave band | Cruise | Normal cruise configuration | | | | X | |
| 5.a.6. | Speedbrake / spoilers extended (as appropriate). | ±5 dB per 1/3 octave band | Cruise | Normal and constant speedbrake deflection for descent at a constant airspeed and power setting. | | | | X | |
| 5.a.7. | Initial approach | ±5 dB per 1/3 octave band | Approach | Constant airspeed, gear up, flaps and slats, as appropriate. | | | | X | |
| 5.a.8. | Final approach | ±5 dB per 1/3 octave band | Landing | Constant airspeed, gear down, full flaps | | | | X | |
| 5.b. | Propeller airplanes. | | | | | | | | |
| 5.b.1. | Ready for engine start | ±5 dB per 1/3 octave band | Ground | Normal conditions prior to engine start with the Auxiliary Power Unit operating, if appropriate. | | | | X | |
| 5.b.2. | All propellers feathered | ±5 dB per 1/3 octave band | Ground | Normal condition prior to takeoff | | | | X | |
| 5.b.3. | Ground idle or equivalent | ±5 dB per 1/3 octave band | Ground | Normal condition prior to takeoff | | | | X | |
| 5.b.4 | Flight idle or equivalent | ±5 dB per 1/3 octave band | Ground | Normal condition prior to takeoff | | | | X | |
| 5.b.5. | All engines at maximum allowable power with brakes set. | ±5 dB per 1/3 octave band | Ground | Normal condition prior to takeoff | | | | X | |
| 5.b.6. | Climb | ±5 dB per 1/3 octave band | En-route climb | Medium altitude | | | | X | |
| 5.b.7. | Cruise | ±5 dB per 1/3 octave band | Cruise | Normal cruise configuration | | | | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.b.8. ..... | Initial approach ..... | ±5 dB per 1/3 octave band ... | Approach ..... | Constant airspeed, gear up, flaps extended as appropriate, RPM as per operating manual. | | | X | |
| 5.b.9. ..... | Final Approach ..... | ±5 dB per 1/3 octave band ... | Landing ..... | Constant airspeed, gear down, full flaps, RPM as per operating manual. | | | X | |
| 5.c. ..... | Special cases. | | | | | | | |
| ..... | | ±5 dB per 1/3 octave band ... | As appropriate ..... | | | | X | These special cases are identified as particularly significant during critical phases of flight and ground operations for a specific airplane type or model. |
| 5.d. ..... | Background noise. | | | | | | | |
| ..... | | ±3 dB per 1/3 octave band ... | | Results of the background noise at initial qualification must be included in the MQTG. Measurements must be made with the simulation running, the sound muted and a ''dead'' flight deck. | | | X | The sound in the simulator will be evaluated to ensure that the background noise does not interfere with training, testing, or checking. |
| 5.e. ..... | Frequency response. | | | | | | | |
| ..... | | ±5 dB on three (3) consecutive bands when compared to initial evaluation; and ±2 dB when comparing the average of the absolute differences between initial and continuing qualification evaluation. | | Applicable only to Continuing Qualification Evaluations. If frequency response plots are provided for each channel at the initial qualification evaluation, these plots may be repeated at the continuing qualification evaluation with the following tolerances applied: (a) The continuing qualification 1/3 octave band amplitudes must not exceed ±5 dB for three consecutive bands when compared to initial results. (b) The average of the sum of the absolute differences between initial and continuing qualification results must not exceed 2 dB (refer to Table A2B in this attachment). | | | X | Measurements are compared to those taken during initial qualification evaluation. |

BEGIN INFORMATION

3. GENERAL

a. If relevant winds are present in the objective data, the wind vector should be clearly noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for test near the ground.

b. The reader is encouraged to review the Airplane Flight Simulator Evaluation Handbook, Volumes I and II, published by the Royal Aeronautical Society, London, UK, and AC 25–7, as amended, Flight Test Guide for Certification of Transport Category Airplanes, and AC 23–8, as amended, Flight Test Guide for Certification of Part 23 Airplanes, for references and examples regarding flight testing requirements and techniques.

4. CONTROL DYNAMICS

a. General. The characteristics of an airplane flight control system have a major effect on handling qualities. A significant consideration in pilot acceptability of an airplane is the ''feel'' provided through the flight controls. Considerable effort is expended on airplane feel system design so that pilots will be comfortable and will consider the airplane desirable to fly. In order for an FFS to be representative, it should ''feel'' like the airplane being simulated. Compliance with this requirement is determined by comparing a recording of the control feel dynamics of the FFS to actual airplane measurements in the takeoff, cruise and landing configurations.

(1) Recordings such as free response to an impulse or step function are classically used to estimate the dynamic properties of electromechanical systems. In any case, it is only possible to estimate the dynamic properties as a result of being able to estimate true inputs and responses. Therefore, it is imperative that the best possible data be collected since close matching of the FFS control loading system to the airplane system is essential. The required dynamic control tests are described in Table A2A of this attachment.

(2) For initial and upgrade evaluations, the QPS requires that control dynamics characteristics be measured and recorded directly from the flight controls (Handling Qualities—Table A2A). This procedure is usually accomplished by measuring the free response of the controls using a step or impulse input to excite the system. The procedure should be accomplished in the takeoff, cruise and landing flight conditions and configurations.

(3) For airplanes with irreversible control systems, measurements may be obtained on the ground if proper pitot-static inputs are provided to represent airspeeds typical of those encountered in flight. Likewise, it may be shown that for some airplanes, takeoff, cruise, and landing configurations have like effects. Thus, one may suffice for another. In either case, engineering validation or airplane manufacturer rationale should be submitted as justification for ground tests or for eliminating a configuration. For FFSs requiring static and dynamic tests at the controls, special test fixtures will not be required during initial and upgrade evaluations if the QTG shows both test fixture results and the results of an alternate approach (e.g., computer plots that were produced concurrently and show satisfactory agreement). Repeat of the alternate method during the initial evaluation satisfies this test requirement.

b. Control Dynamics Evaluation. The dynamic properties of control systems are often stated in terms of frequency, damping and a number of other classical measurements. In order to establish a consistent means of validating test results for FFS control loading, criteria are needed that will clearly define the measurement interpretation and the applied tolerances. Criteria are needed for underdamped, critically damped and overdamped systems. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or overdamped systems, the frequency and damping are not readily measured from a response time history. Therefore, the following suggested measurements may be used:

(1) For Level C and D simulators. Tests to verify that control feel dynamics represent the airplane should show that the dynamic damping cycles (free response of the controls) match those of the airplane within specified tolerances. The NSPM recognizes that several different testing methods may be used to verify the control feel dynamic response. The NSPM will consider the merits of testing methods based on reliability and consistency. One acceptable method of evaluating the response and the tolerance to be applied is described below for the underdamped and critically damped cases. A sponsor using this method to comply with the QPS requirements should perform the tests as follows:

(a) Underdamped response. Two measurements are required for the period, the time to first zero crossing (in case a rate limit is present) and the subsequent frequency of oscillation. It is necessary to measure cycles on an individual basis in case there are nonuniform periods in the response. Each period will be independently compared to the respective period of the airplane control system and, consequently, will enjoy the full tolerance specified for that period. The damping tolerance will be applied to overshoots on an individual basis. Care should be taken when applying the tolerance to small

overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 per cent of the total initial displacement should be considered. The residual band, labeled $T(A_d)$ on Figure A2A is ±5 percent of the initial displacement amplitude $A_d$ from the steady state value of the oscillation. Only oscillations outside the residual band are considered significant. When comparing FFS data to airplane data, the process should begin by overlaying or aligning the FFS and airplane steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing and individual periods of oscillation. The FFS should show the same number of significant overshoots to within one when compared against the airplane data. The procedure for evaluating the response is illustrated in Figure A2A.

(b) Critically damped and overdamped response. Due to the nature of critically damped and overdamped responses (no overshoots), the time to reach 90 percent of the steady state (neutral point) value should be the same as the airplane within ±10 percent. Figure A2B illustrates the procedure.

(c) Special considerations. Control systems that exhibit characteristics other than classical overdamped or underdamped responses should meet specified tolerances. In addition, special consideration should be given to ensure that significant trends are maintained.

(2) Tolerances.

(a) The following table summarizes the tolerances, T, for underdamped systems, and ''n'' is the sequential period of a full cycle of oscillation. See Figure A2A of this attachment for an illustration of the referenced measurements.

$T(P_0)$ ..... ±10% of $P_0$.
$T(P_1)$ ..... ±20% of $P_1$.
$T(P_2)$ ..... ±30% of $P_2$.
$T(P_n)$ ..... ±10(n + 1)% of $P_n$.
$T(A_n)$ ..... ±10% of $A_1$.
$T(A_d)$ ..... ±5% of $A_d$ = residual band.

Significant overshoots, First overshoot and ±1 subsequent overshoots.

(b) The following tolerance applies to critically damped and overdamped systems only. See Figure A2B for an illustration of the reference measurements:

$T(P_0)$ ..... ±10% of $P_0$

END INFORMATION

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BEGIN QPS REQUIREMENT

c. Alternative method for control dynamics evaluation.

(1) An alternative means for validating control dynamics for aircraft with hydraulically powered flight controls and artificial feel systems is by the measurement of control force and rate of movement. For each axis of pitch, roll, and yaw, the control must be forced to its maximum extreme position for the following distinct rates. These tests are conducted under normal flight and ground conditions.

(a) Static test—Slowly move the control so that a full sweep is achieved within 95 to 105 seconds. A full sweep is defined as movement of the controller from neutral to the stop, usually aft or right stop, then to the opposite stop, then to the neutral position.

(b) Slow dynamic test—Achieve a full sweep within 8–12 seconds.

(c) Fast dynamic test—Achieve a full sweep within 3–5 seconds.

NOTE: Dynamic sweeps may be limited to forces not exceeding 100 lbs. (44.5 daN).

(d) Tolerances

(i) Static test; see Table A2A, FFS Objective Tests, Entries 2.a.1., 2.a.2., and 2.a.3.

(ii) Dynamic test—±2 lbs (0.9 daN) or ±10% on dynamic increment above static test.

END QPS REQUIREMENT

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BEGIN INFORMATION

d. The FAA is open to alternative means such as the one described above. The alternatives should be justified and appropriate to the application. For example, the method described here may not apply to all manufacturers' systems and certainly not to aircraft with reversible control systems. Each case is considered on its own merit on an ad hoc basis. If the FAA finds that alternative methods do not result in satisfactory performance, more conventionally accepted methods will have to be used.

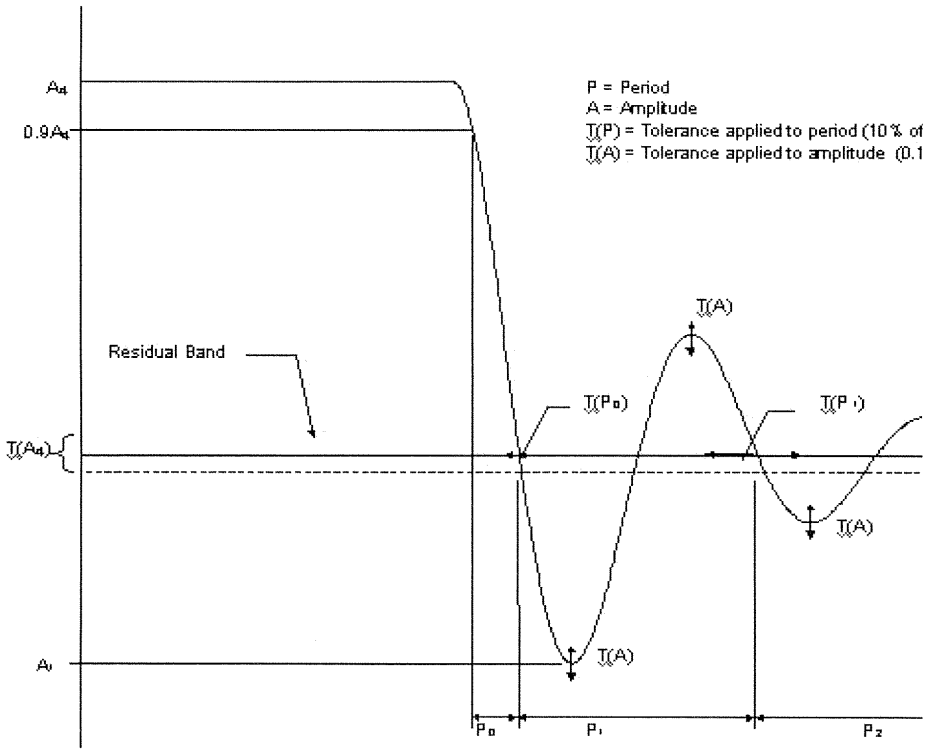


**Figure A2A**
**Underdamped Step Response**

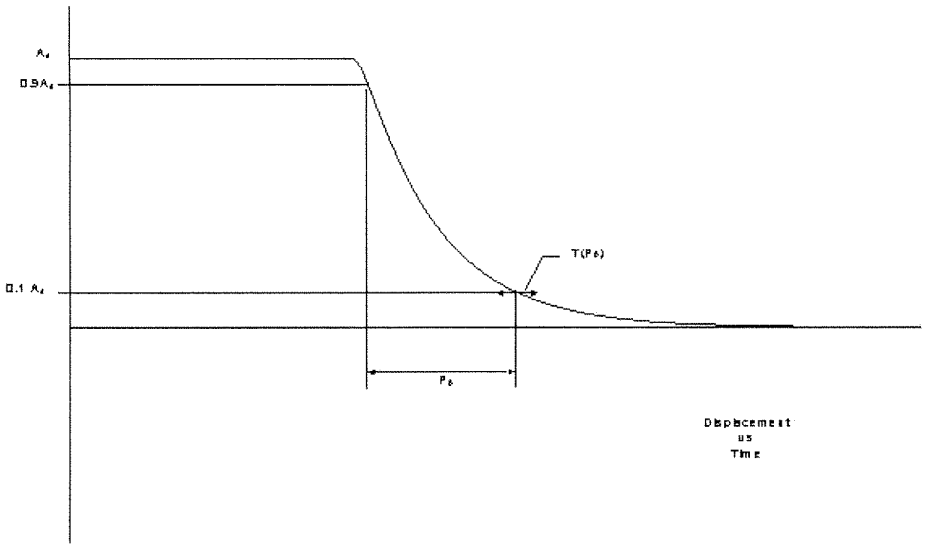


**Figure A2B**
**Critically and Overdamped Step Response**

5. GROUND EFFECT

a. For an FFS to be used for take-off and landing (not applicable to Level A simulators in that the landing maneuver may not be credited in a Level A simulator) it should reproduce the aerodynamic changes that occur in ground effect. The parameters chosen for FFS validation should indicate these changes.

(1) A dedicated test should be provided that will validate the aerodynamic ground effect characteristics.

(2) The organization performing the flight tests may select appropriate test methods and procedures to validate ground effect. However, the flight tests should be performed with enough duration near the ground to sufficiently validate the ground-effect model.

b. The NSPM will consider the merits of testing methods based on reliability and consistency. Acceptable methods of validating ground effect are described below. If other methods are proposed, rationale should be provided to conclude that the tests performed validate the ground-effect model. A sponsor using the methods described below to comply with the QPS requirements should perform the tests as follows:

(1) Level fly-bys. The level fly-bys should be conducted at a minimum of three altitudes within the ground effect, including one at no more than 10% of the wingspan above the ground, one each at approximately 30% and 50% of the wingspan where height refers to main gear tire above the ground. In addition, one level-flight trim condition should be conducted out of ground effect (e.g., at 150% of wingspan).

(2) Shallow approach landing. The shallow approach landing should be performed at a glide slope of approximately one degree with negligible pilot activity until flare.

c. The lateral-directional characteristics are also altered by ground effect. For example, because of changes in lift, roll damping is affected. The change in roll damping will affect other dynamic modes usually evaluated for FFS validation. In fact, Dutch roll dynamics, spiral stability, and roll-rate for a given lateral control input are altered by ground effect. Steady heading sideslips will also be affected. These effects should be accounted for in the FFS modeling. Several tests such as crosswind landing, one engine

inoperative landing, and engine failure on take-off serve to validate lateral-directional ground effect since portions of these tests are accomplished as the aircraft is descending through heights above the runway at which ground effect is an important factor.

6. MOTION SYSTEM

a. General.

(1) Pilots use continuous information signals to regulate the state of the airplane. In concert with the instruments and outside-world visual information, whole-body motion feedback is essential in assisting the pilot to control the airplane dynamics, particularly in the presence of external disturbances. The motion system should meet basic objective performance criteria, and should be subjectively tuned at the pilot's seat position to represent the linear and angular accelerations of the airplane during a prescribed minimum set of maneuvers and conditions. The response of the motion cueing system should also be repeatable.

(2) The Motion System tests in Section 3 of Table A2A are intended to qualify the FFS motion cueing system from a mechanical performance standpoint. Additionally, the list of motion effects provides a representative sample of dynamic conditions that should be present in the flight simulator. An additional list of representative, training-critical maneuvers, selected from Section 1 (Performance tests), and Section 2 (Handling Qualities tests), in Table A2A, that should be recorded during initial qualification (but without tolerance) to indicate the flight simulator motion cueing performance signature have been identified (reference Section 3.e). These tests are intended to help improve the overall standard of FFS motion cueing.

b. Motion System Checks. The intent of test 3a, Frequency Response, test 3b, Leg Balance, and test 3c, Turn-Around Check, as described in the Table of Objective Tests, is to demonstrate the performance of the motion system hardware, and to check the integrity of the motion set-up with regard to calibration and wear. These tests are independent of the motion cueing software and should be considered robotic tests.

c. Motion System Repeatability. The intent of this test is to ensure that the motion system software and motion system hardware have not degraded or changed over time. This diagnostic test should be completed during continuing qualification checks in lieu of the robotic tests. This will allow an improved ability to determine changes in the software or determine degradation in the hardware. The following information delineates the methodology that should be used for this test.

(1) Input: The inputs should be such that rotational accelerations, rotational rates, and linear accelerations are inserted before the transfer from airplane center of gravity to pilot reference point with a minimum amplitude of 5 deg/sec/sec, 10 deg/sec and 0.3 g, respectively, to provide adequate analysis of the output.

(2) Recommended output:

(a) Actual platform linear accelerations; the output will comprise accelerations due to both the linear and rotational motion acceleration;

(b) Motion actuators position.

d. Motion Cueing Performance Signature.

(1) Background. The intent of this test is to provide quantitative time history records of motion system response to a selected set of automated QTG maneuvers during initial qualification. This is not intended to be a comparison of the motion platform accelerations against the flight test recorded accelerations (i.e., not to be compared against airplane cueing). If there is a modification to the initially qualified motion software or motion hardware (e.g., motion washout filter, simulator payload change greater than 10%) then a new baseline may need to be established.

(2) Test Selection. The conditions identified in Section 3.e. in Table A2A are those maneuvers where motion cueing is the most discernible. They are general tests applicable to all types of airplanes and should be completed for motion cueing performance signature at any time acceptable to the NSPM prior to or during the initial qualification evaluation, and the results included in the MQTG.

(3) Priority. Motion system should be designed with the intent of placing greater importance on those maneuvers that directly influence pilot perception and control of the airplane motions. For the maneuvers identified in section 3.e. in Table A2A, the flight simulator motion cueing system should have a high tilt co-ordination gain, high rotational gain, and high correlation with respect to the airplane simulation model.

(4) Data Recording. The minimum list of parameters provided should allow for the determination of the flight simulator's motion cueing performance signature for the initial qualification evaluation. The following parameters are recommended as being acceptable to perform such a function:

(a) Flight model acceleration and rotational rate commands at the pilot reference point;

(b) Motion actuators position;

(c) Actual platform position;

(d) Actual platform acceleration at pilot reference point.

e. Motion Vibrations.

(1) Presentation of results. The characteristic motion vibrations may be used to verify that the flight simulator can reproduce the frequency content of the airplane when flown in specific conditions. The test results should be presented as a Power Spectral Density (PSD) plot with frequencies on

the horizontal axis and amplitude on the vertical axis. The airplane data and flight simulator data should be presented in the same format with the same scaling. The algorithms used for generating the flight simulator data should be the same as those used for the airplane data. If they are not the same then the algorithms used for the flight simulator data should be proven to be sufficiently comparable. As a minimum, the results along the dominant axes should be presented and a rationale for not presenting the other axes should be provided.

(2) Interpretation of results. The overall trend of the PSD plot should be considered while focusing on the dominant frequencies. Less emphasis should be placed on the differences at the high frequency and low amplitude portions of the PSD plot. During the analysis, certain structural components of the flight simulator have resonant frequencies that are filtered and may not appear in the PSD plot. If filtering is required, the notch filter bandwidth should be limited to 1 Hz to ensure that the buffet feel is not adversely affected. In addition, a rationale should be provided to explain that the characteristic motion vibration is not being adversely affected by the filtering. The amplitude should match airplane data as described below. However, if the PSD plot was altered for subjective reasons, a rationale should be provided to justify the change. If the plot is on a logarithmic scale, it may be difficult to interpret the amplitude of the buffet in terms of acceleration. For example, a $1 \times 10^{-3}$ g-rms$^2$/Hz would describe a heavy buffet and may be seen in the deep stall regime. Alternatively, a $1 \times 10^{-6}$ g-rms$^2$/Hz buffet is almost not perceivable; but may represent a flap buffet at low speed. The previous two examples differ in magnitude by 1000. On a PSD plot this represents three decades (one decade is a change in order of magnitude of 10; and two decades is a change in order of magnitude of 100).

NOTE: In the example, ''g-rms$^2$ is the mathematical expression for ''g's root mean squared.''

7. SOUND SYSTEM

a. General. The total sound environment in the airplane is very complex, and changes with atmospheric conditions, airplane configuration, airspeed, altitude, and power settings. Flight deck sounds are an important component of the flight deck operational environment and provide valuable information to the flight crew. These aural cues can either assist the crew (as an indication of an abnormal situation), or hinder the crew (as a distraction or nuisance). For effective training, the flight simulator should provide flight deck sounds that are perceptible to the pilot during normal and abnormal operations, and comparable to those of the airplane. The flight simulator operator should carefully evaluate background noises in the location where the device will be installed. To demonstrate compliance with the sound requirements, the objective or validation tests in this attachment were selected to provide a representative sample of normal static conditions typically experienced by a pilot.

b. Alternate propulsion. For FFS with multiple propulsion configurations, any condition listed in Table A2A of this attachment should be presented for evaluation as part of the QTG if identified by the airplane manufacturer or other data supplier as significantly different due to a change in propulsion system (engine or propeller).

c. Data and Data Collection System.

(1) Information provided to the flight simulator manufacturer should be presented in the format suggested by the International Air Transport Association (IATA) ''Flight Simulator Design and Performance Data Requirements,'' as amended. This information should contain calibration and frequency response data.

(2) The system used to perform the tests listed in Table A2A should comply with the following standards:

(a) The specifications for octave, half octave, and third octave band filter sets may be found in American National Standards Institute (ANSI) S1.11–1986;

(b) Measurement microphones should be type WS2 or better, as described in International Electrotechnical Commission (IEC) 1094–4–1995.

(3) Headsets. If headsets are used during normal operation of the airplane they should also be used during the flight simulator evaluation.

(4) Playback equipment. Playback equipment and recordings of the QTG conditions should be provided during initial evaluations.

(5) Background noise.

(a) Background noise is the noise in the flight simulator that is not associated with the airplane, but is caused by the flight simulator's cooling and hydraulic systems and extraneous noise from other locations in the building. Background noise can seriously impact the correct simulation of airplane sounds and should be kept below the airplane sounds. In some cases, the sound level of the simulation can be increased to compensate for the background noise. However, this approach is limited by the specified tolerances and by the subjective acceptability of the sound environment to the evaluation pilot.

(b) The acceptability of the background noise levels is dependent upon the normal sound levels in the airplane being represented. Background noise levels that fall below the lines defined by the following points, may be acceptable:

(i) 70 dB @ 50 Hz;

(ii) 55 dB @ 1000 Hz;
(iii) 30 dB @ 16 kHz
(NOTE: These limits are for unweighted ⅓ octave band sound levels. Meeting these limits for background noise does not ensure an acceptable flight simulator. Airplane sounds that fall below this limit require careful review and may require lower limits on background noise.)

(6) Validation testing. Deficiencies in airplane recordings should be considered when applying the specified tolerances to ensure that the simulation is representative of the airplane. Examples of typical deficiencies are:
(a) Variation of data between tail numbers;
(b) Frequency response of microphones;
(c) Repeatability of the measurements.

TABLE A2B—EXAMPLE OF CONTINUING QUALIFICATION FREQUENCY RESPONSE TEST TOLERANCE

| Band center frequency | Initial results (dBSPL) | Continuing qualification results (dBSPL) | Absolute difference |
|---|---|---|---|
| 50 | 75.0 | 73.8 | 1.2 |
| 63 | 75.9 | 75.6 | 0.3 |
| 80 | 77.1 | 76.5 | 0.6 |
| 100 | 78.0 | 78.3 | 0.3 |
| 125 | 81.9 | 81.3 | 0.6 |
| 160 | 79.8 | 80.1 | 0.3 |
| 200 | 83.1 | 84.9 | 1.8 |
| 250 | 78.6 | 78.9 | 0.3 |
| 315 | 79.5 | 78.3 | 1.2 |
| 400 | 80.1 | 79.5 | 0.6 |
| 500 | 80.7 | 79.8 | 0.9 |
| 630 | 81.9 | 80.4 | 1.5 |
| 800 | 73.2 | 74.1 | 0.9 |
| 1000 | 79.2 | 80.1 | 0.9 |
| 1250 | 80.7 | 82.8 | 2.1 |
| 1600 | 81.6 | 78.6 | 3.0 |
| 2000 | 76.2 | 74.4 | 1.8 |
| 2500 | 79.5 | 80.7 | 1.2 |
| 3150 | 80.1 | 77.1 | 3.0 |
| 4000 | 78.9 | 78.6 | 0.3 |
| 5000 | 80.1 | 77.1 | 3.0 |
| 6300 | 80.7 | 80.4 | 0.3 |
| 8000 | 84.3 | 85.5 | 1.2 |
| 10000 | 81.3 | 79.8 | 1.5 |
| 12500 | 80.7 | 80.1 | 0.6 |
| 16000 | 71.1 | 71.1 | 0.0 |
| Average | | | 1.1 |

8. ADDITIONAL INFORMATION ABOUT FLIGHT SIMULATOR QUALIFICATION FOR NEW OR DERIVATIVE AIRPLANES

a. Typically, an airplane manufacturer's approved final data for performance, handling qualities, systems or avionics is not available until well after a new or derivative airplane has entered service. However, flight crew training and certification often begins several months prior to the entry of the first airplane into service. Consequently, it may be necessary to use preliminary data provided by the airplane manufacturer for interim qualification of flight simulators.

b. In these cases, the NSPM may accept certain partially validated preliminary airplane and systems data, and early release (''red label'') avionics data in order to permit the necessary program schedule for training, certification, and service introduction.

c. Simulator sponsors seeking qualification based on preliminary data should consult the NSPM to make special arrangements for using preliminary data for flight simulator qualification. The sponsor should also consult the airplane and flight simulator manufacturers to develop a data plan and flight simulator qualification plan.

d. The procedure to be followed to gain NSPM acceptance of preliminary data will vary from case to case and between airplane manufacturers. Each airplane manufacturer's new airplane development and test program is designed to suit the needs of the particular project and may not contain the same events or sequence of events as another manufacturer's program, or even the same manufacturer's program for a different airplane. Therefore, there cannot be a prescribed invariable procedure for acceptance of preliminary data, but instead there should be a statement describing the final sequence of events, data sources, and validation procedures agreed by the simulator sponsor, the airplane manufacturer, the flight simulator manufacturer, and the NSPM.

NOTE: A description of airplane manufacturer-provided data needed for flight simulator modeling and validation is to be found in the IATA Document ''Flight Simulator Design and Performance Data Requirements,'' as amended.

e. The preliminary data should be the manufacturer's best representation of the airplane, with assurance that the final data will not significantly deviate from the preliminary estimates. Data derived from these predictive or preliminary techniques should be validated against available sources including, at least, the following:

(1) Manufacturer's engineering report. The report should explain the predictive method used and illustrate past success of the method on similar projects. For example, the manufacturer could show the application of the method to an earlier airplane model or predict the characteristics of an earlier model and compare the results to final data for that model.

(2) Early flight test results. This data is often derived from airplane certification tests, and should be used to maximum advantage for early flight simulator validation. Certain critical tests that would normally be done early in the airplane certification program should be included to validate essential pilot training and certification maneuvers. These include cases where a pilot is expected to cope with an airplane failure mode or an engine failure. Flight test

data that will be available early in the flight test program will depend on the airplane manufacturer's flight test program design and may not be the same in each case. The flight test program of the airplane manufacturer should include provisions for generation of very early flight test results for flight simulator validation.

f. The use of preliminary data is not indefinite. The airplane manufacturer's final data should be available within 12 months after the airplane's first entry into service or as agreed by the NSPM, the simulator sponsor, and the airplane manufacturer. When applying for interim qualification using preliminary data, the simulator sponsor and the NSPM should agree on the update program. This includes specifying that the final data update will be installed in the flight simulator within a period of 12 months following the final data release, unless special conditions exist and a different schedule is acceptable. The flight simulator performance and handling validation would then be based on data derived from flight tests or from other approved sources. Initial airplane systems data should be updated after engineering tests. Final airplane systems data should also be used for flight simulator programming and validation.

g. Flight simulator avionics should stay essentially in step with airplane avionics (hardware and software) updates. The permitted time lapse between airplane and flight simulator updates should be minimal. It may depend on the magnitude of the update and whether the QTG and pilot training and certification are affected. Differences in airplane and flight simulator avionics versions and the resulting effects on flight simulator qualification should be agreed between the simulator sponsor and the NSPM. Consultation with the flight simulator manufacturer is desirable throughout the qualification process.

h. The following describes an example of the design data and sources that might be used in the development of an interim qualification plan.

(1) The plan should consist of the development of a QTG based upon a mix of flight test and engineering simulation data. For data collected from specific airplane flight tests or other flights, the required design model or data changes necessary to support an acceptable Proof of Match (POM) should be generated by the airplane manufacturer.

(2) For proper validation of the two sets of data, the airplane manufacturer should compare their simulation model responses against the flight test data, when driven by the same control inputs and subjected to the same atmospheric conditions as recorded in the flight test. The model responses should result from a simulation where the following systems are run in an integrated fashion and are consistent with the design data released to the flight simulator manufacturer:

(a) Propulsion;
(b) Aerodynamics;
(c) Mass properties;
(d) Flight controls;
(e) Stability augmentation; and
(f) Brakes/landing gear.

i. A qualified test pilot should be used to assess handling qualities and performance evaluations for the qualification of flight simulators of new airplane types.

END INFORMATION

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BEGIN QPS REQUIREMENT

9. ENGINEERING SIMULATOR—VALIDATION DATA

a. When a fully validated simulation (i.e., validated with flight test results) is modified due to changes to the simulated airplane configuration, the airplane manufacturer or other acceptable data supplier must coordinate with the NSPM if they propose to supply validation data from an ''audited'' engineering simulator/simulation to selectively supplement flight test data. The NSPM must be provided an opportunity to audit the engineering simulation or the engineering simulator used to generate the validation data. Validation data from an audited engineering simulation may be used for changes that are incremental in nature. Manufacturers or other data suppliers must be able to demonstrate that the predicted changes in aircraft performance are based on acceptable aeronautical principles with proven success history and valid outcomes. This must include comparisons of predicted and flight test validated data.

b. Airplane manufacturers or other acceptable data suppliers seeking to use an engineering simulator for simulation validation data as an alternative to flight-test derived validation data, must contact the NSPM and provide the following:

(1) A description of the proposed aircraft changes, a description of the proposed simulation model changes, and the use of an integral configuration management process, including a description of the actual simulation model modifications that includes a step-by-step description leading from the original model(s) to the current model(s).

(2) A schedule for review by the NSPM of the proposed plan and the subsequent validation data to establish acceptability of the proposal.

(3) Validation data from an audited engineering simulator/simulation to supplement specific segments of the flight test data.

c. To be qualified to supply engineering simulator validation data, for aerodynamic, engine, flight control, or ground handling

models, an airplane manufacturer or other acceptable data supplier must:

(1) Be able to verify their ability able to:

(a) Develop and implement high fidelity simulation models; and

(b) Predict the handling and performance characteristics of an airplane with sufficient accuracy to avoid additional flight test activities for those handling and performance characteristics.

(2) Have an engineering simulator that:

(a) Is a physical entity, complete with a flight deck representative of the simulated class of airplane;

(b) Has controls sufficient for manual flight;

(c) Has models that run in an integrated manner;

(d) Has fully flight-test validated simulation models as the original or baseline simulation models;

(e) Has an out-of-the-flight deck visual system;

(f) Has actual avionics boxes interchangeable with the equivalent software simulations to support validation of released software;

(g) Uses the same models as released to the training community (which are also used to produce stand-alone proof-of-match and checkout documents);

(h) Is used to support airplane development and certification; and

(i) Has been found to be a high fidelity representation of the airplane by the manufacturer's pilots (or other acceptable data supplier), certificate holders, and the NSPM.

(3) Use the engineering simulator/simulation to produce a representative set of integrated proof-of-match cases.

(4) Use a configuration control system covering hardware and software for the operating components of the engineering simulator/simulation.

(5) Demonstrate that the predicted effects of the change(s) are within the provisions of sub-paragraph ''a'' of this section, and confirm that additional flight test data are not required.

d. Additional Requirements for Validation Data

(1) When used to provide validation data, an engineering simulator must meet the simulator standards currently applicable to training simulators except for the data package.

(2) The data package used must be:

(a) Comprised of the engineering predictions derived from the airplane design, development, or certification process;

(b) Based on acceptable aeronautical principles with proven success history and valid outcomes for aerodynamics, engine operations, avionics operations, flight control applications, or ground handling;

(c) Verified with existing flight-test data; and

(d) Applicable to the configuration of a production airplane, as opposed to a flight-test airplane.

(3) Where engineering simulator data are used as part of a QTG, an essential match must exist between the training simulator and the validation data.

(4) Training flight simulator(s) using these baseline and modified simulation models must be qualified to at least internationally recognized standards, such as contained in the ICAO Document 9625, the ''Manual of Criteria for the Qualification of Flight Simulators.''

END QPS REQUIREMENT

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10. [RESERVED]

11. VALIDATION TEST TOLERANCES

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BEGIN INFORMATION

a. Non-Flight-Test Tolerances

(1) If engineering simulator data or other non-flight-test data are used as an allowable form of reference validation data for the objective tests listed in Table A2A of this attachment, the data provider must supply a well-documented mathematical model and testing procedure that enables a replication of the engineering simulation results within 20% of the corresponding flight test tolerances.

b. Background

(1) The tolerances listed in Table A2A of this attachment are designed to measure the quality of the match using flight-test data as a reference.

(2) Good engineering judgment should be applied to all tolerances in any test. A test is failed when the results clearly fall outside of the prescribed tolerance(s).

(3) Engineering simulator data are acceptable because the same simulation models used to produce the reference data are also used to test the flight training simulator (i.e., the two sets of results should be ''essentially'' similar).

(4) The results from the two sources may differ for the following reasons:

(a) Hardware (avionics units and flight controls);

(b) Iteration rates;

(c) Execution order;

(d) Integration methods;

(e) Processor architecture;

(f) Digital drift, including:

(i) Interpolation methods;

(ii) Data handling differences; and

(iii) Auto-test trim tolerances.

(5) The tolerance limit between the reference data and the flight simulator results is generally 20% of the corresponding ''flight-test'' tolerances. However, there may

be cases where the simulator models used are of higher fidelity, or the manner in which they are cascaded in the integrated testing loop have the effect of a higher fidelity, than those supplied by the data provider. Under these circumstances, it is possible that an error greater than 20% may be generated. An error greater than 20% may be acceptable if simulator sponsor can provide an adequate explanation.

(6) Guidelines are needed for the application of tolerances to engineering-simulator-generated validation data because:

(a) Flight-test data are often not available due to technical reasons;

(b) Alternative technical solutions are being advanced; and

(c) High costs.

12. VALIDATION DATA ROADMAP

a. Airplane manufacturers or other data suppliers should supply a validation data roadmap (VDR) document as part of the data package. A VDR document contains guidance material from the airplane validation data supplier recommending the best possible sources of data to be used as validation data in the QTG. A VDR is of special value when requesting interim qualification, qualification of simulators for airplanes certificated prior to 1992, and qualification of alternate engine or avionics fits. A sponsor seeking to have a device qualified in accordance with the standards contained in this QPS appendix should submit a VDR to the NSPM as early as possible in the planning stages. The NSPM is the final authority to approve the data to be used as validation material for the QTG. The NSPM and the Joint Aviation Authorities' Synthetic Training Devices Advisory Board have committed to maintain a list of agreed VDRs.

b. The VDR should identify (in matrix format) sources of data for all required tests. It should also provide guidance regarding the validity of these data for a specific engine type, thrust rating configuration, and the revision levels of all avionics affecting airplane handling qualities and performance. The VDR should include rationale or explanation in cases where data or parameters are missing, engineering simulation data are to be used, flight test methods require explanation, or there is any deviation from data requirements. Additionally, the document should refer to other appropriate sources of validation data (e.g., sound and vibration data documents).

c. The Sample Validation Data Roadmap (VDR) for airplanes, shown in Table A2C, depicts a generic roadmap matrix identifying sources of validation data for an abbreviated list of tests. This document is merely a sample and does not provide actual data. A complete matrix should address all test conditions and provide actual data and data sources.

d. Two examples of rationale pages are presented in Appendix F of the IATA ''Flight Simulator Design and Performance Data Requirements.'' These illustrate the type of airplane and avionics configuration information and descriptive engineering rationale used to describe data anomalies or provide an acceptable basis for using alternative data for QTG validation requirements.

END INFORMATION

**Table A2C - Sample Validation Data Roadmap for Airplanes**

| ICAO or IATA # | Test Description | CCA Mode | Validation Source | | Validation Document | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aircraft Flight Test Data | Engineering Simulator Data (DEF-73 Engines) | Aerodynamics POM Doc.#xxx123, Rev. A | Flight Controls POM Doc.#xxx456, NEW | Ground Handling POM Doc. #xxx789, Rev. B | Propulsion POM Doc. #321, Rev. C | Integrated POM Doc. #xxx654, Rev. A | Appendix to this VDR Doc. #xxx987, NEW | *Legend:*<br>D71 = Engine Type (Thrust Rating of 71.5K)<br>D73 = Engine Type (Thrust Rating of 73K)<br><br>**Bold upper case** = primary validation source.<br><br>Lower case, within parentheses = alternative validation source.<br><br>R = Rationale included in the data package Appendix. |
| *Notes:*<br>1. Only one page is shown; and some test conditions were deleted for brevity.<br>2. Relevant regulatory material should be consulted and all applicable tests addressed.<br>3. Validation source, document and comments provided herein are for reference only and do not constitute approval for use.<br>4. CCA mode must be described for each test condition.<br>5. If more than one aircraft type (e.g., derivative and baseline) are used as validation data more columns may be necessary. | | | | | | | | | | | |
| 1.a.1. | Minimum Radius Turn. | | **X** | | | | **D71** | | | | |
| 1.a.2. | Rate of Turn vs. Nosewheel Angle (2 speeds). | | **X** | | | | **D71** | | | | |
| 1.b.1. | Ground Acceleration Time and Distance. | | **X** | | | | (d73) | | **D73** | | Primary data contained in IPOM. |
| 1.b.2. | Minimum Control Speed, Ground (Vmcg). | | (x) | **X** | (d71) | | | | | **D73** | See engineering rationale for test data in VDR. |
| 1.b.3. | Minimum Unstick Speed (Vmu). | | **X** | | **D71** | | | | | | |
| 1.b.4. | Normal Takeoff. | | **X** | | (d73) | | | | **D73** | | Primary data contained in IPOM. |
| 1.b.5. | Critical Engine Failure on Takeoff. | | **X** | | (d71) | | | | | **D73** | Alternative engine thrust rating flight test data in VDR. |
| 1.b.6. | Crosswind Takeoff. | | **X** | | (d71) | | | | | **D73** | Alternative engine thrust rating flight test data in VDR. |
| 1.b.7. | Rejected Takeoff. | | **X** | | **D71** | | | | | **R** | Test procedure anomaly; see rationale. |
| 1.b.8. | Dynamic Engine Failure After Takeoff. | | | **X** | | | | | | **D73** | No flight test data available; see rationale. |
| 1.c.1. | Normal Climb – All Engines. | | **X** | | (d71) | | | | **D71** | | Primary data contained in IPOM. |
| 1.c.2. | Climb – Engine-out, Second Segment. | | **X** | | (d71) | | | | | **D73** | Alternative engine thrust rating flight test data in VDR. |
| 1.c.3. | Climb – Engine-out, Enroute. | | **X** | | (d71) | | | | | **D73** | AFM data available (73K). |
| 1.c.4. | Engine-out, Approach Climb. | | **X** | | **D71** | | | | | | |
| 1.c.5.a. | Level Flight Acceleration. | | (x) | **X** | (d73) | | | | | **D73** | Eng sim data w/ modified EEC accel rate in VDR. |
| 1.c.5.b. | Level Flight Deceleration. | | (x) | **X** | (d73) | | | | | **D73** | Eng sim data w/ modified EEC accel rate in VDR. |
| 1.d.1. | Cruise Performance. | | **X** | | **D71** | | | | | | |
| 1.e.1.a. | Stopping Time & Distance (Wheel brakes / Light weight). | | | **X** | **D71** | | | | | (d73) | No flight test data available; see rationale. |
| 1.e.1.b. | Stopping Time & Distance (Wheel brakes/ Med. weight). | | **X** | (x) | **D71** | | | | | (d73) | |
| 1.e.1.c. | Stopping Time & Distance (Wheel brakes / Heavy weight). | | **X** | (x) | **D71** | | | | | (d73) | |
| 1.e.2.a. | Stopping Time & Distance (Reverse thrust / Light weight). | | **X** | (x) | **D71** | | | | | (d73) | |
| 1.e.2.b. | Stopping Time & Distance (Reverse thrust / Med. Weight). | | | **X** | (d71) | | | | | **D73** | No flight test data available; see rationale. |

BEGIN INFORMATION

13. ACCEPTANCE GUIDELINES FOR ALTERNATIVE ENGINES DATA.

a. Background

(1) For a new airplane type, the majority of flight validation data are collected on the first airplane configuration with a ''baseline'' engine type. These data are then used to validate all flight simulators representing that airplane type.

(2) Additional flight test validation data may be needed for flight simulators representing an airplane with engines of a different type than the baseline, or for engines with thrust rating that is different from previously validated configurations.

(3) When a flight simulator with alternate engines is to be qualified, the QTG should contain tests against flight test validation data for selected cases where engine differences are expected to be significant.

b. Approval Guidelines For Validating Alternate Engine Applications

(1) The following guidelines apply to flight simulators representing airplanes with alternate engine applications or with more than one engine type or thrust rating.

(2) Validation tests can be segmented into two groups, those that are dependent on engine type or thrust rating and those that are not.

(3) For tests that are independent of engine type or thrust rating, the QTG can be based on validation data from any engine application. Tests in this category should be designated as independent of engine type or thrust rating.

(4) For tests that are affected by engine type, the QTG should contain selected engine-specific flight test data sufficient to validate that particular airplane-engine configuration. These effects may be due to engine dynamic characteristics, thrust levels or engine-related airplane configuration changes. This category is primarily characterized by variations between different engine manufacturers' products, but also includes differences due to significant engine design changes from a previously flight-validated configuration within a single engine type. See Table A2D, Alternate Engine Validation Flight Tests in this section for a list of acceptable tests.

(5) Alternate engine validation data should be based on flight test data, except as noted in sub-paragraphs 13.c.(1) and (2), or where other data are specifically allowed (e.g., engineering simulator/simulation data). If certification of the flight characteristics of the airplane with a new thrust rating (regardless of percentage change) does require certification flight testing with a comprehensive stability and control flight instrumentation package, then the conditions described in Table A2D in this section should be obtained from flight testing and presented in the QTG. Flight test data, other than throttle calibration data, are not required if the new thrust rating is certified on the airplane without need for a comprehensive stability and control flight instrumentation package.

(6) As a supplement to the engine-specific flight tests listed in Table A2D and baseline engine-independent tests, additional engine-specific engineering validation data should be provided in the QTG, as appropriate, to facilitate running the entire QTG with the alternate engine configuration. The sponsor and the NSPM should agree in advance on the specific validation tests to be supported by engineering simulation data.

(7) A matrix or VDR should be provided with the QTG indicating the appropriate validation data source for each test.

(8) The flight test conditions in Table A2D are appropriate and should be sufficient to validate implementation of alternate engines in a flight simulator.

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BEGIN QPS REQUIREMENT

c. Test Requirements

(1) The QTG must contain selected engine-specific flight test data sufficient to validate the alternative thrust level when:

(a) the engine type is the same, but the thrust rating exceeds that of a previously flight-test validated configuration by five percent (5%) or more; or

(b) the engine type is the same, but the thrust rating is less than the lowest previously flight-test validated rating by fifteen percent (15%) or more. See Table A2D for a list of acceptable tests.

(2) Flight test data is not required if the thrust increase is greater than 5%, but flight tests have confirmed that the thrust increase does not change the airplane's flight characteristics.

(3) Throttle calibration data (i.e., commanded power setting parameter versus throttle position) must be provided to validate all alternate engine types and engine thrust ratings that are higher or lower than a previously validated engine. Data from a test airplane or engineering test bench with the correct engine controller (both hardware and software) are required.

END QPS REQUIREMENT

BEGIN QPS REQUIREMENT

TABLE A2D—ALTERNATIVE ENGINE VALIDATION FLIGHT TESTS

| Entry No. | Test description | | Alternative engine type | Alternative thrust rating [2] |
|---|---|---|---|---|
| 1.b.1., 1.b.4. | Normal take-off/ground acceleration time and distance | | X | X |
| 1.b.2. | $V_{mcg}$, if performed for airplane certification | | X | X |
| 1.b.5. | Engine-out take-off | Either test | | |
| 1.b.8. | Dynamic engine failure after take-off. | may be performed. | X | |
| 1.b.7. | Rejected take-off if performed for airplane certification | | X | |
| 1.d.1. | Cruise performance | | X | |
| 1.f.1., 1.f.2. | Engine acceleration and deceleration | | X | X |
| 2.a.7. | Throttle calibration [1] | | X | X |
| 2.c.1. | Power change dynamics (acceleration) | | X | X |
| 2.d.1. | $V_{mca}$ if performed for airplane certification | | X | X |
| 2.d.5. | Engine inoperative trim | | X | X |
| 2.e.1. | Normal landing | | X | |

[1] Must be provided for all changes in engine type or thrust rating; see paragraph 13.c.(3).
[2] See paragraphs 13.c.(1) through 13.c.(3), for a definition of applicable thrust ratings.

END QPS REQUIREMENT

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BEGIN INFORMATION

14. ACCEPTANCE GUIDELINES FOR ALTERNATIVE AVIONICS (FLIGHT-RELATED COMPUTERS AND CONTROLLERS)

a. Background

(1) For a new airplane type, the majority of flight validation data are collected on the first airplane configuration with a ''baseline'' flight-related avionics ship-set; (see subparagraph b.(2) of this section). These data are then used to validate all flight simulators representing that airplane type.

(2) Additional validation data may be required for flight simulators representing an airplane with avionics of a different hardware design than the baseline, or a different software revision than previously validated configurations.

(3) When a flight simulator with additional or alternate avionics configurations is to be qualified, the QTG should contain tests against validation data for selected cases where avionics differences are expected to be significant.

b. Approval Guidelines for Validating Alternate Avionics

(1) The following guidelines apply to flight simulators representing airplanes with a revised avionics configuration, or more than one avionics configuration.

(2) The baseline validation data should be based on flight test data, except where other data are specifically allowed (e.g., engineering flight simulator data).

(3) The airplane avionics can be segmented into two groups, systems or components whose functional behavior contributes to the aircraft response presented in the QTG results, and systems that do not. The following avionics are examples of contributory systems for which hardware design changes or software revisions may lead to significant differences in the aircraft response relative to the baseline avionics configuration: Flight control computers and controllers for engines, autopilot, braking system, nosewheel steering system, and high lift system. Related avionics such as stall warning and augmentation systems should also be considered.

(4) The acceptability of validation data used in the QTG for an alternative avionics fit should be determined as follows:

(a) For changes to an avionics system or component that do not affect QTG validation test response, the QTG test can be based on validation data from the previously validated avionics configuration.

(b) For an avionics change to a contributory system, where a specific test is not affected by the change (e.g., the avionics change is a Built In Test Equipment (BITE) update or a modification in a different flight phase), the QTG test can be based on validation data from the previously-validated avionics configuration. The QTG should include authoritative justification (e.g., from the airplane manufacturer or system supplier) that this avionics change does not affect the test.

(c) For an avionics change to a contributory system, the QTG may be based on validation data from the previously-validated avionics configuration if no new functionality is added and the impact of the avionics change on the airplane response is small and based on acceptable aeronautical principles with proven success history and valid outcomes. This should be supplemented with avionics-specific validation data from the airplane manufacturer's engineering

simulation, generated with the revised avionics configuration. The QTG should also include an explanation of the nature of the change and its effect on the airplane response.

(d) For an avionics change to a contributory system that significantly affects some tests in the QTG or where new functionality is added, the QTG should be based on validation data from the previously validated avionics configuration and supplemental avionics-specific flight test data sufficient to validate the alternate avionics revision. Additional flight test validation data may not be needed if the avionics changes were certified without the need for testing with a comprehensive flight instrumentation package. The airplane manufacturer should coordinate flight simulator data requirements, in advance with the NSPM.

(5) A matrix or ''roadmap'' should be provided with the QTG indicating the appropriate validation data source for each test. The roadmap should include identification of the revision state of those contributory avionics systems that could affect specific test responses if changed.

15. TRANSPORT DELAY TESTING

a. This paragraph explains how to determine the introduced transport delay through the flight simulator system so that it does not exceed a specific time delay. The transport delay should be measured from control inputs through the interface, through each of the host computer modules and back through the interface to motion, flight instrument, and visual systems. The transport delay should not exceed the maximum allowable interval.

b. Four specific examples of transport delay are:

(1) Simulation of classic non-computer controlled aircraft;

(2) Simulation of computer controlled aircraft using real airplane black boxes;

(3) Simulation of computer controlled aircraft using software emulation of airplane boxes;

(4) Simulation using software avionics or re-hosted instruments.

c. Figure A2C illustrates the total transport delay for a non-computer-controlled airplane or the classic transport delay test. Since there are no airplane-induced delays for this case, the total transport delay is equivalent to the introduced delay.

d. Figure A2D illustrates the transport delay testing method using the real airplane controller system.

e. To obtain the induced transport delay for the motion, instrument and visual signal, the delay induced by the airplane controller should be subtracted from the total transport delay. This difference represents the introduced delay and should not exceed the standards prescribed in Table A1A.

f. Introduced transport delay is measured from the flight deck control input to the reaction of the instruments and motion and visual systems (See Figure A2C).

g. The control input may also be introduced after the airplane controller system and the introduced transport delay measured directly from the control input to the reaction of the instruments, and simulator motion and visual systems (See Figure A2D).

h. Figure A2E illustrates the transport delay testing method used on a flight simulator that uses a software emulated airplane controller system.

i. It is not possible to measure the introduced transport delay using the simulated airplane controller system architecture for the pitch, roll and yaw axes. Therefore, the signal should be measured directly from the pilot controller. The flight simulator manufacturer should measure the total transport delay and subtract the inherent delay of the actual airplane components because the real airplane controller system has an inherent delay provided by the airplane manufacturer. The flight simulator manufacturer should ensure that the introduced delay does not exceed the standards prescribed in Table A1A.

j. Special measurements for instrument signals for flight simulators using a real airplane instrument display system instead of a simulated or re-hosted display. For flight instrument systems, the total transport delay should be measured and the inherent delay of the actual airplane components subtracted to ensure that the introduced delay does not exceed the standards prescribed in Table A1A.

(1) Figure A2FA illustrates the transport delay procedure without airplane display simulation. The introduced delay consists of the delay between the control movement and the instrument change on the data bus.

(2) Figure A2FB illustrates the modified testing method required to measure introduced delay due to software avionics or rehosted instruments. The total simulated instrument transport delay is measured and the airplane delay should be subtracted from this total. This difference represents the introduced delay and should not exceed the standards prescribed in Table A1A. The inherent delay of the airplane between the data bus and the displays is indicated in figure A2FA. The display manufacturer should provide this delay time.

k. Recorded signals. The signals recorded to conduct the transport delay calculations should be explained on a schematic block diagram. The flight simulator manufacturer should also provide an explanation of why each signal was selected and how they relate to the above descriptions.

l. Interpretation of results. Flight simulator results vary over time from test to test due to ''sampling uncertainty.'' All flight simulators run at a specific rate where all

modules are executed sequentially in the host computer. The flight controls input can occur at any time in the iteration, but these data will not be processed before the start of the new iteration. For example, a flight simulator running at 60 Hz may have a difference of as much as 16.67 msec between test results. This does not mean that the test has failed. Instead, the difference is attributed to variations in input processing. In some conditions, the host simulator and the visual system do not run at the same iteration rate, so the output of the host computer to the visual system will not always be synchronized.

m. The transport delay test should account for both daylight and night modes of operation of the visual system. In both cases, the tolerances prescribed in Table A1A must be met and the motion response should occur before the end of the first video scan containing new information.

**Figure A2C**
**Transport Delay for simulation of classic non-computer controlled aircraft.**

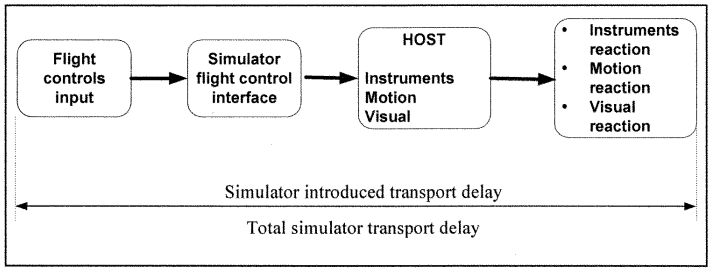



**Figure A2D**
**Transport Delay for simulation of computer controlled aircraft using real airplane black boxes**

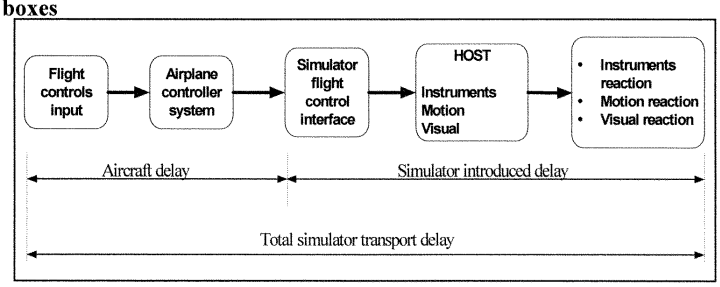



**Figure A2E**
**Transport Delay for simulation of computer controlled aircraft using software emulation of airplane boxes**

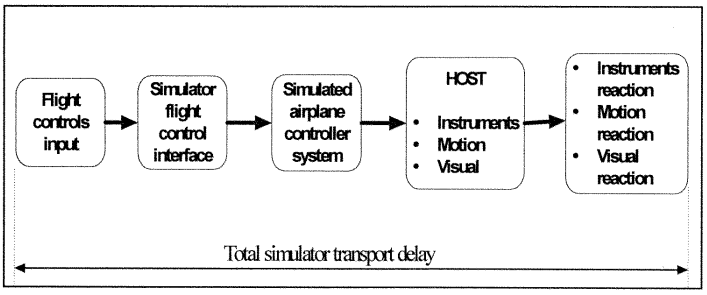
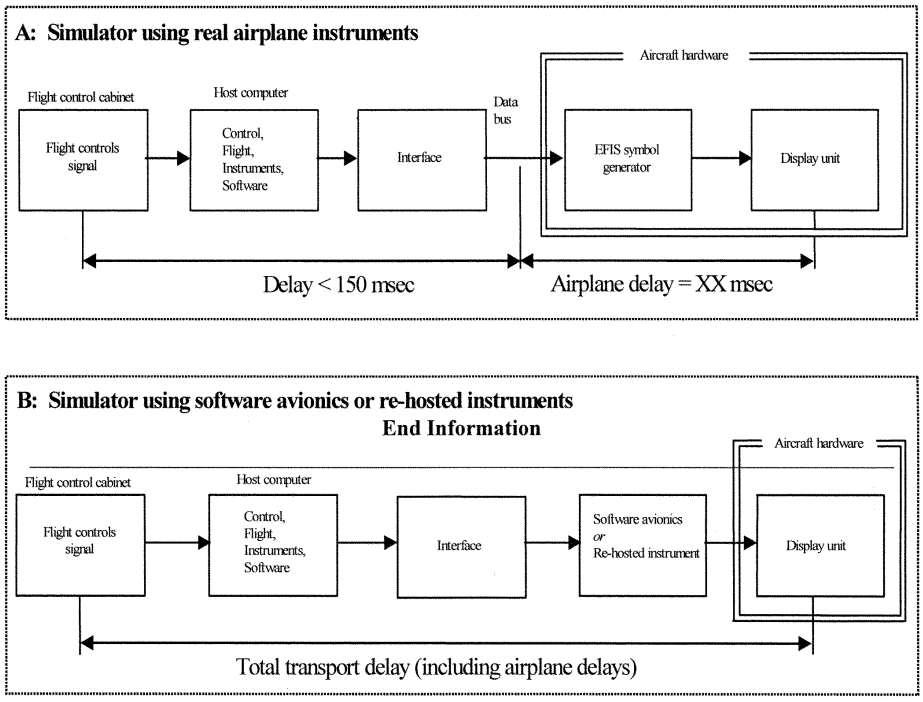


**Figure A2FA and A2FB**
**Transport delay for simulation of airplanes using real or re-hosted instrument drivers**




BEGIN INFORMATION

16. CONTINUING QUALIFICATION EVALUATIONS—VALIDATION TEST DATA PRESENTATION

a. Background

(1) The MQTG is created during the initial evaluation of a flight simulator. This is the master document, as amended, to which flight simulator continuing qualification evaluation test results are compared.

(2) The currently accepted method of presenting continuing qualification evaluation test results is to provide flight simulator results over-plotted with reference data. Test results are carefully reviewed to determine if the test is within the specified tolerances. This can be a time consuming process, particularly when reference data exhibits rapid variations or an apparent anomaly requiring engineering judgment in the application of the tolerances. In these cases, the solution is to compare the results to the MQTG. The continuing qualification results are compared to the results in the MQTG for acceptance. The flight simulator operator and the NSPM should look for any change in the flight simulator performance since initial qualification.

b. Continuing Qualification Evaluation Test Results Presentation

(1) Flight simulator operators are encouraged to over-plot continuing qualification validation test results with MQTG flight simulator results recorded during the initial evaluation and as amended. Any change in a validation test will be readily apparent. In addition to plotting continuing qualification validation test and MQTG results, operators may elect to plot reference data as well.

(2) There are no suggested tolerances between flight simulator continuing qualification and MQTG validation test results. Investigation of any discrepancy between the MQTG and continuing qualification flight simulator performance is left to the discretion of the flight simulator operator and the NSPM.

(3) Differences between the two sets of results, other than variations attributable to repeatability issues that cannot be explained, should be investigated.

(4) The flight simulator should retain the ability to over-plot both automatic and manual validation test results with reference data.

END INFORMATION

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BEGIN QPS REQUIREMENTS

17. ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION: LEVEL A AND LEVEL B SIMULATORS ONLY

a. Sponsors are not required to use the alternative data sources, procedures, and instrumentation. However, a sponsor may choose to use one or more of the alternative sources, procedures, and instrumentation described in Table A2E.

END QPS REQUIREMENTS

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BEGIN INFORMATION

b. It has become standard practice for experienced simulator manufacturers to use modeling techniques to establish data bases for new simulator configurations while awaiting the availability of actual flight test data. The data generated from the aerodynamic modeling techniques is then compared to the flight test data when it becomes available. The results of such comparisons have become increasingly consistent, indicating that these techniques, applied with the appropriate experience, are dependable and accurate for the development of aerodynamic models for use in Level A and Level B simulators.

c. Based on this history of successful comparisons, the NSPM has concluded that those who are experienced in the development of aerodynamic models may use modeling techniques to alter the method for acquiring flight test data for Level A or Level B simulators.

d. The information in Table A2E (Alternative Data Sources, Procedures, and Instrumentation) is presented to describe an acceptable alternative to data sources for simulator modeling and validation and an acceptable alternative to the procedures and instrumentation traditionally used to gather such modeling and validation data.

(1) Alternative data sources that may be used for part or all of a data requirement are the Airplane Maintenance Manual, the Airplane Flight Manual (AFM), Airplane Design Data, the Type Inspection Report (TIR), Certification Data or acceptable supplemental flight test data.

(2) The sponsor should coordinate with the NSPM prior to using alternative data sources in a flight test or data gathering effort.

e. The NSPM position regarding the use of these alternative data sources, procedures, and instrumentation is based on the following presumptions:

(1) Data gathered through the alternative means does not require angle of attack (AOA) measurements or control surface position measurements for any flight test. However, AOA can be sufficiently derived if the flight test program ensures the collection of acceptable level, unaccelerated, trimmed flight data. All of the simulator time history tests that begin in level, unaccelerated, and trimmed flight, including the three basic trim tests and ''fly-by'' trims, can be a successful validation of angle of attack by comparison with flight test pitch angle. (Note: Due to the criticality of angle of attack in the development of the ground effects model, particularly critical for normal landings and landings involving cross-control input applicable to Level B simulators, stable ''fly-by'' trim data will be the acceptable norm for normal and cross-control input landing objective data for these applications.)

(2) The use of a rigorously defined and fully mature simulation controls system model that includes accurate gearing and cable stretch characteristics (where applicable), determined from actual aircraft measurements. Such a model does not require control surface position measurements in the flight test objective data in these limited applications.

f. The sponsor is urged to contact the NSPM for clarification of any issue regarding airplanes with reversible control systems. Table A2E is not applicable to Computer Controlled Aircraft FFSs.

g. Utilization of these alternate data sources, procedures, and instrumentation (Table A2E) does not relieve the sponsor from compliance with the balance of the information contained in this document relative to Level A or Level B FFSs.

h. The term ''inertial measurement system'' is used in the following table to include the use of a functional global positioning system (GPS).

i. Synchronized video for the use of alternative data sources, procedures, and instrumentation should have:

(1) Sufficient resolution to allow magnification of the display to make appropriate measurement and comparisons; and

(2) Sufficient size and incremental marking to allow similar measurement and comparison. The detail provided by the video should provide sufficient clarity and accuracy to measure the necessary parameter(s) to at least ½ of the tolerance authorized for the specific test being conducted and allow

an integration of the parameter(s) in question to obtain a rate of change.

END INFORMATION

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION

| QPS REQUIREMENTS The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix A are not used. | | | | Information |
|---|---|---|---|---|
| Table of objective tests | Sim level | | Alternative data sources, procedures, and instrumentation | Notes |
| Test entry number and title | A | B | | |
| 1.a.1. Performance. Taxi. Minimum Radius turn. | X | X | TIR, AFM, or Design data may be used. | |
| 1.a.2. Performance. Taxi Rate of Turn vs. Nosewheel Steering Angle. | | X | Data may be acquired by using a constant tiller position, measured with a protractor or full rudder pedal application for steady state turn, and synchronized video of heading indicator. If less than full rudder pedal is used, pedal position must be recorded. | A single procedure may not be adequate for all airplane steering systems, therefore appropriate measurement procedures must be devised and proposed for NSPM concurrence. |
| 1.b.1. Performance. Takeoff. Ground Acceleration Time and Distance. | X | X | Preliminary certification data may be used. Data may be acquired by using a stop watch, calibrated airspeed, and runway markers during a takeoff with power set before brake release. Power settings may be hand recorded. If an inertial measurement system is installed, speed and distance may be derived from acceleration measurements. | |
| 1.b.2. Performance. Takeoff. Minimum Control Speed—ground ($V_{mcg}$) using aerodynamic controls only (per applicable airworthiness standard) or low speed, engine inoperative ground control characteristics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | Rapid throttle reductions at speeds near $V_{mcg}$ may be used while recording appropriate parameters. The nosewheel must be free to caster, or equivalently freed of sideforce generation. |
| 1.b.3. Performance. Takeoff. Minimum Unstick Speed ($V_{mu}$) or equivalent test to demonstrate early rotation takeoff characteristics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and the force/position measurements of flight deck controls. | |
| 1.b.4. Performance. Takeoff. Normal Takeoff. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. AOA can be calculated from pitch attitude and flight path. | |
| 1.b.5. Performance. Takeoff. Critical Engine Failure during Takeoff. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | Record airplane dynamic response to engine failure and control inputs required to correct flight path. |
| 1.b.6. Performance. Takeoff. Crosswind Takeoff. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | The ''1:7 law'' to 100 feet (30 meters) is an acceptable wind profile. |

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

| QPS REQUIREMENTS The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix A are not used. | | | | Information |
|---|---|---|---|---|
| Table of objective tests | Sim level | | Alternative data sources, procedures, and instrumentation | Notes |
| Test entry number and title | A | B | | |
| 1.b.7. Performance. Takeoff. Rejected Takeoff. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments, thrust lever position, engine parameters, and distance (e.g., runway markers). A stop watch is required.. | |
| 1.c. 1. Performance. Climb. Normal Climb all engines operating.. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments and engine power throughout the climb range. | |
| 1.c.2. Performance. Climb. One engine Inoperative Climb. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments and engine power throughout the climb range. | |
| 1.c.4. Performance. Climb. One Engine Inoperative Approach Climb (if operations in icing conditions are authorized). | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments and engine power throughout the climb range. | |
| 1.d.1. Cruise/Descent. Level flight acceleration.. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time. | |
| 1.d.2. Cruise/Descent. Level flight deceleration.. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time. | |
| 1.d.4. Cruise/Descent. Idle descent. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time. | |
| 1.d.5. Cruise/Descent. Emergency Descent. | X | X | Data may be acquired with a synchronized video of calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time. | |
| 1.e.1. Performance. Stopping. Deceleration time and distance, using manual application of wheel brakes and no reverse thrust on a dry runway. | X | X | Data may be acquired during landing tests using a stop watch, runway markers, and a synchronized video of calibrated airplane instruments, thrust lever position and the pertinent parameters of engine power. | |
| 1.e.2. Performance. Ground. Deceleration Time and Distance, using reverse thrust and no wheel brakes. | X | X | Data may be acquired during landing tests using a stop watch, runway markers, and a synchronized video of calibrated airplane instruments, thrust lever position and pertinent parameters of engine power. | |
| 1.f.1. Performance. Engines. Acceleration. | X | X | Data may be acquired with a synchronized video recording of engine instruments and throttle position. | |
| 1.f.2. Performance. Engines. Deceleration. | X | X | Data may be acquired with a synchronized video recording of engine instruments and throttle position. | |

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

| QPS REQUIREMENTS The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix A are not used. | | | | Information |
|---|---|---|---|---|
| Table of objective tests | Sim level | | Alternative data sources, procedures, and instrumentation | Notes |
| Test entry number and title | A | B | | |
| 2.a.1.a. Handling Qualities. Static Control Checks. Pitch Controller Position vs. Force and Surface Position Calibration. | X | X | Surface position data may be acquired from flight data recorder (FDR) sensor or, if no FDR sensor, at selected, significant column positions (encompassing significant column position data points), acceptable to the NSPM, using a control surface protractor on the ground. Force data may be acquired by using a hand held force gauge at the same column position data points. | For airplanes with reversible control systems, surface position data acquisition should be accomplished with winds less than 5 kts. |
| 2.a.2.a. Handling Qualities. Static Control Checks. Roll Controller Position vs. Force and Surface Position Calibration. | X | X | Surface position data may be acquired from flight data recorder (FDR) sensor or, if no FDR sensor, at selected, significant wheel positions (encompassing significant wheel position data points), acceptable to the NSPM, using a control surface protractor on the ground. Force data may be acquired by using a hand held force gauge at the same wheel position data points. | For airplanes with reversible control systems, surface position data acquisition should be accomplished with winds less than 5 kts. |
| 2.a.3.a. Handling Qualities. Static Control Checks. Rudder Pedal Position vs. Force and Surface Position Calibration. | X | X | Surface position data may be acquired from flight data recorder (FDR) sensor or, if no FDR sensor, at selected, significant rudder pedal positions (encompassing significant rudder pedal position data points), acceptable to the NSPM, using a control surface protractor on the ground. Force data may be acquired by using a hand held force gauge at the same rudder pedal position data points. | For airplanes with reversible control systems, surface position data acquisition should be accomplished with winds less than 5 kts. |
| 2.a.4. Handling Qualities. Static Control Checks. Nosewheel Steering Controller Force and Position. | X | X | Breakout data may be acquired with a hand held force gauge. The remainder of the force to the stops may be calculated if the force gauge and a protractor are used to measure force after breakout for at least 25% of the total displacement capability. | |
| 2.a.5. Handling Qualities. Static Control Checks. Rudder Pedal Steering Calibration. | X | X | Data may be acquired through the use of force pads on the rudder pedals and a pedal position measurement device, together with design data for nosewheel position. | |
| 2.a.6. Handling Qualities. Static Control Checks. Pitch Trim Indicator vs. Surface Position Calibration. | X | X | Data may be acquired through calculations. | |
| 2.a.7. Handling qualities. Static control tests. Pitch trim rate. | X | X | Data may be acquired by using a synchronized video of pitch trim indication and elapsed time through range of trim indication. | |
| 2.a.8. Handling Qualities. Static Control tests. Alignment of Flight deck Throttle Lever Angle vs. Selected engine parameter. | X | X | Data may be acquired through the use of a temporary throttle quadrant scale to document throttle position. Use a synchronized video to record steady state instrument readings or hand-record steady state engine performance readings. | |

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

| QPS REQUIREMENTS The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix A are not used. | | | | Information |
|---|---|---|---|---|
| Table of objective tests | Sim level | | Alternative data sources, procedures, and instrumentation | Notes |
| Test entry number and title | A | B | | |
| 2.a.9. Handling qualities. Static control tests. Brake pedal position vs. force and brake system pressure calibration. | X | X | Use of design or predicted data is acceptable. Data may be acquired by measuring deflection at ''zero'' and ''maximum'' and calculating deflections between the extremes using the airplane design data curve. | |
| 2.c.1. Handling qualities. Longitudinal control tests. Power change dynamics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and throttle position. | |
| 2.c.2. Handling qualities. Longitudinal control tests. Flap/slat change dynamics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and flap/slat position. | |
| 2.c.3. Handling qualities. Longitudinal control tests. Spoiler/speedbrake change dynamics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and spoiler/speedbrake position. | |
| 2.c.4. Handling qualities. Longitudinal control tests. Gear change dynamics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and gear position. | |
| 2.c.5. Handling qualities. Longitudinal control tests. Longitudinal trim. | X | X | Data may be acquired through use of an inertial measurement system and a synchronized video of flight deck controls position (previously calibrated to show related surface position) and the engine instrument readings. | |
| 2.c.6. Handling qualities. Longitudinal control tests. Longitudinal maneuvering stability (stick force/g). | X | X | Data may be acquired through the use of an inertial measurement system and a synchronized video of calibrated airplane instruments; a temporary, high resolution bank angle scale affixed to the attitude indicator; and a wheel and column force measurement indication. | |
| 2.c.7. Handling qualities. Longitudinal control tests. Longitudinal static stability. | X | X | Data may be acquired through the use of a synchronized video of airplane flight instruments and a hand held force gauge. | |
| 2.c.8. Handling qualities. Longitudinal control tests. Stall characteristics. | X | X | Data may be acquired through a synchronized video recording of a stop watch and calibrated airplane airspeed indicator. Hand-record the flight conditions and airplane configuration. | Airspeeds may be cross checked with those in the TIR and AFM. |
| 2.c.9. Handling qualities. Longitudinal control tests. Phugoid dynamics. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |
| 2.c.10. Handling qualities. Longitudinal control tests. Short period dynamics. | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

| QPS REQUIREMENTS The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix A are not used. | | | | Information |
|---|---|---|---|---|
| Table of objective tests | Sim level | | Alternative data sources, procedures, and instrumentation | Notes |
| Test entry number and title | A | B | | |
| 2.d.1. Handling qualities. Lateral directional tests. Minimum control speed, air ($V_{mca}$ or $V_{mci}$), per applicable airworthiness standard or Low speed engine inoperative handling characteristics in the air. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |
| 2.d.2. Handling qualities. Lateral directional tests. Roll response (rate). | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck lateral controls. | May be combined with step input of flight deck roll controller test, 2.d.3. |
| 2.d.3. Handling qualities. Lateral directional tests. Roll response to flight deck roll controller step input. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck lateral controls. | |
| 2.d.4. Handling qualities. Lateral directional tests. Spiral stability. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments; force/position measurements of flight deck controls; and a stop watch. | |
| 2.d.5. Handling qualities. Lateral directional tests. Engine inoperative trim. | X | X | Data may be hand recorded in-flight using high resolution scales affixed to trim controls that have been calibrated on the ground using protractors on the control/trim surfaces with winds less than 5 kts.OR Data may be acquired during second segment climb (with proper pilot control input for an engine-out condition) by using a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | Trimming during second segment climb is not a certification task and should not be conducted until a safe altitude is reached. |
| 2.d.6. Handling qualities. Lateral directional tests. Rudder response. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of rudder pedals. | |
| 2.d.7. Handling qualities. Lateral directional tests. Dutch roll, (yaw damper OFF). | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |
| 2.d.8. Handling qualities. Lateral directional tests. Steady state sideslip. | X | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls.<br>Ground track and wind corrected heading may be used for sideslip angle. | |
| 2.e.1. Handling qualities. Landings. Normal landing. | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

| QPS REQUIREMENTS The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix A are not used. | | | | Information |
|---|---|---|---|---|
| Table of objective tests | Sim level | | Alternative data sources, procedures, and instrumentation | Notes |
| Test entry number and title | A | B | | |
| 2.e.3. Handling qualities. Landings. Crosswind landing. | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |
| 2.e.4. Handling qualities. Landings. One engine inoperative landing. | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and the force/position measurements of flight deck controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip. | |
| 2.e.5. Handling qualities. Landings. Autopilot landing (if applicable). | ..... | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls.Normal and lateral accelerations may be recorded in lieu of AOA and sideslip. | |
| 2.e.6. Handling qualities. Landings. All engines operating, autopilot, go around. | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip. | |
| 2.e.7. Handling qualities. Landings. One engine inoperative go around. | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip. | |
| 2.e.8. Handling qualities. Landings. Directional control (rudder effectiveness with symmetric thrust). | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip. | |
| 2.e.9. Handling qualities. Landings. Directional control (rudder effectiveness with asymmetric reverse thrust). | | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip. | |
| 2.f. Handling qualities. Ground effect. Test to demonstrate ground effect. | | X | Data may be acquired by using calibrated airplane instruments, an inertial measurement system, and a synchronized video of calibrated airplane instruments and force/position measurements of flight deck controls. | |

END INFORMATION

## ATTACHMENT 3 TO APPENDIX A TO PART 60—SIMULATOR SUBJECTIVE EVALUATION

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Except for special use airport models, described as Class III, all airport models required by this part must be representations of real-world, operational airports or representations of fictional airports and must meet the requirements set out in Tables A3B or A3C of this attachment, as appropriate.

b. If fictional airports are used, the sponsor must ensure that navigational aids and all appropriate maps, charts, and other navigational reference material for the fictional airports (and surrounding areas as necessary) are compatible, complete, and accurate with respect to the visual presentation of the airport model of this fictional airport. An SOC must be submitted that addresses navigation aid installation and performance and other criteria (including obstruction clearance protection) for all instrument approaches to the fictional airports that are available in the simulator. The SOC must reference and account for information in the terminal instrument procedures manual and the construction and availability of the required maps, charts, and other navigational material. This material must be clearly marked ''for training purposes only.''

c. When the simulator is being used by an instructor or evaluator for purposes of training, checking, or testing under this chapter, only airport models classified as Class I, Class II, or Class III may be used by the instructor or evaluator. Detailed descriptions/definitions of these classifications are found in Appendix F of this part.

d. When a person sponsors an FFS maintained by a person other than a U.S. certificate holder, the sponsor is accountable for that FFS originally meeting, and continuing to meet, the criteria under which it was originally qualified and the appropriate Part 60 criteria, including the airport models that may be used by instructors or evaluators for purposes of training, checking, or testing under this chapter.

e. Neither Class II nor Class III airport visual models are required to appear on the SOQ, and the method used for keeping instructors and evaluators apprised of the airport models that meet Class II or Class III requirements on any given simulator is at the option of the sponsor, but the method used must be available for review by the TPAA.

f. When an airport model represents a real world airport and a permanent change is made to that real world airport (e.g., a new runway, an extended taxiway, a new lighting system, a runway closure) without a written extension grant from the NSPM (described in paragraph 1.g. of this section), an update to that airport model must be made in accordance with the following time limits:

(1) For a new airport runway, a runway extension, a new airport taxiway, a taxiway extension, or a runway/taxiway closure—within 90 days of the opening for use of the new airport runway, runway extension, new airport taxiway, or taxiway extension; or within 90 days of the closure of the runway or taxiway.

(2) For a new or modified approach light system—within 45 days of the activation of the new or modified approach light system.

(3) For other facility or structural changes on the airport (e.g., new terminal, relocation of Air Traffic Control Tower)—within 180 days of the opening of the new or changed facility or structure.

g. If a sponsor desires an extension to the time limit for an update to a visual scene or airport model or has an objection to what must be updated in the specific airport model requirement, the sponsor must provide a written extension request to the NSPM stating the reason for the update delay and a proposed completion date, or explain why the update is not necessary (i.e., why the identified airport change will not have an impact on flight training, testing, or checking). A copy of this request or objection must also be sent to the POI/TCPM. The NSPM will send the official response to the sponsor and a copy to the POI/TCPM. If there is an objection, after consultation with the appropriate POI/TCPM regarding the training, testing, or checking impact, the NSPM will send the official response to the sponsor and a copy to the POI/TCPM.

END QPS REQUIREMENTS

BEGIN INFORMATION

2. DISCUSSION

a. The subjective tests provide a basis for evaluating the capability of the simulator to perform over a typical utilization period; determining that the simulator accurately simulates each required maneuver, procedure, or task; and verifying correct operation of the simulator controls, instruments, and systems. The items listed in the following Tables are for simulator evaluation purposes only. They may not be used to limit or exceed the authorizations for use of a given level of simulator, as described on the SOQ, or as approved by the TPAA.

b. The tests in Table A3A, Operations Tasks, in this attachment, address pilot functions, including maneuvers and procedures (called flight tasks), and are divided by

flight phases. The performance of these tasks by the NSPM includes an operational examination of the visual system and special effects. There are flight tasks included to address some features of advanced technology airplanes and innovative training programs. For example, ''high angle-of-attack maneuvering'' is included to provide a required alternative to ''approach to stalls'' for airplanes employing flight envelope protection functions.

c. The tests in Table A3A, Operations Tasks, and Table A3G, Instructor Operating Station of this attachment, address the overall function and control of the simulator including the various simulated environmental conditions; simulated airplane system operations (normal, abnormal, and emergency); visual system displays; and special effects necessary to meet flight crew training, evaluation, or flight experience requirements.

d. All simulated airplane systems functions will be assessed for normal and, where appropriate, alternate operations. Normal, abnormal, and emergency operations associated with a flight phase will be assessed during the evaluation of flight tasks or events within that flight phase. Simulated airplane systems are listed separately under ''Any Flight Phase'' to ensure appropriate attention to systems checks. Operational navigation systems (including inertial navigation systems, global positioning systems, or other long-range systems) and the associated electronic display systems will be evaluated if installed. The NSP pilot will include in his report to the TPAA, the effect of the system operation and any system limitation.

e. Simulators demonstrating a satisfactory circling approach will be qualified for the circling approach maneuver and may be approved for such use by the TPAA in the sponsor's FAA-approved flight training program. To be considered satisfactory, the circling approach will be flown at maximum gross weight for landing, with minimum visibility for the airplane approach category, and must allow proper alignment with a landing runway at least 90° different from the instrument approach course while allowing the pilot to keep an identifiable portion of the airport in sight throughout the maneuver (reference—14 CFR 91.175(e)).

f. At the request of the TPAA, the NSPM may assess a device to determine if it is capable of simulating certain training activities in a sponsor's training program, such as a portion of a Line Oriented Flight Training (LOFT) scenario. Unless directly related to a requirement for the qualification level, the results of such an evaluation would not affect the qualification level of the simulator. However, if the NSPM determines that the simulator does not accurately simulate that training activity, the simulator would not be approved for that training activity.

g. The FAA intends to allow the use of Class III airport models when the sponsor provides the TPAA (or other regulatory authority) an appropriate analysis of the skills, knowledge, and abilities (SKAs) necessary for competent performance of the tasks in which this particular media element is used. The analysis should describe the ability of the FFS/visual media to provide an adequate environment in which the required SKAs are satisfactorily performed and learned. The analysis should also include the specific media element, such as the airport model. Additional sources of information on the conduct of task and capability analysis may be found on the FAA's Advanced Qualification Program (AQP) Web site at: *http://www.faa.gov/education_research/training/aqp/.*

h. The TPAA may accept Class III airport models without individual observation provided the sponsor provides the TPAA with an acceptable description of the process for determining the acceptability of a specific airport model, outlines the conditions under which such an airport model may be used, and adequately describes what restrictions will be applied to each resulting airport or landing area model. Examples of situations that may warrant Class III model designation by the TPAA include the following:

(a) Training, testing, or checking on very low visibility operations, including SMGCS operations.

(b) Instrument operations training (including instrument takeoff, departure, arrival, approach, and missed approach training, testing, or checking) using—

(i) A specific model that has been geographically ''moved'' to a different location and aligned with an instrument procedure for another airport.

(ii) A model that does not match changes made at the real-world airport (or landing area for helicopters) being modeled.

(iii) A model generated with an ''off-board'' or an ''on-board'' model development tool (by providing proper latitude/longitude reference; correct runway or landing area orientation, length, width, marking, and lighting information; and appropriate adjacent taxiway location) to generate a facsimile of a real world airport or landing area.

i. Previously qualified simulators with certain early generation Computer Generated Image (CGI) visual systems, are limited by the capability of the Image Generator or the display system used. These systems are:

(1) Early CGI visual systems that are excepted from the requirement of including runway numbers as a part of the specific runway marking requirements are:

(a) Link NVS and DNVS.

(b) Novoview 2500 and 6000.

(c) FlightSafety VITAL series up to, and including, VITAL III, but not beyond.

(d) Redifusion SP1, SP1T, and SP2.

(2) Early CGI visual systems are excepted from the requirement of including runway numbers unless the runways are used for LOFT training sessions. These LOFT airport models require runway numbers but only for the specific runway end (one direction) used in the LOFT session. The systems required to display runway numbers only for LOFT scenes are:

(a) FlightSafety VITAL IV.

(b) Redifusion SP3 and SP3T.

(c) Link-Miles Image II.

(3) The following list of previously qualified CGI and display systems are incapable of generating blue lights. These systems are not required to have accurate taxi-way edge lighting:

(a) Redifusion SP1.

(b) FlightSafety Vital IV.

(c) Link-Miles Image II and Image IIT

(d) XKD displays (even though the XKD image generator is capable of generating blue colored lights, the display cannot accommodate that color).

END INFORMATION

TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | | |
| | | A | B | C | D |
| Tasks in this table are subject to evaluation if appropriate for the airplane simulated as indicated in the SOQ Configuration List or the level of simulator qualification involved. Items not installed or not functional on the simulator and, therefore, not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ. | | | | | |
| 1. | Preparation For Flight<br>Preflight. Accomplish a functions check of all switches, indicators, systems, and equipment at all crewmembers' and instructors' stations and determine that the flight deck design and functions are identical to that of the airplane simulated. | X | X | X | X |
| 2. | Surface Operations (Pre-Take-Off) | | | | |
| 2.a. | Engine Start | | | | |
| 2.a.1. | Normal start | X | X | X | X |
| 2.a.2. | Alternate start procedures | X | X | X | X |
| 2.a.3. | Abnormal starts and shutdowns (e.g., hot/hung start, tail pipe fire) | X | X | X | X |
| 2.b. | Pushback/Powerback | X | X | X | |
| 2.c. | Taxi | | | | |
| 2.c.1. | Thrust response | X | X | X | X |
| 2.c.2. | Power lever friction | X | X | X | X |
| 2.c.3. | Ground handling | X | X | X | X |
| 2.c.4. | Nosewheel scuffing | | | X | X |
| 2.c.5. | Brake operation (normal and alternate/emergency) | X | X | X | X |
| 2.c.6. | Brake fade (if applicable) | X | X | X | X |
| 3. | Take-off. | | | | |
| 3.a. | Normal. | | | | |
| 3.a.1. | Airplane/engine parameter relationships | X | X | X | X |
| 3.a.2. | Acceleration characteristics (motion) | X | X | X | X |
| 3.a.3. | Nosewheel and rudder steering | X | X | X | X |
| 3.a.4. | Crosswind (maximum demonstrated) | X | X | X | X |
| 3.a.5. | Special performance (e.g., reduced $V_1$, max de-rate, short field operations) | X | X | X | X |
| 3.a.6. | Low visibility take-off | X | X | X | X |
| 3.a.7. | Landing gear, wing flap leading edge device operation | X | X | X | X |

TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | | |
| | | A | B | C | D |
| 3.a.8. ..... | Contaminated runway operation ..... | X | X | | |
| 3.b. ..... | Abnormal/emergency | | | | |
| 3.b.1. ..... | Rejected Take-off ..... | X | X | X | X |
| 3.b.2. ..... | Rejected special performance (e.g., reduced $V_1$, max de-rate, short field operations) ..... | X | X | X | X |
| 3.b.3. ..... | Takeoff with a propulsion system malfunction (allowing an analysis of causes, symptoms, recognition, and the effects on aircraft performance and handling) at the following points: .. (i) Prior to $V_1$ decision speed ..... (ii) Between $V_1$ and Vr (rotation speed) ..... (iii) Between Vr and 500 feet above ground level ..... | X | X | X | X |
| 3.b.4. ..... | With wind shear ..... | X | X | X | X |
| 3.b.5. ..... | Flight control system failures, reconfiguration modes, manual reversion and associated handling. | X | X | X | X |
| 3.b.6. ..... | Rejected takeoff with brake fade ..... | X | X | | |
| 3.b.7. ..... | Rejected, contaminated runway ..... | X | X | | |
| 4. ..... | Climb. | | | | |
| 4.a. ..... | Normal ..... | X | X | X | X |
| 4.b. ..... | One or more engines inoperative ..... | X | X | X | X |
| 5. ..... | Cruise | | | | |
| 5.a. ..... | Performance characteristics (speed vs. power) ..... | X | X | X | X |
| 5.b. ..... | High altitude handling ..... | X | X | X | X |
| 5.c. ..... | High Mach number handling (Mach tuck, Mach buffet) and recovery (trim change) ..... | X | X | X | X |
| 5.d. ..... | Overspeed warning (in excess of $V_{mo}$ or $M_{mo}$) ..... | X | X | X | X |
| 5.e. ..... | High IAS handling ..... | X | X | X | X |
| 6. ..... | Maneuvers | | | | |
| 6.a. ..... | High angle of attack, approach to stalls, stall warning, buffet, and g-break (take-off, cruise, approach, and landing configuration). | X | X | X | X |
| 6.b. ..... | Flight envelope protection (high angle of attack, bank limit, overspeed, etc.) ..... | X | X | X | X |
| 6.c. ..... | Turns with/without speedbrake/spoilers deployed ..... | X | X | X | X |
| 6.d. ..... | Normal and steep turns ..... | X | X | X | X |
| 6.e. ..... | In flight engine shutdown and restart (assisted and windmill) ..... | X | X | X | X |
| 6.f. ..... | Maneuvering with one or more engines inoperative, as appropriate ..... | X | X | X | X |
| 6.g. ..... | Specific flight characteristics (e.g., direct lift control) ..... | X | X | X | X |
| 6.h. ..... | Flight control system failures, reconfiguration modes, manual reversion and associated handling. | X | X | X | X |
| 7. ..... | Descent. | | | | |
| 7.a. ..... | Normal ..... | X | X | X | X |
| 7.b. ..... | Maximum rate (clean and with speedbrake, etc.) ..... | X | X | X | X |
| 7.c. ..... | With autopilot ..... | X | X | X | X |

TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | | |
| | | A | B | C | D |
| 7.d. | Flight control system failures, reconfiguration modes, manual reversion and associated handling. | X | X | X | X |
| 8. | Instrument Approaches and Landing. Those instrument approach and landing tests relevant to the simulated airplane type are selected from the following list. Some tests are made with limiting wind velocities, under wind shear conditions, and with relevant system failures, including the failure of the Flight Director. If Standard Operating Procedures allow use autopilot for non-precision approaches, evaluation of the autopilot will be included. Level A simulators are not authorized to credit the landing maneuver | | | | |
| 8.a. | Precision. | | | | |
| 8.a.1. | PAR | X | X | X | X |
| 8.a.2. | CAT I/GBAS (ILS/MLS) published approaches | X | X | X | X |
| | (i) Manual approach with/without flight director including landing | X | X | X | X |
| | (ii) Autopilot/autothrottle coupled approach and manual landing | X | X | X | X |
| | (iii) Manual approach to DH and go-around all engines | X | X | X | X |
| | (iv) Manual one engine out approach to DH and go-around | X | X | X | X |
| | (v) Manual approach controlled with and without flight director to 30 m (100 ft) below CAT I minima. | X | X | X | X |
| | A. With cross-wind (maximum demonstrated) | X | X | X | X |
| | B. With windshear | X | X | X | X |
| | (vi) Autopilot/autothrottle coupled approach, one engine out to DH and go-around | X | X | X | X |
| | (vii) Approach and landing with minimum/standby electrical power | X | X | X | X |
| 8.a.3. | CAT II/GBAS (ILS/MLS) published approaches | X | X | X | X |
| | (i) Autopilot/autothrottle coupled approach to DH and landing | X | X | X | X |
| | (ii) Autopilot/autothrottle coupled approach to DH and go-around | X | X | X | X |
| | (iii) Autocoupled approach to DH and manual go-around | X | X | X | X |
| | (iv) Category II published approach (autocoupled, autothrottle) | X | X | X | X |
| 8.a.4. | CAT III/GBAS (ILS/MLS) published approaches | X | X | X | X |
| | (i) Autopilot/autothrottle coupled approach to land and rollout | X | X | X | X |
| | (ii) Autopilot/autothrottle coupled approach to DH/Alert Height and go-around | X | X | X | X |
| | (iii) Autopilot/autothrottle coupled approach to land and rollout with one engine out | X | X | X | X |
| | (iv) Autopilot/autothrottle coupled approach to DH/Alert Height and go-around with one engine out. | X | X | X | X |
| | (v) Autopilot/autothrottle coupled approach (to land or to go around) | X | X | X | X |
| | A. With generator failure | X | X | X | X |
| | B. With 10 knot tail wind | X | X | X | X |
| | C. With 10 knot crosswind | X | X | X | X |
| 8.b. | Non-precision | | | | |
| 8.b.1. | NDB | X | X | X | X |
| 8.b.2. | VOR, VOR/DME, VOR/TAC | X | X | X | X |
| 8.b.3. | RNAV (GNSS/GPS) | X | X | X | X |
| 8.b.4. | ILS LLZ (LOC), LLZ (LOC)/BC | X | X | X | X |
| 8.b.5. | ILS offset localizer | X | X | X | X |
| 8.b.6. | Direction finding facility (ADF/SDF) | X | X | X | X |
| 8.b.7. | Airport surveillance radar (ASR) | X | X | X | X |
| 9. | Visual Approaches (Visual Segment) and Landings. Flight simulators with visual systems, which permit completing a special approach procedure in accordance with applicable regulations, may be approved for that particular approach procedure | | | | |
| 9.a. | Maneuvering, normal approach and landing, all engines operating with and without visual approach aid guidance. | X | X | X | X |
| 9.b. | Approach and landing with one or more engines inoperative | X | X | X | X |

TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | | |
| | | A | B | C | D |
| 9.c. | Operation of landing gear, flap/slats and speedbrakes (normal and abnormal) | X | X | X | X |
| 9.d. | Approach and landing with crosswind (max. demonstrated) | X | X | X | X |
| 9.e. | Approach to land with wind shear on approach | X | X | X | X |
| 9.f. | Approach and landing with flight control system failures, reconfiguration modes, manual reversion and associated handling (most significant degradation which is probable). | X | X | X | X |
| 9.g. | Approach and landing with trim malfunctions | X | X | X | X |
| 9.g.1. | Longitudinal trim malfunction | X | X | X | X |
| 9.g.2. | Lateral-directional trim malfunction | X | X | X | X |
| 9.h. | Approach and landing with standby (minimum) electrical/hydraulic power | X | X | X | X |
| 9.i. | Approach and landing from circling conditions (circling approach) | X | X | X | X |
| 9.j. | Approach and landing from visual traffic pattern | X | X | X | X |
| 9.k. | Approach and landing from non-precision approach | X | X | X | X |
| 9.l. | Approach and landing from precision approach | X | X | X | X |
| 9.m. | Approach procedures with vertical guidance (APV), e.g., SBAS | X | X | X | X |
| 10. | Missed Approach | | | | |
| 10.a. | All engines | X | X | X | X |
| 10.b. | One or more engine(s) out | X | X | X | X |
| 10.c. | With flight control system failures, reconfiguration modes, manual reversion and associated handling. | X | X | X | X |
| 11. | Surface Operations (Landing roll and taxi). | | | | |
| 11.a. | Spoiler operation | X | X | X | X |
| 11.b. | Reverse thrust operation | X | X | X | X |
| 11.c. | Directional control and ground handling, both with and without reverse thrust | X | X | X | |
| 11.d. | Reduction of rudder effectiveness with increased reverse thrust (rear pod-mounted engines). | X | X | X | |
| 11.e. | Brake and anti-skid operation with dry, patchy wet, wet on rubber residue, and patchy icy conditions. | X | X | | |
| 11.f. | Brake operation, to include auto-braking system where applicable | X | X | X | X |
| 12. | Any Flight Phase. | | | | |
| 12.a. | Airplane and engine systems operation. | | | | |
| 12.a.1. | Air conditioning and pressurization (ECS) | X | X | X | X |
| 12.a.2. | De-icing/anti-icing | X | X | X | X |
| 12.a.3. | Auxiliary power unit (APU) | X | X | X | X |
| 12.a.4. | Communications | X | X | X | X |
| 12.a.5. | Electrical | X | X | X | X |
| 12.a.6. | Fire and smoke detection and suppression | X | X | X | X |
| 12.a.7. | Flight controls (primary and secondary) | X | X | X | X |

TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | | |
| | | A | B | C | D |
| 12.a.8. ... | Fuel and oil, hydraulic and pneumatic | X | X | X | X |
| 12.a.9. ... | Landing gear | X | X | X | X |
| 12.a.10. | Oxygen | X | X | X | X |
| 12.a.11. | Engine | X | X | X | X |
| 12.a.12. | Airborne radar | X | X | X | X |
| 12.a.13. | Autopilot and Flight Director | X | X | X | X |
| 12.a.14. | Collision avoidance systems. (e.g., (E)GPWS, TCAS) | X | X | X | X |
| 12.a.15. | Flight control computers including stability and control augmentation | X | X | X | X |
| 12.a.16. | Flight display systems | X | X | X | X |
| 12.a.17. | Flight management computers | X | X | X | X |
| 12.a.18. | Head-up guidance, head-up displays | X | X | X | X |
| 12.a.19. | Navigation systems | X | X | X | X |
| 12.a.20. | Stall warning/avoidance | X | X | X | X |
| 12.a.21. | Wind shear avoidance equipment | X | X | X | X |
| 12.a.22. | Automatic landing aids. | X | X | X | X |
| 12.b. | Airborne procedures | | | | |
| 12.b.1. ... | Holding | X | X | X | X |
| 12.b.2. ... | Air hazard avoidance (traffic, weather) | X | X | | |
| 12.b.3. ... | Wind shear | X | X | | |
| 12.b.4. ... | Effects of airframe ice | X | X | | |
| 12.c. | Engine shutdown and parking | | | | |
| 12.c.1. ... | Engine and systems operation | X | X | X | X |
| 12.c.2. ... | Parking brake operation | X | X | X | X |

TABLE A3B—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | For qualification at the stated level—Class I airport models | Simulator level | | | |
| | | A | B | C | D |
| This table specifies the minimum airport model content and functionality to qualify a simulator at the indicated level. This table applies only to the airport models required for simulator qualification; i.e., one airport model for Level A and Level B simulators; three airport models for Level C and Level D simulators. | | | | | |
| **Begin QPS Requirements** | | | | | |
| 1. | Functional test content requirements for Level A and Level B simulators. The following is the minimum airport model content requirement to satisfy visual capability tests, and provides suitable visual cues to allow completion of all functions and subjective tests described in this attachment for simulators at Levels A and B. | | | | |
| 1.a. | A minimum of one (1) representative airport model. This model identification must be acceptable to the sponsor's TPAA, selectable from the IOS, and listed on the SOQ. | X | X | | |

TABLE A3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | For qualification at the stated level—Class I airport models | Simulator level | | | |
| | | A | B | C | D |
| 1.b. | The fidelity of the airport model must be sufficient for the aircrew to visually identify the airport; determine the position of the simulated airplane within a night visual scene; successfully accomplish take-offs, approaches, and landings; and maneuver around the airport on the ground as necessary. | X | X | | |
| 1.c. | Runways: | X | X | | |
| 1.c.1. | Visible runway number | X | X | | |
| 1.c.2. | Runway threshold elevations and locations must be modeled to provide sufficient correlation with airplane systems (e.g., altimeter). | X | X | | |
| 1.c.3. | Runway surface and markings | X | X | | |
| 1.c.4. | Lighting for the runway in use including runway edge and centerline | X | X | | |
| 1.c.5. | Lighting, visual approach aid and approach lighting of appropriate colors | X | X | | |
| 1.c.6. | Representative taxiway lights | X | X | | |
| 2. | Functional test content requirements for Level C and Level D simulators. The following is the minimum airport model content requirement to satisfy visual capability tests, and provide suitable visual cues to allow completion of all functions and subjective tests described in this attachment for simulators at Levels C and D. Not all of the elements described in this section must be found in a single airport model. However, all of the elements described in this section must be found throughout a combination of the three (3) airport models described in entry 2.a. | | | | |
| 2.a. | A minimum of three (3) representative airport models. The model identifications must be acceptable to the sponsor's TPAA, selectable from the IOS, and listed on the SOQ. | | | X | X |
| 2.a.1. | Night and Twilight (Dusk) scenes required | | | X | X |
| 2.a.2. | Daylight scenes required | | | | X |
| 2.b. | Two parallel runways and one crossing runway, displayed simultaneously; at least two of the runways must be able to be lighted fully and simultaneously.<br>Note: This requirement may be demonstrated at either a fictional airport or a real-world airport. However, if a fictional airport is used, this airport must be listed on the SOQ. | | | X | X |
| 2.c. | Runway threshold elevations and locations must be modeled to provide sufficient correlation with airplane systems (e.g., HGS, GPS, altimeter); slopes in runways, taxiways, and ramp areas must not cause distracting or unrealistic effects, including pilot eye-point height variation. | | | X | X |
| 2.d. | Representative airport buildings, structures and lighting | | | X | X |
| 2.e. | At least one useable gate, at the appropriate height (required only for those airplanes that typically operate from terminal gates). | | | X | X |
| 2.f. | Representative moving and static gate clutter (e.g., other airplane, power carts, tugs, fuel trucks, and additional gates). | | | X | X |
| 2.g. | Representative gate/apron markings (e.g., hazard markings, lead-in lines, gate numbering) and lighting. | | | X | X |
| 2.h. | Representative runway markings, lighting, and signage, including a windsock that gives appropriate wind cues. | | | X | X |
| 2.i. | Representative taxiway markings, lighting, and signage necessary for position identification, and to taxi from parking to a designated runway and return to parking. | | | X | X |
| 2.j. | A low visibility taxi route (e.g., Surface Movement Guidance Control System, follow-me truck, daylight taxi lights) must also be demonstrated. | | | | X |
| 2.k. | Representative moving and static ground traffic (e.g., vehicular and airplane), including the capability to present ground hazards (e.g., another airplane crossing the active runway). | | | X | X |

TABLE A3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | For qualification at the stated level—Class I airport models | Simulator level | | | |
| | | A | B | C | D |
| 2.l. | Representative moving airborne traffic, including the capability to present air hazards (e.g., airborne traffic on a possible collision course). | | | X | X |
| 2.m. | Representative depiction of terrain and obstacles as well as significant and identifiable natural and cultural features, within 25 NM of the reference airport. | | | X | X |
| 2.n. | Appropriate approach lighting systems and airfield lighting for a VFR circuit and landing, non-precision approaches and landings, and Category I, II and III precision approaches and landings. | | | X | X |
| 2.o. | Representative gate docking aids or a marshaller | | | X | X |
| 2.p. | Portrayal of physical relationships known to cause landing illusions (e.g., short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path).<br>This requirement may be met by a SOC and a demonstration of two landing illusions. The illusions are not required to be beyond the normal operational capabilities of the airplane being simulated. The demonstrated illusions must be available to the instructor or check airman at the IOS for training, testing, checking, or experience activities. | | | | X |
| 2.q. | Portrayal of runway surface contaminants, including runway lighting reflections when wet and partially obscured lights when snow is present, or suitable alternative effects. | | | | X |
| 3. | Airport model management. The following is the minimum airport model management requirements for simulators at Levels A, B, C, and D. | | | | |
| 3.a. | Runway and approach lighting must fade into view in accordance with the environmental conditions set in the simulator, and the distance from the object. | X | X | X | X |
| 3.b. | The direction of strobe lights, approach lights, runway edge lights, visual landing aids, runway centerline lights, threshold lights, and touchdown zone lights must be replicated. | X | X | X | X |
| 4. | Visual feature recognition. The following is the minimum distances at which runway features must be visible for simulators at Levels A, B, C, and D. Distances are measured from runway threshold to an airplane aligned with the runway on an extended 3° glide-slope in simulated meteorological conditions that recreate the minimum distances for visibility. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. | | | | |
| 4.a. | Runway definition, strobe lights, approach lights, and runway edge white lights from 5 sm (8 km) of the runway threshold. | X | X | X | X |
| 4.b. | Visual Approach Aid lights (VASI or PAPI) from 5 sm (8 km) of the runway threshold | | | X | X |
| 4.c. | Visual Approach Aid lights (VASI or PAPI) from 3 sm (5 km) of the runway threshold | X | X | | |
| 4.d. | Runway centerline lights and taxiway definition from 3 sm (5 km) | X | X | X | X |
| 4.e. | Threshold lights and touchdown zone lights from 2 sm (3 km) | X | X | X | X |
| 4.f. | Runway markings within range of landing lights for night scenes as required by the surface resolution test on day scenes. | X | X | X | X |
| 4.g. | For circling approaches, the runway of intended landing and associated lighting must fade into view in a non-distracting manner. | X | X | X | X |

TABLE A3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | For qualification at the stated level—Class I airport models | Simulator level | | | |
| | | A | B | C | D |
| 5. | Airport model content. The following sets out the minimum requirements for what must be provided in an airport model and also identifies the other aspects of the airport environment that must correspond with that model for simulators at Levels A, B, C, and D. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. If all runways in an airport model used to meet the requirements of this attachment are not designated as ''in use,'' then the ''in use'' runways must be listed on the SOQ (e.g., KORD, Rwys 9R, 14L, 22R). Models of airports with more than one runway must have all significant runways not ''in-use'' visually depicted for airport and runway recognition purposes. The use of white or off white light strings that identify the runway threshold, edges, and ends for twilight and night scenes are acceptable for this requirement. Rectangular surface depictions are acceptable for daylight scenes. A visual system's capabilities must be balanced between providing airport models with an accurate representation of the airport and a realistic representation of the surrounding environment. Airport model detail must be developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material; however, this does not require that such models contain details that are beyond the design capability of the currently qualified visual system. Only one ''primary'' taxi route from parking to the runway end will be required for each ''in-use'' runway. | | | | |
| 5.a. | The surface and markings for each ''in-use'' runway must include the following: | | | | |
| 5.a.1. | Threshold markings | X | X | X | X |
| 5.a.2. | Runway numbers | X | X | X | X |
| 5.a.3. | Touchdown zone markings | X | X | X | X |
| 5.a.4. | Fixed distance markings | X | X | X | X |
| 5.a.5. | Edge markings | X | X | X | X |
| 5.a.6. | Centerline stripes | X | X | X | X |
| 5.b. | Each runway designated as an ''in-use'' runway must include the following: | | | | |
| 5.b.1. | The lighting for each ''in-use'' runway must include the following: | | | | |
| | (i) Threshold lights | X | X | X | X |
| | (ii) Edge lights | X | X | X | X |
| | (iii) End lights | X | X | X | X |
| | (iv) Centerline lights, if appropriate | X | X | X | X |
| | (v) Touchdown zone lights, if appropriate | X | X | X | X |
| | (vi) Leadoff lights, if appropriate | X | X | X | X |
| | (vii) Appropriate visual landing aid(s) for that runway | X | X | X | X |
| | (viii) Appropriate approach lighting system for that runway | X | X | X | X |
| 5.b.2. | The taxiway surface and markings associated with each ''in-use'' runway must include the following: | | | | |
| | (i) Edge | X | X | X | X |
| | (ii) Centerline | X | X | X | X |
| | (iii) Runway hold lines | X | X | X | X |
| | (iv) ILS critical area marking | X | X | X | X |
| 5.b.3. | The taxiway lighting associated with each ''in-use'' runway must include the following: | | | | |
| | (i) Edge | X | X | X | X |
| | (ii) Centerline, if appropriate | X | X | X | X |
| | (iii) Runway hold and ILS critical area lights | X | X | X | X |

TABLE A3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | For qualification at the stated level—Class I airport models | Simulator level | | | |
| | | A | B | C | D |
| | (iv) Edge lights of correct color | | | X | X |
| 5.b.4. | Airport signage associated with each ''in-use'' runway must include the following: | | | | |
| | (i) Distance remaining signs, if appropriate | X | X | X | X |
| | (ii) Signs at intersecting runways and taxiways | X | X | X | X |
| | (iii) Signs described in entries 2.h. and 2.i. of this table | X | X | X | X |
| 5.b.5. | Required airport model correlation with other aspects of the airport environment simulation: | | | | |
| | (i) The airport model must be properly aligned with the navigational aids that are associated with operations at the runway ''in-use''. | X | X | X | X |
| | (ii) The simulation of runway contaminants must be correlated with the displayed runway surface and lighting where applicable. | | | | X |
| 6. | Correlation with airplane and associated equipment. The following are the minimum correlation comparisons that must be made for simulators at Levels A, B, C, and D. | | | | |
| 6.a. | Visual system compatibility with aerodynamic programming | X | X | X | X |
| 6.b. | Visual cues to assess sink rate and depth perception during landings | | X | X | X |
| 6.c. | Accurate portrayal of environment relating to flight simulator attitudes | X | X | X | X |
| 6.d. | The airport model and the generated visual scene must correlate with integrated airplane systems (e.g., terrain, traffic and weather avoidance systems and Head-up Guidance System (HGS)). | | | X | X |
| 6.e. | Representative visual effects for each visible, own-ship, airplane external light(s)—taxi and landing light lobes (including independent operation, if appropriate). | X | X | X | X |
| 6.f. | The effect of rain removal devices | | | X | X |
| 7. | Scene quality. The following are the minimum scene quality tests that must be conducted for simulators at Levels A, B, C, and D. | | | | |
| 7.a. | Surfaces and textural cues must be free from apparent and distracting quantization (aliasing). | | | X | X |
| 7.b. | System capable of portraying full color realistic textural cues | | | X | X |
| 7.c. | The system light points must be free from distracting jitter, smearing or streaking | X | X | X | X |
| 7.d. | Demonstration of occulting through each channel of the system in an operational scene. | X | X | | |
| 7.e. | Demonstration of a minimum of ten levels of occulting through each channel of the system in an operational scene. | | | X | X |
| 7.f. | System capable of providing focus effects that simulate rain | | | X | X |
| 7.g. | System capable of providing focus effects that simulate light point perspective growth | | | X | X |
| 7.h. | System capable of six discrete light step controls (0–5) | X | X | X | X |
| 8. | Environmental effects. The following are the minimum environmental effects that must be available as indicated. | | | | |
| 8.a. | The displayed scene corresponding to the appropriate surface contaminants and include runway lighting reflections for wet, partially obscured lights for snow, or alternative effects. | | | X | X |
| 8.a.1. | Special weather representations which include: | | | | |

TABLE A3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | For qualification at the stated level—Class I airport models | Simulator level | | | |
| | | A | B | C | D |
| | (i) The sound, motion and visual effects of light, medium and heavy precipitation near a thunderstorm on take-off, approach, and landings at and below an altitude of 2,000 ft (600 m) above the airport surface and within a radius of 10 sm (16 km) from the airport. | | | X | X |
| | (ii) One airport with a snow scene to include terrain snow and snow-covered taxiways and runways. | | | X | X |
| 8.b. | In-cloud effects such as variable cloud density, speed cues and ambient changes | | | X | X |
| 8.c. | The effect of multiple cloud layers representing few, scattered, broken and overcast conditions giving partial or complete obstruction of the ground scene. | | | X | X |
| 8.d. | Visibility and RVR measured in terms of distance. Visibility/RVR checked at 2,000 ft (600 m) above the airport and at two heights below 2000 ft with at least 500 ft of separation between the measurements. The measurements must be taken within a radius of 10 sm (16 km) from the airport. | X | X | X | X |
| 8.e. | Patchy fog giving the effect of variable RVR | | | X | X |
| 8.f. | Effects of fog on airport lighting such as halos and defocus | | | X | X |
| 8.g. | Effect of own-ship lighting in reduced visibility, such as reflected glare, including landing lights, strobes, and beacons. | | | X | X |
| 8.h. | Wind cues to provide the effect of blowing snow or sand across a dry runway or taxiway selectable from the instructor station. | | | X | X |
| 9. | Instructor control of the following: The following are the minimum instructor controls that must be available in simulators at Levels A, B, C, and D. | | | | |
| 9.a. | Environmental effects, e.g., cloud base, cloud effects, cloud density, visibility in statute miles/kilometers and RVR in feet/meters. | X | X | X | X |
| 9.b. | Airport selection | X | X | X | X |
| 9.c. | Airport lighting, including variable intensity | *X* | X | *X* | *X* |
| 9.d. | Dynamic effects including ground and flight traffic | | | X | X |
| **End QPS Requirement** | | | | | |
| **Begin Information** | | | | | |
| 10. | An example of being able to ''combine two airport models to achieve two ''in-use'' runways:<br>One runway designated as the ''in use'' runway in the first model of the airport, and the second runway designated as the ''in use'' runway in the second model of the same airport. For example, the clearance is for the ILS approach to Runway 27, Circle to Land on Runway 18 right. Two airport visual models might be used: the first with Runway 27 designated as the ''in use'' runway for the approach to runway 27, and the second with Runway 18 Right designated as the ''in use'' runway. When the pilot breaks off the ILS approach to runway 27, the instructor may change to the second airport visual model in which runway 18 Right is designated as the ''in use'' runway, and the pilot would make a visual approach and landing. This process is acceptable to the FAA as long as the temporary interruption due to the visual model change is not distracting to the pilot, does not cause changes in navigational radio frequencies, and does not cause undue instructor/evaluator time. | | | | |
| 11. | Sponsors are not required to provide every detail of a runway, but the detail that is provided should be correct within the capabilities of the system. | | | | |
| **End Information** | | | | | |

TABLE A3C—FUNCTIONS AND SUBJECTIVE TESTS

| QPS requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Additional airport models beyond minimum required for qualification—Class II airport models | Simulator level | | | |
| | | A | B | C | D |
| This table specifies the minimum airport model content and functionality necessary to add airport models to a simulator's model library, beyond those necessary for qualification at the stated level, without the necessity of further involvement of the NSPM or TPAA. | | | | | |
| | **Begin QPS Requirements** | | | | |
| 1. | Airport model management. The following is the minimum airport model management requirements for simulators at Levels A, B, C, and D. | | | | |
| 1.a. | The direction of strobe lights, approach lights, runway edge lights, visual landing aids, runway centerline lights, threshold lights, and touchdown zone lights on the ''in-use'' runway must be replicated. | X | X | X | X |
| 2. | Visual feature recognition. The following are the minimum distances at which runway features must be visible for simulators at Levels A, B, C, and D. Distances are measured from runway threshold to an airplane aligned with the runway on an extended 3° glide-slope in simulated meteorological conditions that recreate the minimum distances for visibility. For circling approaches, all requirements of this section apply to the runway used for the initial approach and to the runway of intended landing. | | | | |
| 2.a. | Runway definition, strobe lights, approach lights, and runway edge white lights from 5 sm (8 km) from the runway threshold. | X | X | X | X |
| 2.b. | Visual Approach Aid lights (VASI or PAPI) from 5 sm (8 km) from the runway threshold | | | X | X |
| 2.c. | Visual Approach Aid lights (VASI or PAPI) from 3 sm (5 km) from the runway threshold | X | X | | |
| 2.d. | Runway centerline lights and taxiway definition from 3 sm (5 km) from the runway threshold. | X | X | X | X |
| 2.e. | Threshold lights and touchdown zone lights from 2 sm (3 km) from the runway threshold | X | X | X | X |
| 2.f. | Runway markings within range of landing lights for night scenes and as required by the surface resolution requirements on day scenes. | X | X | X | X |
| 2.g. | For circling approaches, the runway of intended landing and associated lighting must fade into view in a non-distracting manner. | X | X | X | X |
| 3. | Airport model content. The following prescribes the minimum requirements for what must be provided in an airport model and identifies other aspects of the airport environment that must correspond with that model for simulators at Levels A, B, C, and D. The detail must be developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material; however, this does not require that airport models contain details that are beyond the designed capability of the currently qualified visual system. For circling approaches, all requirements of this section apply to the runway used for the initial approach and to the runway of intended landing. Only one ''primary'' taxi route from parking to the runway end will be required for each ''in-use'' runway. | | | | |
| 3.a. | The surface and markings for each ''in-use'' runway: | | | | |
| 3.a.1. | Threshold markings | X | X | X | X |
| 3.a.2. | Runway numbers | X | X | X | X |
| 3.a.3. | Touchdown zone markings | X | X | X | X |
| 3.a.4. | Fixed distance markings | X | X | X | X |
| 3.a.5. | Edge markings | X | X | X | X |
| 3.a.6. | Centerline stripes | X | X | X | X |
| 3.b. | The lighting for each ''in-use'' runway | | | | |
| 3.b.1. | Threshold lights | X | X | X | X |
| 3.b.2. | Edge lights | X | X | X | X |
| 3.b.3. | End lights | X | X | X | X |
| 3.b.4. | Centerline lights | X | X | X | X |

TABLE A3C—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Additional airport models beyond minimum required for qualification—Class II airport models | Simulator level | | | |
| | | A | B | C | D |
| 3.b.5. | Touchdown zone lights, if appropriate | X | X | X | X |
| 3.b.6. | Leadoff lights, if appropriate | X | X | X | X |
| 3.b.7. | Appropriate visual landing aid(s) for that runway | X | X | X | X |
| 3.b.8. | Appropriate approach lighting system for that runway | X | X | X | X |
| 3.c. | The taxiway surface and markings associated with each ''in-use'' runway: | | | | |
| 3.c.1. | Edge | X | X | X | X |
| 3.c.2. | Centerline | X | X | X | X |
| 3.c.3. | Runway hold lines | X | X | X | X |
| 3.c.4. | ILS critical area markings | X | X | X | X |
| 3.d. | The taxiway lighting associated with each ''in-use'' runway: | | | | |
| 3.d.1. | Edge | | | X | X |
| 3.d.2. | Centerline | X | X | X | X |
| 3.d.3. | Runway hold and ILS critical area lights | X | X | X | X |
| **4.** | Required model correlation with other aspects of the airport environment simulation The following are the minimum model correlation tests that must be conducted for simulators at Levels A, B, C, and D. | | | | |
| 4.a. | The airport model must be properly aligned with the navigational aids that are associated with operations at the ''in-use'' runway. | X | X | X | X |
| 4.b. | Slopes in runways, taxiways, and ramp areas, if depicted in the visual scene, must not cause distracting or unrealistic effects. | X | X | X | X |
| 5. | Correlation with airplane and associated equipment. The following are the minimum correlation comparisons that must be made for simulators at Levels A, B, C, and D. | | | | |
| 5.a. | Visual system compatibility with aerodynamic programming | X | X | X | X |
| 5.b. | Accurate portrayal of environment relating to flight simulator attitudes | X | X | X | X |
| 5.c. | Visual cues to assess sink rate and depth perception during landings | | X | X | X |
| 5.d. | Visual effects for each visible, own-ship, airplane external light(s) | | X | X | X |
| 6. | Scene quality. The following are the minimum scene quality tests that must be conducted for simulators at Levels A, B, C, and D. | | | | |
| 6.a. | Surfaces and textural cues must be free of apparent and distracting quantization (aliasing) | | | X | X |
| 6.b. | Correct color and realistic textural cues | | | X | X |
| 6.c. | Light points free from distracting jitter, smearing or streaking | X | X | X | X |
| 7. | Instructor controls of the following: The following are the minimum instructor controls that must be available in simulators at Levels A, B, C, and D. | | | | |
| 7.a. | Environmental effects, e.g., cloud base (if used), cloud effects, cloud density, visibility in statute miles/kilometers and RVR in feet/meters. | X | X | X | X |
| 7.b. | Airport selection | X | X | X | X |
| 7.c. | Airport lighting including variable intensity | X | X | X | X |
| 7.d. | Dynamic effects including ground and flight traffic | | | X | X |

TABLE A3C—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Additional airport models beyond minimum required for qualification—Class II airport models | Simulator level | | | |
| | | A | B | C | D |
| **End QPS Requirements** | | | | | |
| **Begin Information** | | | | | |
| 8. ..... | Sponsors are not required to provide every detail of a runway, but the detail that is provided must be correct within the capabilities of the system. | X | X | X | X |
| **End Information** | | | | | |

TABLE A3D—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry no. | Motion system effects | Simulator level | | | | Notes |
| | | A | B | C | D | |
| This table specifies motion effects that are required to indicate when a flight crewmember must be able to recognize an event or situation. Where applicable, flight simulator pitch, side loading and directional control characteristics must be representative of the airplane. | | | | | | |
| 1. ..... | Runway rumble, oleo deflection, ground speed, uneven runway, runway and taxiway centerline light characteristics:<br>Procedure: After the airplane has been preset to the takeoff position and then released, taxi at various speeds with a smooth runway and note the general characteristics of the simulated runway rumble effects of oleo deflections. Repeat the maneuver with a runway roughness of 50%, then with maximum roughness. Note the associated motion vibrations affected by ground speed and runway roughness. | X | X | X | X | Different gross weights can also be selected, which may also affect the associated vibrations depending on airplane type. The associated motion effects for the above tests should also include an assessment of the effects of rolling over centerline lights, surface discontinuities of uneven runways, and various taxiway characteristics. |
| 2. ..... | Buffets on the ground due to spoiler/speedbrake extension and reverse thrust:<br>Procedure: Perform a normal landing and use ground spoilers and reverse thrust—either individually or in combination—to decelerate the simulated airplane. Do not use wheel braking so that only the buffet due to the ground spoilers and thrust reversers is felt. | X | X | X | X | |
| 3. ..... | Bumps associated with the landing gear:<br>Procedure: Perform a normal take-off paying special attention to the bumps that could be perceptible due to maximum oleo extension after lift-off. When the landing gear is extended or retracted, motion bumps can be felt when the gear locks into position. | X | X | X | X | |
| 4. ..... | Buffet during extension and retraction of landing gear:<br>Procedure: Operate the landing gear. Check that the motion cues of the buffet experienced represent the actual airplane. | X | X | X | X | |

TABLE A3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry no. | Motion system effects | Simulator level | | | | Notes |
| | | A | B | C | D | |
| 5. ..... | Buffet in the air due to flap and spoiler/speedbrake extension and approach to stall buffet:<br>Procedure: Perform an approach and extend the flaps and slats with airspeeds deliberately in excess of the normal approach speeds. In cruise configuration, verify the buffets associated with the spoiler/speedbrake extension. The above effects can also be verified with different combinations of spoiler/speedbrake, flap, and landing gear settings to assess the interaction effects. | X | X | X | X | |
| 6. ..... | Approach to stall buffet:<br>Procedure: Conduct an approach-to-stall with engines at idle and a deceleration of 1 knot/second. Check that the motion cues of the buffet, including the level of buffet increase with decreasing speed, are representative of the actual airplane. | X | X | X | X | |
| 7. ..... | Touchdown cues for main and nose gear:<br>Procedure: Conduct several normal approaches with various rates of descent. Check that the motion cues for the touchdown bumps for each descent rate are representative of the actual airplane. | X | X | X | X | |
| 8. ..... | Nosewheel scuffing:<br>Procedure: Taxi at various ground speeds and manipulate the nosewheel steering to cause yaw rates to develop that cause the nosewheel to vibrate against the ground (''scuffing''). Evaluate the speed/nosewheel combination needed to produce scuffing and check that the resultant vibrations are representative of the actual airplane. | X | X | X | X | |
| 9. ..... | Thrust effect with brakes set:<br>Procedure: Set the brakes on at the take-off point and increase the engine power until buffet is experienced. Evaluate its characteristics. Confirm that the buffet increases appropriately with increasing engine thrust. | X | X | X | X | This effect is most discernible with wing-mounted engines. |
| 10. ..... | Mach and maneuver buffet:<br>Procedure: With the simulated airplane trimmed in 1 g flight while at high altitude, increase the engine power so that the Mach number exceeds the documented value at which Mach buffet is experienced. Check that the buffet begins at the same Mach number as it does in the airplane (for the same configuration) and that buffet levels are representative of the actual airplane. For certain airplanes, maneuver buffet can also be verified for the same effects. Maneuver buffet can occur during turning flight at conditions greater than 1 g, particularly at higher altitudes. | | X | X | X | |

TABLE A3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry no. | Motion system effects | Simulator level | | | | Notes |
| | | A | B | C | D | |
| 11. ..... | Tire failure dynamics:<br>Procedure: Simulate a single tire failure and a multiple tire failure. | | | X | X | The pilot may notice some yawing with a multiple tire failure selected on the same side. This should require the use of the rudder to maintain control of the airplane.<br>Dependent on airplane type, a single tire failure may not be noticed by the pilot and should not have any special motion effect. Sound or vibration may be associated with the actual tire losing pressure. |
| 12. ..... | Engine malfunction and engine damage:<br>Procedure: The characteristics of an engine malfunction as stipulated in the malfunction definition document for the particular flight simulator must describe the special motion effects felt by the pilot. Note the associated engine instruments varying according to the nature of the malfunction and note the replication of the effects of the airframe vibration. | | X | X | X | |
| 13. ..... | Tail strikes and engine pod strikes:<br>Procedure: Tail-strikes can be checked by over-rotation of the airplane at a speed below $V_r$ while performing a takeoff. The effects can also be verified during a landing.<br>Excessive banking of the airplane during its take-off/landing roll can cause a pod strike. | | X | X | X | The motion effect should be felt as a noticeable bump. If the tail strike affects the airplane angular rates, the cueing provided by the motion system should have an associated effect. |

TABLE A3E—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Sound system | Simulator level | | | |
| | | A | B | C | D |
| The following checks are performed during a normal flight profile with motion system ON. | | | | | |
| 1. ..... | Precipitation ..... | | | X | X |
| 2. ..... | Rain removal equipment. ..... | | | X | X |
| 3. ..... | Significant airplane noises perceptible to the pilot during normal operations ..... | | | X | X |
| 4. ..... | Abnormal operations for which there are associated sound cues including, engine malfunctions, landing gear/tire malfunctions, tail and engine pod strike and pressurization malfunction. | | | X | X |
| 5. ..... | Sound of a crash when the flight simulator is landed in excess of limitations ..... | X | X | | |

TABLE A3F—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Special effects | Simulator level | | | |
| | | A | B | C | D |
| This table specifies the minimum special effects necessary for the specified simulator level. | | | | | |
| 1. ..... | Braking Dynamics:<br>Representations of the dynamics of brake failure (flight simulator pitch, side-loading, and directional control characteristics representative of the airplane), including antiskid and decreased brake efficiency due to high brake temperatures (based on airplane related data), sufficient to enable pilot identification of the problem and implementation of appropriate procedures. | | | X | X |
| 2. ..... | Effects of Airframe and Engine Icing: | | | X | X |

TABLE A3F—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Special effects | Simulator level | | | |
| | | A | B | C | D |
| | Required only for those airplanes authorized for operations in known icing conditions.<br>Procedure: With the simulator airborne, in a clean configuration, nominal altitude and cruise airspeed, autopilot on and auto-throttles off, engine and airfoil anti-ice/de-ice systems deactivated; activate icing conditions at a rate that allows monitoring of simulator and systems response. Icing recognition will include an increase in gross weight, airspeed decay, change in simulator pitch attitude, change in engine performance indications (other than due to airspeed changes), and change in data from pitot/static system. Activate heating, anti-ice, or de-ice systems independently. Recognition will include proper effects of these systems, eventually returning the simulated airplane to normal flight. | | | | |

TABLE A3G—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Special effects | Simulator level | | | |
| | | A | B | C | D |
| Functions in this table are subject to evaluation only if appropriate for the airplane and/or the system is installed on the specific simulator. | | | | | |
| 1. ..... | Simulator Power Switch(es) ..... | X | X | X | X |
| 2. ..... | Airplane conditions | | | | |
| 2.a. .... | Gross weight, center of gravity, fuel loading and allocation ..... | X | X | X | X |
| 2.b. .... | Airplane systems status ..... | X | X | X | X |
| 2.c. ..... | Ground crew functions (e.g., ext. power, push back) ..... | X | X | X | X |
| 3. ..... | Airports | | | | |
| 3.a. .... | Number and selection ..... | X | X | X | X |
| 3.b. .... | Runway selection ..... | X | X | X | X |
| 3.c. ..... | Runway surface condition (e.g., rough, smooth, icy, wet) ..... | X | X | | |
| 3.d. .... | Preset positions (e.g., ramp, gate, #1 for takeoff, takeoff position, over FAF) ..... | X | X | X | X |
| 3.e. .... | Lighting controls ..... | X | X | X | X |
| 4. ..... | Environmental controls | | | | |
| 4.a ..... | Visibility (statute miles (kilometers)) ..... | X | X | X | X |
| 4.b. .... | Runway visual range (in feet (meters)) ..... | X | X | X | X |
| 4.c. ..... | Temperature ..... | X | X | X | X |
| 4.d. .... | Climate conditions (e.g., ice, snow, rain) ..... | X | X | X | X |
| 4.e. .... | Wind speed and direction ..... | X | X | X | X |
| 4.f. ..... | Windshear ..... | X | X | | |
| 4.g. .... | Clouds (base and tops) ..... | X | X | X | X |
| 5. ..... | Airplane system malfunctions (Inserting and deleting malfunctions into the simulator) ..... | X | X | X | X |
| 6. ..... | Locks, Freezes, and Repositioning | | | | |
| 6.a. .... | Problem (all) freeze/release ..... | X | X | X | X |
| 6.b. .... | Position (geographic) freeze/release ..... | X | X | X | X |
| 6.c. ..... | Repositioning (locations, freezes, and releases) ..... | X | X | X | X |

TABLE A3G—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS Requirements | | | | | |
|---|---|---|---|---|---|
| Entry No. | Special effects | Simulator level | | | |
| | | A | B | C | D |
| 6.d. .... | Ground speed control | X | X | X | X |
| 7. ..... | Remote IOS | X | X | X | X |
| 8. ..... | Sound Controls. On/off/adjustment | X | X | X | X |
| 9. ..... | Motion/Control Loading System | | | | |
| 9.a. .... | On/off/emergency stop | X | X | X | X |
| 10. ..... | Observer Seats/Stations. Position/Adjustment/Positive restraint system | X | X | X | X |

BEGIN INFORMATION

1. INTRODUCTION

a. The following is an example test schedule for an Initial/Upgrade evaluation that covers the majority of the requirements set out in the Functions and Subjective test requirements. It is not intended that the schedule be followed line by line, rather, the example should be used as a guide for preparing a schedule that is tailored to the airplane, sponsor, and training task.

b. Functions and subjective tests should be planned. This information has been organized as a reference document with the considerations, methods, and evaluation notes for each individual aspect of the simulator task presented as an individual item. In this way the evaluator can design his or her own test plan, using the appropriate sections to provide guidance on method and evaluation criteria. Two aspects should be present in any test plan structure:

(1) An evaluation of the simulator to determine that it replicates the aircraft and performs reliably for an uninterrupted period equivalent to the length of a typical training session.

(2) The simulator should be capable of operating reliably after the use of training device functions such as repositions or malfunctions.

c. A detailed understanding of the training task will naturally lead to a list of objectives that the simulator should meet. This list will form the basis of the test plan. Additionally, once the test plan has been formulated, the initial conditions and the evaluation criteria should be established. The evaluator should consider all factors that may have an influence on the characteristics observed during particular training tasks in order to make the test plan successful.

2. EVENTS

*a. Initial Conditions*

(1) Airport.
(2) QNH.
(3) Temperature.
(4) Wind/Crosswind.
(5) Zero Fuel Weight /Fuel/Gross Weight /Center of Gravity.

*b. Initial Checks*

(1) Documentation of Simulator.
(a) Simulator Acceptance Test Manuals.
(b) Simulator Approval Test Guide.
(c) Technical Logbook Open Item List.
(d) Daily Functional Pre-flight Check.
(2) Documentation of User/Carrier Flight Logs.
(a) Simulator Operating/Instructor Manual.
(b) Difference List (Aircraft/Simulator).
(c) Flight Crew Operating Manuals.
(d) Performance Data for Different Fields.
(e) Crew Training Manual.
(f) Normal/Abnormal/Emergency Checklists.
(3) Simulator External Checks.
(a) Appearance and Cleanliness.
(b) Stairway/Access Bridge.
(c) Emergency Rope Ladders.
(d) ''Motion On''/''Flight in Progress'' Lights.
(4) Simulator Internal Checks.
(a) Cleaning/Disinfecting Towels (for cleaning oxygen masks).
(b) Flight deck Layout (compare with difference list).
(5) Equipment.
(a) Quick Donning Oxygen Masks.
(b) Head Sets.
(c) Smoke Goggles.
(d) Sun Visors.
(e) Escape Rope.
(f) Chart Holders.
(g) Flashlights.
(h) Fire Extinguisher (inspection date).
(i) Crash Axe.
(j) Gear Pins.

*c. Power Supply and APU Start Checks*

(1) Batteries and Static Inverter.
(2) APU Start with Battery.
(3) APU Shutdown using Fire Handle.
(4) External Power Connection.
(5) APU Start with External Power.
(6) Abnormal APU Start/Operation.

*d. Flight deck Checks*

(1) Flight deck Preparation Checks.
(2) FMC Programming.
(3) Communications and Navigational Aids Checks.

*e. Engine Start*

(1) Before Start Checks.
(2) Battery start with Ground Air Supply Unit.
(3) Engine Crossbleed Start.
(4) Normal Engine Start.
(5) Abnormal Engine Starts.
(6) Engine Idle Readings.
(7) After Start Checks.

*f. Taxi Checks*

(1) Pushback/Powerback.
(2) Taxi Checks.
(3) Ground Handling Check:
(a) Power required to initiate ground roll.
(b) Thrust response.
(c) Nosewheel and Pedal Steering.
(d) Nosewheel Scuffing.
(e) Perform 180 degree turns.
(f) Brakes Response and Differential Braking using Normal, Alternate and Emergency.
(g) Brake Systems.
(h) Eye height and fore/aft position.
(4) Runway Roughness.

*g. Visual Scene—Ground Assessment.* Select 3 different airport models and perform the following checks with Day, Dusk and Night selected, as appropriate:
(1) Visual Controls.
(a) Daylight, Dusk, Night Scene Controls.
(b) Flight deck ''Daylight'' ambient lighting.
(c) Environment Light Controls.
(d) Runway Light Controls.
(e) Taxiway Light Controls.
(2) Airport Model Content.
(a) Ramp area for buildings, gates, airbridges, maintenance ground equipment, parked aircraft.
(b) Daylight shadows, night time light pools.
(c) Taxiways for correct markings, taxiway/runway, marker boards, CAT I and II/III hold points, taxiway shape/grass areas, taxiway light (positions and colors).
(d) Runways for correct markings, lead-off lights, boards, runway slope, runway light positions, and colors, directionality of runway lights.
(e) Airport environment for correct terrain and significant features.
(f) Visual scene quantization (aliasing), color, and occulting levels.
(3) Ground Traffic Selection.
(4) Environment Effects.
(a) Low cloud scene.
(i) Rain:
(A) Runway surface scene.
(B) Windshield wiper—operation and sound.
(ii) Hail:
(A) Runway surface scene.
(B) Windshield wiper—operation and sound.
(b) Lightning/thunder.
(c) Snow/ice runway surface scene.
(d) Fog.

*h. Takeoff.* Select one or several of the following test cases:
(1) T/O Configuration Warnings.
(2) Engine Takeoff Readings.
(3) Rejected Takeoff (Dry/Wet/Icy Runway) and check the following:
(a) Autobrake function.
(b) Anti-skid operation.
(c) Motion/visual effects during deceleration.
(d) Record stopping distance (use runway plot or runway lights remaining).
Continue taxiing along the runway while applying brakes and check the following:
(e) Center line lights alternating red/white for 2000 feet/600 meters.
(f) Center line lights all red for 1000 feet/300 meters.
(g) Runway end, red stop bars.
(h) Braking fade effect.
(i) Brake temperature indications.
(4) Engine Failure between VI and V2.
(5) Normal Takeoff:
(a) During ground roll check the following:
(i) Runway rumble.
(ii) Acceleration cues.
(iii) Groundspeed effects.
(iv) Engine sounds.
(v) Nosewheel and rudder pedal steering.
(b) During and after rotation, check the following:
(i) Rotation characteristics.
(ii) Column force during rotation.
(iii) Gear uplock sounds/bumps.
(iv) Effect of slat/flap retraction during climbout.
(6) Crosswind Takeoff (check the following):
(a) Tendency to turn into or out of the wind.
(b) Tendency to lift upwind wing as airspeed increases.
(7) Windshear during Takeoff (check the following):
(a) Controllable during windshear encounter.
(b) Performance adequate when using correct techniques.
(c) Windshear Indications satisfactory.
(d) Motion cues satisfactory (particularly turbulence).
(8) Normal Takeoff with Control Malfunction.

(9) Low Visibility T/O (check the following):
(a) Visual cues.
(b) Flying by reference to instruments.
(c) SID Guidance on LNAV.

*i. Climb Performance.* Select one or several of the following test cases:

(1) Normal Climb—Climb while maintaining recommended speed profile and note fuel, distance and time.

(2) Single Engine Climb—Trim aircraft in a zero wheel climb at V2.

NOTE: Up to 5° bank towards the operating engine(s) is permissible. Climb for 3 minutes and note fuel, distance, and time. Increase speed toward en route climb speed and retract flaps. Climb for 3 minutes and note fuel, distance, and time.

*j. Systems Operation During Climb.*

Check normal operation and malfunctions as appropriate for the following systems:

(1) Air conditioning/Pressurization/Ventilation.
(2) Autoflight.
(3) Communications.
(4) Electrical.
(5) Fuel.
(6) Icing Systems.
(7) Indicating and Recording Systems.
(8) Navigation/FMS.
(9) Pneumatics.

*k. Cruise Checks.* Select one or several of the following test cases:

(1) Cruise Performance.

(2) High Speed/High Altitude Handling (check the following):
(a) Overspeed warning.
(b) High Speed buffet.
(c) Aircraft control satisfactory.
(d) Envelope limiting functions on Computer Controlled Aircraft.

Reduce airspeed to below level flight buffet onset speed, start a turn, and check the following:

(e) High Speed buffet increases with G loading.

Reduce throttles to idle and start descent, deploy the speedbrake, and check the following:

(f) Speedbrake indications.
(g) Symmetrical deployment.
(h) Airframe buffet.
(i) Aircraft response hands off.

(3) Yaw Damper Operation. Switch off yaw dampers and autopilot. Initiate a Dutch roll and check the following:
(a) Aircraft dynamics.
(b) Simulator motion effects.

Switch on yaw dampers, re-initiate a Dutch roll and check the following:

(c) Damped aircraft dynamics.

(4) APU Operation.

(5) Engine Gravity Feed.

(6) Engine Shutdown and Driftdown Check: FMC operation Aircraft performance.

(7) Engine Relight.

*l. Descent.* Select one of the following test cases:

(1) Normal Descent. Descend while maintaining recommended speed profile and note fuel, distance and time.

(2) Cabin Depressurization/Emergency Descent.

*m. Medium Altitude Checks.* Select one or several of the following test cases:

(1) High Angle of Attack/Stall. Trim the aircraft at 1.4 Vs, establish 1 kt/sec$^2$ deceleration rate, and check the following—
(a) System displays/operation satisfactory.
(b) Handling characteristics satisfactory.
(c) Stall and Stick shaker speed.
(d) Buffet characteristics and onset speed.
(e) Envelope limiting functions on Computer Controlled Aircraft.

Recover to straight and level flight and check the following:

(f) Handling characteristics satisfactory.

(2) Turning Flight. Roll aircraft to left, establish a 30° to 45° bank angle, and check the following:
(a) Stick force required, satisfactory.
(b) Wheel requirement to maintain bank angle.
(c) Slip ball response, satisfactory.
(d) Time to turn 180°.

Roll aircraft from 45° bank one way to 45° bank the opposite direction while maintaining altitude and airspeed—check the following:

(e) Controllability during maneuver.

(3) Degraded flight controls.

(4) Holding Procedure (check the following:)
(a) FMC operation.
(b) Autopilot auto thrust performance.

(5) Storm Selection (check the following:)
(a) Weather radar controls.
(b) Weather radar operation.
(c) Visual scene corresponds with WXR pattern.

(Fly through storm center, and check the following:)
(d) Aircraft enters cloud.
(e) Aircraft encounters representative turbulence.
(f) Rain/hail sound effects evident.

*As aircraft leaves storm area, check the following:*
(g) Storm effects disappear.

(6) TCAS (check the following:)
(a) Traffic appears on visual display.
(b) Traffic appears on TCAS display(s).

As conflicting traffic approaches, take relevant avoiding action, and check the following:

(c) Visual and TCAS system displays.

*n. Approach and Landing.* Select one or several of the following test cases while monitoring flight control and hydraulic systems for normal operation and with malfunctions selected:

(1) Flaps/Gear Normal Operation. Check the following:

(a) Time for extension/retraction.
(b) Buffet characteristics.
(2) Normal Visual Approach and Landing.
Fly a normal visual approach and landing—check the following:
(a) Aircraft handling.
(b) Spoiler operation.
(c) Reverse thrust operation.
(d) Directional control on the ground.
(e) Touchdown cues for main and nosewheel.
(f) Visual cues.
(g) Motion cues.
(h) Sound cues.
(i) Brake and anti-skid operation.
(3) Flaps/Gear Abnormal Operation or with hydraulic malfunctions.
(4) Abnormal Wing Flaps/Slats Landing.
(5) Manual Landing with Control Malfunction.
(a) Aircraft handling.
(b) Radio aids and instruments.
(c) Airport model content and cues.
(d) Motion cues.
(e) Sound cues.
(6) Non-precision Approach—All Engines Operating.
(a) Aircraft handling.
(b) Radio Aids and instruments.
(c) Airport model content and cues.
(d) Motion cues.
(e) Sound cues.
(7) Circling Approach.
(a) Aircraft handling.
(c) Radio Aids and instruments.
(d) Airport model content and cues.
(e) Motion cues.
(f) Sound cues.
(8) Non-precision Approach—One Engine Inoperative.
(a) Aircraft handling.
(b) Radio Aids and instruments.
(c) Airport model content and cues.
(d) Motion cues.
(e) Sound cues.
(9) One Engine Inoperative Go-around.
(a) Aircraft handling.
(b) Radio Aids and instruments.
(c) Airport model content and cues.
(d) Motion cues.
(e) Sound cues.
(10) CAT I Approach and Landing with raw-data ILS.
(a) Aircraft handling.
(b) Radio Aids and instruments.
(c) Airport model content and cues.
(d) Motion cues.
(e) Sound cues.
(11) CAT I Approach and Landing with Limiting Crosswind.
(a) Aircraft handling.
(b) Radio Aids and instruments.
(c) Airport model content and cues.
(d) Motion cues.
(e) Sound cues.
(12) CAT I Approach with Windshear. Check the following:
(a) Controllable during windshear encounter.
(b) Performance adequate when using correct techniques.
(c) Windshear indications/warnings.
(d) Motion cues (particularly turbulence).
(13) CAT II Approach and Automatic Go-Around.
(14) CAT III Approach and Landing—System Malfunctions.
(15) CAT III Approach and Landing—1 Engine Inoperative.
(16) GPWS evaluation.
*o. Visual Scene—In-Flight Assessment.*
Select three (3) different visual models and perform the following checks with ''day,'' ''dusk,'' and ''night'' (as appropriate) selected. Reposition the aircraft at or below 2000 feet within 10 nm of the airfield. Fly the aircraft around the airport environment and assess control of the visual system and evaluate the Airport model content as described below:
(1) Visual Controls.
(a) Daylight, Dusk, Night Scene Controls.
(b) Environment Light Controls.
(c) Runway Light Controls.
(d) Taxiway Light Controls.
(e) Approach Light Controls.
(2) Airport model Content.
(a) Airport environment for correct terrain and significant features.
(b) Runways for correct markings, runway slope, directionality of runway lights.
(c) Visual scene for quantization (aliasing), color, and occulting.
Reposition the aircraft to a long, final approach for an ''ILS runway.'' Select flight freeze when the aircraft is 5-statute miles (sm)/8-kilometers (km) out and on the glide slope. Check the following:
(3) Airport model content.
(a) Airfield features.
(b) Approach lights.
(c) Runway definition.
(d) Runway definition.
(e) Runway edge lights and VASI lights.
(f) Strobe lights.
Release flight freeze. Continue flying the approach with NP engaged. Select flight freeze when aircraft is 3 sm/5 km out and on the glide slope. Check the following:
(4) Airport model Content.
(a) Runway centerline light.
(b) Taxiway definition and lights.
Release flight freeze and continue flying the approach with A/P engaged. Select flight freeze when aircraft is 2 sm/3 km out and on the glide slope. Check the following:
(5) Airport model content.
(a) Runway threshold lights.
(b) Touchdown zone lights.
At 200 ft radio altitude and still on glide slope, select Flight Freeze. Check the following:
(6) Airport model content.
(a) Runway markings.

Set the weather to Category I conditions and check the following:

(7) Airport model content.

(a) Visual ground segment.

Set the weather to Category II conditions, release Flight Freeze, re-select Flight Freeze at 100 feet radio altitude, and check the following:

(8) Airport model content.

(a) Visual ground segment.

Select night/dusk (twilight) conditions and check the following:

(9) Airport model content.

(a) Runway markings visible within landing light lobes.

Set the weather to Category III conditions, release Flight Freeze, re-select Flight Freeze at 50 feet radio altitude and check the following:

(10) Airport model content.

(a) Visual ground segment.

Set WX to a typical ''missed approach? weather condition, release Flight Freeze, re-select Flight Freeze at 15 feet radio altitude, and check the following:

(11) Airport model content.

(a) Visual ground segment.

When on the ground, stop the aircraft. Set 0 feet RVR, ensure strobe/beacon tights are switched on and check the following:

(12) Airport model content.

(a) Visual effect of strobe and beacon.

Reposition to final approach, set weather to ''Clear,'' continue approach for an automatic landing, and check the following:

(13) Airport model content.

(a) Visual cues during flare to assess sink rate.

(b) Visual cues during flare to assess Depth perception.

(c) Flight deck height above ground.

After Landing Operations.

(1) After Landing Checks.

(2) Taxi back to gate. Check the following:

(a) Visual model satisfactory.

(b) Parking brake operation satisfactory.

(3) Shutdown Checks.

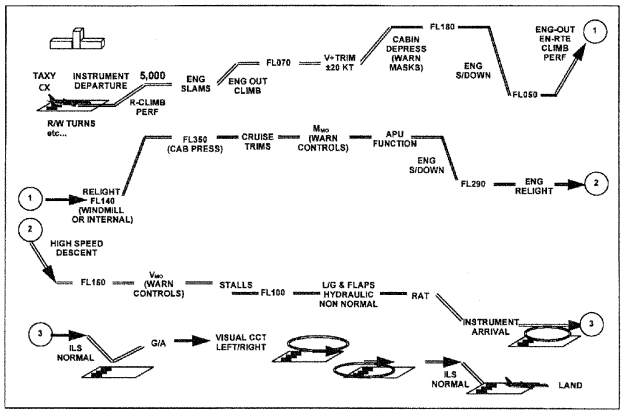
q. Crash Function.

(1) Gear-up Crash.

(2) Excessive rate of descent Crash.

(3) Excessive bank angle Crash.

Typical Subjective Continuing Qualification Evaluation Profile (2 hours)




**End Information**

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**Attachment 4 to Appendix A to Part 60--**

**SAMPLE DOCUMENTS**

**Table of Contents**

Title of Sample

Figure A4A Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation.

Figure A4B Attachment: FFS Information Form

Figure A4C Sample Letter of Compliance

Figure A4D Sample Qualification Test Guide Cover Page

Figure A4E Sample Statement of Qualification - Certificate

Figure A4F Sample Statement of Qualification - Configuration List

Figure A4G Sample Statement of Qualification - List of Qualified Tasks

Figure A4H Sample Continuing Qualification Evaluation Requirements Page

Figure A4I Sample MQTG Index of Effective FFS Directives

**Attachment 4 to Appendix A to Part 60—**
**Figure A4A – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**INFORMATION**

Date _____

Edward D. Cook, Ph.D.
Manager, National Simulator Program
Federal Aviation Administration
100 Hartsfield Centre Parkway, Suite 400
Atlanta, GA 30354

Dear Dr. Cook:

**RE: Request for Initial/Upgrade Evaluation Date**

This is to advise you of our intent to request an (initial or upgrade) evaluation of our (FFS Manufacturer), (Aircraft Type/Level) Full Flight Simulator (FFS), (FAA ID Number, if previously qualified), located in (City, State) at the (Facility) on (Proposed Evaluation Date). (The proposed evaluation date shall not be more than 180 days following the date of this letter.) The FFS will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FFS will be sponsored as follows: (Select One)

☐ The FFS will be used within the sponsor's FAA approved training program and placed on the sponsor's Training/Operations Specifications.

☐ The FFS will be used for dry lease only.

We agree to provide the formal request for the evaluation to your staff as follows: (check one)

☐ For QTG tests run at the factory, not later, than 45 days prior to the proposed evaluation date with the additional "l/3 on-site" tests provided not later than 14 days prior to the proposed evaluation date.

☐ For QTG tests run on-site, not later than 30 days prior to the proposed evaluation date.

We understand that the formal request will contain the following documents:

1. Sponsor's Letter of Request (*Company Compliance Letter*).
2. Principal Operations Inspector (POI) or Training Center Program Manager's (TCPM) endorsement.
3. Complete QTG.

*If we are unable to meet the above requirements, we understand this may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation.*

(The sponsor should add additional comments as necessary).

Please contact (Name Telephone and Fax Number of Sponsor's Contact) to confirm the date for this initial evaluation. We understand a member of your National Simulator Program staff will respond to this request within 14 days.

A copy of this letter of intent has been provided to (Name), the Principal Operations Inspector (POI) and/or Training Center Program Manager (TCPM).

Sincerely,

Attachment: FFS Information Form
cc: POI/TCPM

**Attachment 4 to Appendix A to Part 60—**
**Figure A4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**
**INFORMATION**

| | | | | | |
|---|---|---|---|---|---|
| **Date:** ____ | | | | | |
| **Section 1. FSTD Information and Characteristics** | | | | | |
| **Sponsor Name:** | ____ | | **FSTD Location:** | | |
| **Address:** | ____ | | **Physical Address:** | ____ | |
| **City:** | ____ | | **City:** | ____ | |
| **State:** | ____ | | **State:** | ____ | |
| **Country:** | ____ | | **Country:** | ____ | |
| **ZIP:** | ____ | | **ZIP:** | ____ | |
| **Manager** | ____ | | | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | | **Nearest Airport:** (Airport Designator) | ____ | |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | | | |
| **Aircraft Make/model/series:** | ____ | | | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | | **Manufacturer's Identification or Serial Number** | ____ | |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | | ☐ **eMQTG** | | |
| **Qualification Basis:** ____ | ☐ **A** | ☐ **B** | ☐ **Interim C** | ☐ **C** | ☐ **D** |
| | ☐ **6** | ☐ **7** | ☐ **Provisional Status** | | |
| **Other Technical Information:** | | | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | | **FSTD Manufacturer:** | ____ | |
| **Convertible FSTD:** | ☐ **Yes:** | | **Date of Manufacture:** | ____ MM/DD/YYYY | |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | | **Sponsor FSTD ID No:** ____ | | |
| **Engine model(s) and data revision:** ____ | | | **Source of aerodynamic model:** ____ | | |
| **FMS identification and revision level:** ____ | | | **Source of aerodynamic coefficient data:** ____ | | |
| **Visual system manufacturer/model:** ____ | | | **Aerodynamic data revision number:** ____ | | |
| **Flight control data revision:** ____ | | | **Visual system display:** ____ | | |
| **Mot ion system manufacturer/type:** ____ | | | **FSTD computer(s) identification:** ____ | | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | | | |
| **NAA FSTD ID No:** | ____ | | **Last NAA Evaluation Date:** | ____ | |
| **NAA Qualification Level:** | ____ | | | | |
| **NAA Qualification Basis:** | ____ | | | | |
| **Visual System Manufacturer and Type:** | ____ | **FSTD Seats Available:** ____ | **Motion System Manufacturer and Type:** | ____: | |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**
**INFORMATION**

| Aircraft Equipment: | Engine Type(s): | Flight Instrumentation: | Engine Instrumentation: |
|---|---|---|---|
| | _____<br>_____ | ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS<br>☐ TCAS ☐ GPWS ☐ Plain View<br>☐ GPS ☐ FMS Type: ___<br>☐ WX Radar ☐ Other: ___ | ☐ EICAS ☐ FADEC<br>☐ Other: ___ |

| | | | |
|---|---|---|---|
| **Airport Models:** | 3.6.1 _____<br>Airport Designator | 3.6.2_____<br>Airport Designator | 3.6.3 _____<br>Airport Designator |
| **Circle to Land:** | 3. 7.1 _____<br>Airport Designator | 3. 7.2_____<br>Approach | 3. 7.3 _____<br>Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____<br>Airport Designator | 3.8 .2_____<br>Approach | 3. 8.3 _____<br>Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |
| **Proficiency Checks** (135/121/142) | ☐ | _____ |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**
**INFORMATION**

| | | |
|---|---|---|
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III** * (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4C – Sample Letter of Compliance**
**INFORMATION**

(Date)

Mr. (Name of Training Program Approval Authority):
(Name of FAA FSDO)
(Address)
(City/State/Zip)

Dear Mr. (Name of TPAA):

**RE: Letter of Compliance**

(Operator Sponsor Name) requests evaluation of our (Aircraft Type) FFS for Level (__) qualification. The (FFS Manufacturer Name) FFS with (Visual System Manufacturer Name/Model) system is fully defined on the FFS Information page of the accompanying Qualification Test Guide (QTG). We have completed the tests of the FFS and certify that it meets all applicable requirements of FAR parts 121, 125, or 135), and the guidance of (AC 120-40B or 14 CFR Part 60). Appropriate hardware and software configuration control procedures have been established. Our Pilot(s), (Name(s)), who are qualified on (Aircraft Type) aircraft have assessed the FFS and have found that it conforms to the (Operator/Sponsor) (Aircraft Type) flight deck configuration and that the simulated systems and subsystems function equivalently to those in the aircraft. The above named pilot(s) have also assessed the performance and the flying qualities of the FFS and find that it represents the respective aircraft.

(Added Comments may be placed here)

Sincerely,
(Sponsor Representative)

cc:
FAA, National Simulator Program

**Attachment 4 to Appendix A to Part 60—**
**Figure A4D – Sample Qualification Test Guide Cover Page**
**INFORMATION**

SPONSOR NAME

SPONSOR ADDRESS

FAA QUALIFICATION TEST GUIDE

(SPECIFIC AIRPLANE MODEL)
*for example*
Stratos BA797-320A

(Type of Simulator)

(Simulator Identification Including Manufacturer, Serial Number, Visual System Used)

(Simulator Level)

(Qualification Performance Standard Used)

(Simulator Location)

FAA Initial Evaluation

Date: _____

_____ Date: _____
(Sponsor)

_____ Date: _____
Manager, National
Simulator Program, FAA

**Attachment 4 to Appendix A to Part 60—**
**Figure A4E – Sample Statement of Qualification - Certificate**
**INFORMATION**

Federal Aviation Administration
National Simulator Program

# *Certificate of Qualification*

**This is to certify that representatives of the National Simulator Program Completed an evaluation of the**

## Go-Fast Airlines
## Farnsworth Z-100 Full Flight Simulator

FAA Identification Number 999

And pursuant to 14 CFR Part 60 found it to meet its original qualification basis, AC 120-40B (MM/DD/YY)

**The Master Qualification Test Guide and the attached Configuration List and Restrictions List Provide the Qualification Basis for this device to operate at**

Level D

**Until April 30, 2010**

**Unless sooner rescinded or extended by the National Simulator Program Manager**

March 15, 2009 (date)

*B. Williamson* (for the NSPM)

**Attachment 4 to Appendix A to Part 60—**
**Figure A4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

## STATEMENT OF QUALIFICATION
## CONFIGURATION LIST

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ ____ | **Physical Address:** | ____ ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| | | | |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | ____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:** ____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| | | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐ **Yes:** | **Date of Manufacture:** | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** ____ | |
| **Engine model(s) and data revision:** ____ | | **Source of aerodynamic model:** ____ | |
| **FMS identification and revision level:** ____ | | **Source of aerodynamic coefficient data:** ____ | |
| **Visual system manufacturer/model:** ____ | | **Aerodynamic data revision number:** ____ | |
| **Flight control data revision:** ____ | | **Visual system display:** ____ | |
| **Mot ion system manufacturer/type:** ____ | | **FSTD computer(s) identification:** ____ | |
| | | | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | |
| **NAA FSTD ID No:** | ____ | **Last NAA Evaluation Date:** | ____ |
| **NAA Qualification Level:** | ____ | | |
| **NAA Qualification Basis:** | ____ | | |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

| | | | | | |
|---|---|---|---|---|---|
| **Visual System Manufacturer and Type:** | _____ | **FSTD Seats Available:** _____ | **Motion System Manufacturer and Type:** | _____: | |
| **Aircraft Equipment:** | **Engine Type(s):** _____ _____ | **Flight Instrumentation:** ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS ☐ TCAS ☐ GPWS ☐ Plain View ☐ GPS ☐ FMS Type: __ ☐ WX Radar ☐ Other: __ | | **Engine Instrumentation:** ☐ EICAS ☐ FADEC ☐ Other: __ | |

| | | | |
|---|---|---|---|
| **Airport Models:** | 3.6.1 _____ Airport Designator | 3.6.2_____ Airport Designator | 3.6.3 _____ Airport Designator |
| **Circle to Land:** | 3. 7.1 _____ Airport Designator | 3. 7.2_____ Approach | 3. 7.3 _____ Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____ Airport Designator | 3.8 .2_____ Approach | 3. 8.3 _____ Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

| | | |
|---|---|---|
| **Proficiency Checks** (135/121/142) | ☐ | _____ |
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III *** (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4G – Sample Statement of Qualification – List of Qualified Tasks**
**INFORMATION**

**STATEMENT of QUALIFICATION**
**List of Qualified Tasks**

Go Fast Airline Training -- Farnsworth Z-100 -- Level D -- FAA ID# 999

| **The FFS is qualified to perform all of the Maneuvers, Procedures, Tasks, and Functions Listed in Appendix A, Attachment 1, Table A1B, Minimum FFS Requirements In Effect on [mm/dd/yyyy] except for the following listed Tasks or Functions.** |
|---|

| Qualified for all tasks in Table A1B, for which the sponsor has requested qualification, except for the following:<br><br>3.e(1)(i) NDB approach<br>3.f. Recovery from Unusual Attitudes<br>4.3. Circling Approach |
|---|
| Additional tasks for which this FFS is qualified (i.e., in addition to the list in Table A1B)<br><br>1. Enhanced Visual System<br>2. Windshear Training IAW Section 121.409(d). |
| The airport visual models evaluated for qualification at this level are:<br>1. Atlanta Hartsfield International Airport (KATL)<br>2. Miami International Airport (KMIA)<br>3. Dallas/Ft. Worth Regional Airport (KDFW) |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4H – Sample Continuing Qualification Evaluation Requirements Page**
**INFORMATION**

| **Continuing Qualification Evaluation Requirements**<br>***Completed at conclusion of Initial Evaluation*** | |
|---|---|
| Continuing qualification Evaluations to be conducted each<br><br>_(fill in)__ months<br><br>Allotting _____ hours of FTD time.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

| **Revision:** | |
|---|---|
| Based on (enter reasoning): | |
| | |
| | |
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

| **Revision:** | |
|---|---|
| Based on (enter reasoning): | |
| | |
| | |
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

(Repeat as Necessary)

**Attachment 4 to Appendix A to Part 60—**
**Figure A4I – Sample MQTG Index of Effective FFS Directives**
**INFORMATION**

| Index of Effective FSTD Directives Filed in this Section | | | |
|---|---|---|---|
| **Number** | **Effective Date** | **Date of Notification** | **Details** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Continue as Necessary....

ATTACHMENT 5 TO APPENDIX A TO PART 60—SIMULATOR QUALIFICATION REQUIREMENTS FOR WINDSHEAR TRAINING PROGRAM USE

BEGIN QPS REQUIREMENTS

1. APPLICABILITY

This attachment applies to all simulators, regardless of qualification level, that are used to satisfy the training requirements of an FAA-approved low-altitude windshear flight training program, or any FAA-approved training program that addresses windshear encounters.

2. STATEMENT OF COMPLIANCE AND CAPABILITY (SOC)

a. The sponsor must submit an SOC confirming that the aerodynamic model is based on flight test data supplied by the airplane manufacturer or other approved data provider. The SOC must also confirm that any change to environmental wind parameters, including variances in those parameters for windshear conditions, once inserted for computation, result in the correct simulated performance. This statement must also include examples of environmental wind parameters currently evaluated in the simulator (such as crosswind takeoffs, crosswind approaches, and crosswind landings).

b. For simulators without windshear warning, caution, or guidance hardware in the original equipment, the SOC must also state that the simulation of the added hardware and/or software, including associated flight deck displays and annunciations, replicates the system(s) installed in the airplane. The statement must be accompanied by a block diagram depicting the input and output signal flow, and comparing the signal flow to the equipment installed in the airplane.

3. MODELS

The windshear models installed in the simulator software used for the qualification evaluation must do the following:

a. Provide cues necessary for recognizing windshear onset and potential performance degradation requiring a pilot to initiate recovery procedures. The cues must include all of the following, as appropriate for the portion of the flight envelope:

(1) Rapid airspeed change of at least ±15 knots (kts).

(2) Stagnation of airspeed during the takeoff roll.

(3) Rapid vertical speed change of at least ±500 feet per minute (fpm).

(4) Rapid pitch change of at least ±5°.

b. Be adjustable in intensity (or other parameter to achieve an intensity effect) to at

least two (2) levels so that upon encountering the windshear the pilot may identify its presence and apply the recommended procedures for escape from such a windshear.

(1) If the intensity is lesser, the performance capability of the simulated airplane in the windshear permits the pilot to maintain a satisfactory flightpath; and

(2) If the intensity is greater, the performance capability of the simulated airplane in the windshear does not permit the pilot to maintain a satisfactory flightpath (crash). Note: The means used to accomplish the ''nonsurvivable'' scenario of paragraph 3.b.(2) of this attachment, that involve operational elements of the simulated airplane, must reflect the dispatch limitations of the airplane.

c. Be available for use in the FAA-approved windshear flight training program.

4. DEMONSTRATIONS

a. The sponsor must identify one survivable takeoff windshear training model and one survivable approach windshear training model. The wind components of the survivable models must be presented in graphical format so that all components of the windshear are shown, including initiation point, variance in magnitude, and time or distance correlations. The simulator must be operated at the same gross weight, airplane configuration, and initial airspeed during the takeoff demonstration (through calm air and through the first selected survivable windshear), and at the same gross weight, airplane configuration, and initial airspeed during the approach demonstration (through calm air and through the second selected survivable windshear).

b. In each of these four situations, at an ''initiation point'' (i.e., where windshear onset is or should be recognized), the recommended procedures for windshear recovery are applied and the results are recorded as specified in paragraph 5 of this attachment.

c. These recordings are made without inserting programmed random turbulence. Turbulence that results from the windshear model is to be expected, and no attempt may be made to neutralize turbulence from this source.

d. The definition of the models and the results of the demonstrations of all four?(4) cases described in paragraph 4.a of this attachment, must be made a part of the MQTG.

5. RECORDING PARAMETERS

a. In each of the four MQTG cases, an electronic recording (time history) must be made of the following parameters:

(1) Indicated or calibrated airspeed.

(2) Indicated vertical speed.

(3) Pitch attitude.

(4) Indicated or radio altitude.

(5) Angle of attack.

(6) Elevator position.

(7) Engine data (thrust, N1, or throttle position).

(8) Wind magnitudes (simple windshear model assumed).

b. These recordings must be initiated at least 10 seconds prior to the initiation point, and continued until recovery is complete or ground contact is made.

6. EQUIPMENT INSTALLATION AND OPERATION

All windshear warning, caution, or guidance hardware installed in the simulator must operate as it operates in the airplane. For example, if a rapidly changing wind speed and/or direction would have caused a windshear warning in the airplane, the simulator must respond equivalently without instructor/evaluator intervention.

7. QUALIFICATION TEST GUIDE

a. All QTG material must be forwarded to the NSPM.

b. A simulator windshear evaluation will be scheduled in accordance with normal procedures. Continuing qualification evaluation schedules will be used to the maximum extent possible.

c. During the on-site evaluation, the evaluator will ask the operator to run the performance tests and record the results. The results of these on-site tests will be compared to those results previously approved and placed in the QTG or MQTG, as appropriate.

d. QTGs for new (or MQTGs for upgraded) simulators must contain or reference the information described in paragraphs 2, 3, 4, and 5 of this attachment.

END QPS REQUIREMENTS

---

BEGIN INFORMATION

8. SUBJECTIVE EVALUATION

The NSPM will fly the simulator in at least two of the available windshear scenarios to subjectively evaluate simulator performance as it encounters the programmed windshear conditions.

a. One scenario will include parameters that enable the pilot to maintain a satisfactory flightpath.

b. One scenario will include parameters that will not enable the pilot to maintain a satisfactory flightpath (crash).

c. Other scenarios may be examined at the NSPM's discretion.

9. QUALIFICATION BASIS

The addition of windshear programming to a simulator in order to comply with the qualification for required windshear training

does not change the original qualification basis of the simulator.

10. DEMONSTRATION REPEATABILITY

For the purposes of demonstration repeatability, it is recommended that the simulator be flown by means of the simulator's autodrive function (for those simulators that have autodrive capability) during the demonstrations.

END INFORMATION

---

ATTACHMENT 6 TO APPENDIX A TO PART 60—FSTD DIRECTIVES APPLICABLE TO AIRPLANE FLIGHT SIMULATORS

FLIGHT SIMULATION TRAINING DEVICE (FSTD) DIRECTIVE

FSTD Directive 1. Applicable to all Full Flight Simulators (FFS), regardless of the original qualification basis and qualification date (original or upgrade), having Class II or Class III airport models available.

*Agency:* Federal Aviation Administration (FAA), DOT.

*Action:* This is a retroactive requirement to have all Class II or Class III airport models meet current requirements.

---

*Summary:* Notwithstanding the authorization listed in paragraph 13b in Appendices A and C of this part, this FSTD Directive requires each certificate holder to ensure that by May 30, 2009, except for the airport model(s) used to qualify the simulator at the designated level, each airport model used by the certificate holder's instructors or evaluators for training, checking, or testing under this chapter in an FFS, meets the definition of a Class II or Class III airport model as defined in 14CFR part 60. The completion of this requirement will not require a report, and the method used for keeping instructors and evaluators apprised of the airport models that meet Class II or Class III requirements on any given simulator is at the option of the certificate holder whose employees are using the FFS, but the method used must be available for review by the TPAA for that certificate holder.

*Dates:* FSTD Directive 1 becomes effective on May 30, 2008.

*For Further Information Contact:* Ed Cook, Senior Advisor to the Division Manager, Air Transportation Division, AFS–200, 800 Independence Ave, SW., Washington, DC 20591; telephone: (404) 832–4701; fax: (404) 761–8906.

SPECIFIC REQUIREMENTS:

1. Part 60 requires that each FSTD be:

a. Sponsored by a person holding or applying for an FAA operating certificate under Part 119, Part 141, or Part 142, or holding or applying for an FAA-approved training program under Part 63, Appendix C, for flight engineers, and

b. Evaluated and issued an SOQ for a specific FSTD level.

2. FFSs also require the installation of a visual system that is capable of providing an out-of-the-flight-deck view of airport models. However, historically these airport models were not routinely evaluated or required to meet any standardized criteria. This has led to qualified simulators containing airport models being used to meet FAA-approved training, testing, or checking requirements with potentially incorrect or inappropriate visual references.

3. To prevent this from occurring in the future, by May 30, 2009, except for the airport model(s) used to qualify the simulator at the designated level, each certificate holder must assure that each airport model used for training, testing, or checking under this chapter in a qualified FFS meets the definition of a Class II or Class III airport model as defined in Appendix F of this part.

4. These references describe the requirements for visual scene management and the minimum distances from which runway or landing area features must be visible for all levels of simulator. The airport model must provide, for each ''in-use runway'' or ''in-use landing area,'' runway or landing area surface and markings, runway or landing area lighting, taxiway surface and markings, and taxiway lighting. Additional requirements include correlation of the v airport models with other aspects of the airport environment, correlation of the aircraft and associated equipment, scene quality assessment features, and the control of these models the instructor must be able to exercise.

5. For circling approaches, all requirements of this section apply to the runway used for the initial approach and to the runway of intended landing.

6. The details in these models must be developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material. However, this FSTD DIRECTIVE 1 does not require that airport models contain details that are beyond the initially designed capability of the visual system, as currently qualified. The recognized limitations to visual systems are as follows:

a. Visual systems not required to have runway numbers as a part of the specific runway marking requirements are:

(1) Link NVS and DNVS.

(2) Novoview 2500 and 6000.

(3) FlightSafety VITAL series up to, and including, VITAL III, but not beyond.

(4) Redifusion SP1, SP1T, and SP2.

b. Visual systems required to display runway numbers only for LOFT scenes are:

(1) FlightSafety VITAL IV.

(2) Redifusion SP3 and SP3T.

(3) Link-Miles Image II.

c. Visual systems not required to have accurate taxiway edge lighting are:
(1) Redifusion SP1.
(2) FlightSafety Vital IV.
(3) Link-Miles Image II and Image IIT
(4) XKD displays (even though the XKD image generator is capable of generating blue colored lights, the display cannot accommodate that color).

7. A copy of this Directive must be filed in the MQTG in the designated FSTD Directive Section, and its inclusion must be annotated on the Index of Effective FSTD Directives chart. See Attachment 4, Appendices A through D for a sample MQTG Index of Effective FSTD Directives chart.

[Doc. No. FAA–2002–12461, 73 FR 26490, May 9, 2008]

## APPENDIX B TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR AIRPLANE FLIGHT TRAINING DEVICES

BEGIN INFORMATION

This appendix establishes the standards for Airplane FTD evaluation and qualification at Level 4, Level 5, or Level 6. The Flight Standards Service, NSPM, is responsible for the development, application, and implementation of the standards contained within this appendix. The procedures and criteria specified in this appendix will be used by the NSPM, or a person or persons assigned by the NSPM when conducting airplane FTD evaluations.

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1. Introduction
2. Applicability (§§60.1 and 60.2).
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4. Qualification Performance Standards (§60.4).
5. Quality Management System (§60.5).
6. Sponsor Qualification Requirements (§60.7).
7. Additional Responsibilities of the Sponsor (§60.9).
8. FTD Use (§60.11).
9. FTD Objective Data Requirements (§60.13).
10. Special Equipment and Personnel Requirements for Qualification of the FTD (§60.14).
11. Initial (and Upgrade) Qualification Requirements (§60.15).
12. Additional Qualifications for Currently Qualified FTDs (§60.16).
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19. Automatic Loss of Qualification and Procedures for Restoration of Qualification (§60.27).
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21. Record Keeping and Reporting (§60.31).
22. Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements (§60.33).
23. [Reserved]
24. Levels of FTD.
25. FTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA) (§60.37).
Attachment 1 to Appendix B to Part 60—General FTD Requirements.
Attachment 2 to Appendix B to Part 60—Flight Training Device (FTD) Objective Tests.
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Attachment 4 to Appendix B to Part 60—Sample Documents.

END INFORMATION

### 1. INTRODUCTION

BEGIN INFORMATION

a. This appendix contains background information as well as regulatory and informative material as described later in this section. To assist the reader in determining what areas are required and what areas are permissive, the text in this appendix is divided into two sections: ''QPS Requirements'' and ''Information.'' The QPS Requirements sections contain details regarding compliance with the part 60 rule language. These details are regulatory, but are found only in this appendix. The Information sections contain material that is advisory in nature, and designed to give the user general information about the regulation.

b. Questions regarding the contents of this publication should be sent to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Service, National Simulator Program Staff, AFS–205, 100 Hartsfield Centre Parkway, Suite 400, Atlanta, Georgia, 30354. Telephone contact numbers for the NSP are: phone, 404–832–4700; fax, 404–761–8906. The general e-mail address for the NSP office is: *9-aso-avr-simteam@faa.gov*. The NSP Internet Web Site address is: *http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/nsp/*. On this Web Site you will find an NSP personnel list with telephone and e-mail contact information for each NSP staff member, a list of

qualified flight simulation devices, ACs, a description of the qualification process, NSP policy, and an NSP ''In-Works'' section. Also linked from this site are additional information sources, handbook bulletins, frequently asked questions, a listing and text of the Federal Aviation Regulations, Flight Standards Inspector's handbooks, and other FAA links.

c. The NSPM encourages the use of electronic media for all communication, including any record, report, request, test, or statement required by this appendix. The electronic media used must have adequate security provisions and be acceptable to the NSPM. The NSPM recommends inquiries on system compatibility, and minimum system requirements are also included on the NSP Web site.

d. Related Reading References.

(1) 14 CFR part 60.

(2) 14 CFR part 61.

(3) 14 CFR part 63.

(4) 14 CFR part 119.

(5) 14 CFR part 121.

(6) 14 CFR part 125.

(7) 14 CFR part 135.

(8) 14 CFR part 141.

(9) 14 CFR part 142.

(10) AC 120–28, as amended, Criteria for Approval of Category III Landing Weather Minima.

(11) AC 120–29, as amended, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.

(12) AC 120–35, as amended, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.

(13) AC 120–41, as amended, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.

(14) AC 120–45, as amended, Airplane Flight Training Device Qualification.

(14) AC 120–57, as amended, Surface Movement Guidance and Control System (SMGCS).

(15) AC 150/5300–13, as amended, Airport Design.

(16) AC 150/5340–1, as amended, Standards for Airport Markings.

(17) AC 150/5340–4, as amended, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.

(18) AC 150/5340–19, as amended, Taxiway Centerline Lighting System.

(19) AC 150/5340–24, as amended, Runway and Taxiway Edge Lighting System.

(20) AC 150/5345–28, as amended, Precision Approach Path Indicator (PAPI) Systems.

(21) International Air Transport Association document, ''Flight Simulator Design and Performance Data Requirements,'' as amended.

(22) AC 25–7, as amended, Flight Test Guide for Certification of Transport Category Airplanes.

(23) AC 23–8A, as amended, Flight Test Guide for Certification of Part 23 Airplanes.

(24) International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, as amended.

(25) Airplane Flight Simulator Evaluation Handbook, Volume I, as amended and Volume II, as amended, The Royal Aeronautical Society, London, UK.

(26) FAA Publication FAA–S–8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).

(27) The FAA Aeronautical Information Manual (AIM). An electronic version of the AIM is on the Internet at *http://www.faa.gov/atpubs*.

(28) Aeronautical Radio, Inc. (ARINC) document number 436, titled *Guidelines For Electronic Qualification Test Guide* (as amended).

(29) Aeronautical Radio, Inc. (ARINC) document 610, Guidance for *Design and Integration of Aircraft Avionics Equipment in Simulators* (as amended).

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END INFORMATION

2. APPLICABILITY (§§ 60.1 AND 60.2)

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BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.1, Applicability, or to § 60.2, Applicability of sponsor rules to person who are not sponsors and who are engaged in certain unauthorized activities.

3. DEFINITIONS (§ 60.3)

See appendix F of this part for a list of definitions and abbreviations from part 1, part 60, and the QPS appendices of part 60.

4. QUALIFICATION PERFORMANCE STANDARDS (§ 60.4)

No additional regulatory or informational material applies to § 60.4, Qualification Performance Standards.

5. QUALITY MANAGEMENT SYSTEM (§ 60.5)

Additional regulatory material and informational material regarding Quality Management Systems for FTDs may be found in appendix E of this part.

END INFORMATION

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6. SPONSOR QUALIFICATION REQUIREMENTS. (§ 60.7).

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BEGIN INFORMATION

a. The intent of the language in §60.7(b) is to have a specific FTD, identified by the sponsor, used at least once in an FAA-approved flight training program for the airplane simulated during the 12-month period described. The identification of the specific FTD may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FTD at least once during the prescribed period. There is no minimum number of hours or minimum FTD periods required.

b. The following examples describe acceptable operational practices:

(1) Example One.

(a) A sponsor is sponsoring a single, specific FTD for its own use, in its own facility or elsewhere— this single FTD forms the basis for the sponsorship. The sponsor uses that FTD at least once in each 12-month period in that sponsor's FAA-approved flight training program for the airplane simulated. This 12-month period is established according to the following schedule:

(i) If the FTD was qualified prior to May 30, 2008, the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with §60.19 after May 30, 2008, and continues for each subsequent 12-month period;

(ii) A device qualified on or after May 30, 2008, will be required to undergo an initial or upgrade evaluation in accordance with §60.15. Once the initial or upgrade evaluation is complete, the first continuing qualification evaluation will be conducted within 6 months. The 12 month continuing qualification evaluation cycle begins on that date and continues for each subsequent 12-month period.

(b) There is no minimum number of hours of FTD use required.

(c) The identification of the specific FTD may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FTD at least once during the prescribed period.

(2) Example Two.

(a) A sponsor sponsors an additional number of FTDs, in its facility or elsewhere. Each additionally sponsored FTD must be—

(i) Used by the sponsor in the sponsor's FAA-approved flight training program for the airplane simulated (as described in §60.7(d)(1)); or

(ii) Used by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the airplane simulated (as described in §60.7(d)(1)). This 12-month period is established in the same manner as in example one; or

(iii) Provided a statement each year from a qualified pilot, (after having flown the airplane, not the subject FTD or another FTD, during the preceding 12-month period) stating that the subject FTD's performance and handling qualities represent the airplane (as described in §60.7(d)(2)). This statement is provided at least once in each 12-month period established in the same manner as in example one.

(b) There is no minimum number of hours of FTD use required.

(3) Example Three.

(a) A sponsor in New York (in this example, a Part 142 certificate holder) establishes ''satellite'' training centers in Chicago and Moscow.

(b) The satellite function means that the Chicago and Moscow centers must operate under the New York center's certificate (in accordance with all of the New York center's practices, procedures, and policies; e.g., instructor and/or technician training/checking requirements, record keeping, QMS program).

(c) All of the FTDs in the Chicago and Moscow centers could be dry-leased (i.e., the certificate holder does not have and use FAA-approved flight training programs for the FTDs in the Chicago and Moscow centers) because—

(i) Each FTD in the Chicago center and each FTD in the Moscow center is used at least once each 12-month period by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the airplane (as described in §60.7(d)(1)); or

(ii) A statement is obtained from a qualified pilot (having flown the airplane, not the subject FTD or another FTD during the preceding 12-month period) stating that the performance and handling qualities of each FTD in the Chicago and Moscow centers represents the airplane (as described in §60.7(d)(2)).

END INFORMATION

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7. ADDITIONAL RESPONSIBILITIES OF THE SPONSOR (§60.9)

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BEGIN INFORMATION

The phrase ''as soon as practicable'' in §60.9(a) means without unnecessarily disrupting or delaying beyond a reasonable time the training, evaluation, or experience being conducted in the FTD.

8. FTD USE (§60.11)

No additional regulatory or informational material applies to §60.11, FTD use.

END INFORMATION

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9. FTD Objective Data Requirements (§60.13)

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BEGIN QPS REQUIREMENTS

a. Flight test data used to validate FTD performance and handling qualities must have been gathered in accordance with a flight test program containing the following:

(1) A flight test plan consisting of:

(a) The maneuvers and procedures required for aircraft certification and simulation programming and validation.

(b) For each maneuver or procedure—

(i) The procedures and control input the flight test pilot and/or engineer used.

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

(iv) The airplane configuration, including weight and center of gravity.

(v) The data to be gathered.

(vi) All other information necessary to recreate the flight test conditions in the FTD.

(2) Appropriately qualified flight test personnel.

(3) An understanding of the accuracy of the data to be gathered using appropriate alternative data sources, procedures, and instrumentation that is traceable to a recognized standard as described in Attachment 2, Table B2F of this appendix.

(4) Appropriate and sufficient data acquisition equipment or system(s), including appropriate data reduction and analysis methods and techniques, acceptable to the FAA's Aircraft Certification Service.

b. The data, regardless of source, must be presented:

(1) In a format that supports the FTD validation process;

(2) In a manner that is clearly readable and annotated correctly and completely;

(3) With resolution sufficient to determine compliance with the tolerances set forth in Attachment 2, Table B2A, Appendix B;

(4) With any necessary guidance information provided; and

(5) Without alteration, adjustments, or bias. Data may be corrected to address known data calibration errors provided that an explanation of the methods used to correct the errors appears in the QTG. The corrected data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation.

c. After completion of any additional flight test, a flight test report must be submitted in support of the validation data. The report must contain sufficient data and rationale to support qualification of the FTD at the level requested.

d. As required by §60.13(f), the sponsor must notify the NSPM when it becomes aware that an addition to or a revision of the flight related data or airplane systems related data is available if this data is used to program and operate a qualified FTD. The data referred to in this sub-section are those data that are used to validate the performance, handling qualities, or other characteristics of the aircraft, including data related to any relevant changes occurring after the type certification is issued. The sponsor must—

(1) Within 10 calendar days, notify the NSPM of the existence of this data; and

(2) Within 45 calendar days, notify the NSPM of—

(i) The schedule to incorporate this data into the FTD; or

(ii) The reason for not incorporating this data into the FTD.

e. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot test results'' in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

END QPS REQUIREMENTS

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BEGIN INFORMATION

f. The FTD sponsor is encouraged to maintain a liaison with the manufacturer of the aircraft being simulated (or with the holder of the aircraft type certificate for the aircraft being simulated if the manufacturer is no longer in business), and if appropriate, with the person having supplied the aircraft data package for the FTD in order to facilitate the notification described in this paragraph.

g. It is the intent of the NSPM that for new aircraft entering service, at a point well in advance of preparation of the QTG, the sponsor should submit to the NSPM for approval, a descriptive document (see Appendix A, Table A2C, Sample Validation Data Roadmap for Airplanes) containing the plan for acquiring the validation data, including data sources. This document should clearly identify sources of data for all required tests, a description of the validity of these data for a specific engine type and thrust rating configuration, and the revision levels of all avionics affecting the performance or flying qualities of the aircraft. Additionally, this document should provide other information such as the rationale or explanation for cases where data or data parameters are missing, instances where engineering simulation data are used, or where flight test methods require further explanations. It should also provide a brief narrative describing the cause and effect of any deviation from data requirements. The aircraft manufacturer may provide this document.

h. There is no requirement for any flight test data supplier to submit a flight test

plan or program prior to gathering flight test data. However, the NSPM notes that inexperienced data gatherers often provide data that is irrelevant, improperly marked, or lacking adequate justification for selection. Other problems include inadequate information regarding initial conditions or test maneuvers. The NSPM has been forced to refuse these data submissions as validation data for an FTD evaluation. It is for this reason that the NSPM recommends that any data supplier not previously experienced in this area review the data necessary for programming and for validating the performance of the FTD and discuss the flight test plan anticipated for acquiring such data with the NSPM well in advance of commencing the flight tests.

i. The NSPM will consider, on a case-by-case basis, whether to approve supplemental validation data derived from flight data recording systems such as a Quick Access Recorder or Flight Data Recorder.

END INFORMATION

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10. SPECIAL EQUIPMENT AND PERSONNEL REQUIREMENTS FOR QUALIFICATION OF THE FTD (§60.14).

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BEGIN INFORMATION

a. In the event that the NSPM determines that special equipment or specifically qualified persons will be required to conduct an evaluation, the NSPM will make every attempt to notify the sponsor at least one (1) week, but in no case less than 72 hours, in advance of the evaluation. Examples of special equipment include flight control measurement devices, accelerometers, or oscilloscopes. Examples of specially qualified personnel include individuals specifically qualified to install or use any special equipment when its use is required.

b. Examples of a special evaluation include an evaluation conducted after: An FTD is moved; at the request of the TPAA; or as a result of comments received from users of the FTD that raise questions about the continued qualification or use of the FTD.

END INFORMATION

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11. INITIAL (AND UPGRADE) QUALIFICATION REQUIREMENTS (§60.15).

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BEGIN QPS REQUIREMENT

a. In order to be qualified at a particular qualification level, the FTD must:

(1) Meet the general requirements listed in Attachment 1 of this appendix;

(2) Meet the objective testing requirements listed in Attachment 2 of this appendix (Level 4 FTDs do not require objective tests); and

(3) Satisfactorily accomplish the subjective tests listed in Attachment 3 of this appendix.

b. The request described in §60.15(a) must include all of the following:

(1) A statement that the FTD meets all of the applicable provisions of this part and all applicable provisions of the QPS.

(2) A confirmation that the sponsor will forward to the NSPM the statement described in §60.15(b) in such time as to be received no later than 5 business days prior to the scheduled evaluation and may be forwarded to the NSPM via traditional or electronic means.

(3) Except for a Level 4 FTD, a QTG, acceptable to the NSPM, that includes all of the following:

(a) Objective data obtained from aircraft testing or another approved source.

(b) Correlating objective test results obtained from the performance of the FTD as prescribed in the appropriate QPS.

(c) The result of FTD subjective tests prescribed in the appropriate QPS.

(d) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

c. The QTG described in paragraph a(3) of this section, must provide the documented proof of compliance with the FTD objective tests in Attachment 2, Table B2A of this appendix.

d. The QTG is prepared and submitted by the sponsor, or the sponsor?s agent on behalf of the sponsor, to the NSPM for review and approval, and must include, for each objective test:

(1) Parameters, tolerances, and flight conditions;

(2) Pertinent and complete instructions for conducting automatic and manual tests;

(3) A means of comparing the FTD test results to the objective data;

(4) Any other information as necessary to assist in the evaluation of the test results;

(5) Other information appropriate to the qualification level of the FTD.

e. The QTG described in paragraphs (a)(3) and (b) of this section, must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 4, Figure B4C, of this appendix, for a sample QTG cover page).

(2) A continuing qualification evaluation requirements page. This page will be used by the NSPM to establish and record the frequency with which continuing qualification evaluations must be conducted and any subsequent changes that may be determined by

the NSPM in accordance with §60.19. See Attachment 4, Figure B4G, of this appendix, for a sample Continuing Qualification Evaluation Requirements page.

(3) An FTD information page that provides the information listed in this paragraph, if applicable (see Attachment 4, Figure B4B, of this appendix, for a sample FTD information page). For convertible FTDs, the sponsor must submit a separate page for each configuration of the FTD.

(a) The sponsor's FTD identification number or code.

(b) The airplane model and series being simulated.

(c) The aerodynamic data revision number or reference.

(d) The source of the basic aerodynamic model and the aerodynamic coefficient data used to modify the basic model.

(e) The engine model(s) and its data revision number or reference.

(f) The flight control data revision number or reference.

(g) The flight management system identification and revision level.

(h) The FTD model and manufacturer.

(i) The date of FTD manufacture.

(j) The FTD computer identification.

(k) The visual system model and manufacturer, including display type.

(l) The motion system type and manufacturer, including degrees of freedom.

(4) A Table of Contents.

(5) A log of revisions and a list of effective pages.

(6) List of all relevant data references.

(7) A glossary of terms and symbols used (including sign conventions and units).

(8) Statements of compliance and capability (SOCs) with certain requirements.

(9) Recording procedures or equipment required to accomplish the objective tests.

(10) The following information for each objective test designated in Attachment 2 of this appendix, as applicable to the qualification level sought:

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating FTD objective test results.

(g) List of all relevant parameters driven or constrained during the automatic test(s).

(h) List of all relevant parameters driven or constrained during the manual test(s).

(i) Tolerances for relevant parameters.

(j) Source of Validation Data (document and page number).

(k) Copy of the Validation Data (if located in a separate binder, a cross reference for the identification and page number for pertinent data location must be provided).

(l) FTD Objective Test Results as obtained by the sponsor. Each test result must reflect the date completed and must be clearly labeled as a product of the device being tested.

f. A convertible FTD is addressed as a separate FTD for each model and series airplane to which it will be converted and for the FAA qualification level sought. The NSPM will conduct an evaluation for each configuration. If a sponsor seeks qualification for two or more models of an airplane type using a convertible FTD, the sponsor must provide a QTG for each airplane model, or a QTG for the first airplane model and a supplement to that QTG for each additional airplane model. The NSPM will conduct evaluations for each airplane model.

g. The form and manner of presentation of objective test results in the QTG must include the following:

(1) The sponsor's FTD test results must be recorded in a manner acceptable to the NSPM, that allows easy comparison of the FTD test results to the validation data (e.g., use of a multi-channel recorder, line printer, cross plotting, overlays, transparencies).

(2) FTD results must be labeled using terminology common to airplane parameters as opposed to computer software identifications.

(3) Validation data documents included in a QTG may be photographically reduced only if such reduction will not alter the graphic scaling or cause difficulties in scale interpretation or resolution.

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in Attachment 2, Table B2A of this appendix.

(5) Tests involving time histories, data sheets (or transparencies thereof) and FTD test results must be clearly marked with appropriate reference points to ensure an accurate comparison between FTD and airplane with respect to time. Time histories recorded via a line printer are to be clearly identified for cross-plotting on the airplane data. Overplots may not obscure the reference data.

h. The sponsor may elect to complete the QTG objective and subjective tests at the manufacturer's facility or at the sponsor's training facility. If the tests are conducted at the manufacturer's facility, the sponsor must repeat at least one-third of the tests at the sponsor's training facility in order to substantiate FTD performance. The QTG must be clearly annotated to indicate when and where each test was accomplished. Tests conducted at the manufacturer's facility and at the sponsor's training facility must be conducted after the FTD is assembled with systems and sub-systems functional and operating in an interactive manner. The test results must be submitted to the NSPM.

i. The sponsor must maintain a copy of the MQTG at the FTD location.

j. All FTDs for which the initial qualification is conducted after May 30, 2014, must have an electronic MQTG (eMQTG) including all objective data obtained from airplane testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the FTD (reformatted or digitized) as prescribed in this appendix. The eMQTG must also contain the general FTD performance or demonstration results (reformatted or digitized) prescribed in this appendix, and a description of the equipment necessary to perform the initial qualification evaluation and the continuing qualification evaluations. The eMQTG must include the original validation data used to validate FTD performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original time-history plots that were provided by the data supplier. A copy of the eMQTG must be provided to the NSPM.

k. All other FTDs (not covered in subparagraph ''j'') must have an electronic copy of the MQTG by and after May 30, 2014. An electronic copy of the copy of the MQTG must be provided to the NSPM. This may be provided by an electronic scan presented in a Portable Document File (PDF), or similar format acceptable to the NSPM.

l. During the initial (or upgrade) qualification evaluation conducted by the NSPM, the sponsor must also provide a person knowledgeable about the operation of the aircraft and the operation of the FTD.

END QPS REQUIREMENTS

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BEGIN INFORMATION

m. Only those FTDs that are sponsored by a certificate holder as defined in Appendix F will be evaluated by the NSPM. However, other FTD evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

n. The NSPM will conduct an evaluation for each configuration, and each FTD must be evaluated as completely as possible. To ensure a thorough and uniform evaluation, each FTD is subjected to the general FTD requirements in Attachment 1 of this appendix, the objective tests listed in Attachment 2 of this appendix, and the subjective tests listed in Attachment 3 of this appendix. The evaluations described herein will include, but not necessarily be limited to the following:

(1) Airplane responses, including longitudinal and lateral-directional control responses (see Attachment 2 of this appendix);

(2) Performance in authorized portions of the simulated airplane's operating envelope, to include tasks evaluated by the NSPM in the areas of surface operations, takeoff, climb, cruise, descent, approach and landing, as well as abnormal and emergency operations (see Attachment 2 of this appendix);

(3) Control checks (see Attachment 1 and Attachment 2 of this appendix);

(4) Flight deck configuration (see Attachment 1 of this appendix);

(5) Pilot, flight engineer, and instructor station functions checks (see Attachment 1 and Attachment 3 of this appendix);

(6) Airplane systems and sub-systems (as appropriate) as compared to the airplane simulated (see Attachment 1 and Attachment 3 of this appendix);

(7) FTD systems and sub-systems, including force cueing (motion), visual, and aural (sound) systems, as appropriate (see Attachment 1 and Attachment 2 of this appendix); and

(8) Certain additional requirements, depending upon the qualification level sought, including equipment or circumstances that may become hazardous to the occupants. The sponsor may be subject to Occupational Safety and Health Administration requirements.

o. The NSPM administers the objective and subjective tests, which includes an examination of functions. The tests include a qualitative assessment of the FTD by an NSP pilot. The NSP evaluation team leader may assign other qualified personnel to assist in accomplishing the functions examination and/or the objective and subjective tests performed during an evaluation when required.

(1) Objective tests provide a basis for measuring and evaluating FTD performance and determining compliance with the requirements of this part.

(2) Subjective tests provide a basis for:

(a) Evaluating the capability of the FTD to perform over a typical utilization period;

(b) Determining that the FTD satisfactorily simulates each required task;

(c) Verifying correct operation of the FTD controls, instruments, and systems; and

(d) Demonstrating compliance with the requirements of this part.

p. The tolerances for the test parameters listed in Attachment 2 of this appendix reflect the range of tolerances acceptable to the NSPM for FTD validation and are not to be confused with design tolerances specified for FTD manufacture. In making decisions regarding tests and test results, the NSPM relies on the use of operational and engineering judgment in the application of data (including consideration of the way in which the flight test was flown and way the data was gathered and applied), data presentations, and the applicable tolerances for each test.

q. In addition to the scheduled continuing qualification evaluation, each FTD is subject to evaluations conducted by the NSPM at any time without prior notification to the

sponsor. Such evaluations would be accomplished in a normal manner (i.e., requiring exclusive use of the FTD for the conduct of objective and subjective tests and an examination of functions) if the FTD is not being used for flight crewmember training, testing, or checking. However, if the FTD were being used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the FTD evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the FTD along with the student(s) and observing the operation of the FTD during the training, testing, or checking activities.

r. Problems with objective test results are handled as follows:

(1) If a problem with an objective test result is detected by the NSP evaluation team during an evaluation, the test may be repeated or the QTG may be amended.

(2) If it is determined that the results of an objective test do not support the qualification level requested but do support a lower level, the NSPM may qualify the FTD at a lower level. For example, if a Level 6 evaluation is requested, but the FTD fails to meet the spiral stability test tolerances, it could be qualified at Level 5.

s. After an FTD is successfully evaluated, the NSPM issues an SOQ to the sponsor, the NSPM recommends the FTD to the TPAA, who will approve the FTD for use in a flight training program. The SOQ will be issued at the satisfactory conclusion of the initial or continuing qualification evaluation and will list the tasks for which the FTD is qualified, referencing the tasks described in Table B1B in Attachment 1 of this appendix. However, it is the sponsor's responsibility to obtain TPAA approval prior to using the FTD in an FAA-approved flight training program.

t. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within ten (10) working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made. A sponsor may schedule an evaluation date as early as 6 months in advance. However, there may be a delay of 45 days or more in rescheduling and completing the evaluation if the sponsor is unable to meet the scheduled date. See Attachment 4, Figure B4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation, of this appendix.

u. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in Attachment 2, FTD Objective Tests, Table B2A, of this appendix.

v. Contact the NSPM or visit the NSPM Web site for additional information regarding the preferred qualifications of pilots used to meet the requirements of §60.15(d).

w. Examples of the exclusions for which the FTD might not have been subjectively tested by the sponsor or the NSPM and for which qualification might not be sought or granted, as described in §60.15(g)(6), include engine out maneuvers or circling approaches.

12. ADDITIONAL QUALIFICATIONS FOR CURRENTLY QUALIFIED FTDS (§60.16).

No additional regulatory or informational material applies to §60.16, Additional Qualifications for a Currently Qualified FTD.

END INFORMATION

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13. PREVIOUSLY QUALIFIED FTDS (§60.17).

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BEGIN QPS REQUIREMENTS

a. In instances where a sponsor plans to remove an FTD from active status for a period of less than two years, the following procedures apply:

(1) The NSPM must be notified in writing and the notification must include an estimate of the period that the FTD will be inactive;

(2) Continuing Qualification evaluations will not be scheduled during the inactive period;

(3) The NSPM will remove the FTD from the list of qualified FTDs on a mutually established date not later than the date on which the first missed continuing qualification evaluation would have been scheduled;

(4) Before the FTD is restored to qualified status, it must be evaluated by the NSPM. The evaluation content and the time required to accomplish the evaluation is based on the number of continuing qualification evaluations and sponsor-conducted quarterly inspections missed during the period of inactivity.

(5) The sponsor must notify the NSPM of any changes to the original scheduled time out of service;

b. FTDs qualified prior to May 30, 2008, and replacement FTD systems, are not required to meet the general FTD requirements, the objective test requirements, and the subjective test requirements of Attachments 1, 2, and 3 of this appendix as long as the FTD continues to meet the test requirements contained in the MQTG developed under the original qualification basis.

c. [Reserved]

d. FTDs qualified prior to May 30, 2008, may be updated. If an evaluation is deemed appropriate or necessary by the NSPM after such an update, the evaluation will not require an evaluation to standards beyond those against which the FTD was originally qualified.

END QPS REQUIREMENTS

BEGIN INFORMATION

e. Other certificate holders or persons desiring to use an FTD may contract with FTD sponsors to use FTDs previously qualified at a particular level for an airplane type and approved for use within an FAA-approved flight training program. Such FTDs are not required to undergo an additional qualification process, except as described in §60.16.

f. Each FTD user must obtain approval from the appropriate TPAA to use any FTD in an FAA-approved flight training program.

g. The intent of the requirement listed in §60.17(b), for each FTD to have an SOQ within 6 years, is to have the availability of that statement (including the configuration list and the limitations to authorizations) to provide a complete picture of the FTD inventory regulated by the FAA. The issuance of the statement will not require any additional evaluation or require any adjustment to the evaluation basis for the FTD.

h. Downgrading of an FTD is a permanent change in qualification level and will necessitate the issuance of a revised SOQ to reflect the revised qualification level, as appropriate. If a temporary restriction is placed on an FTD because of a missing, malfunctioning, or inoperative component or ongoing repairs, the restriction is not a permanent change in qualification level. Instead, the restriction is temporary and is removed when the reason for the restriction has been resolved.

i. The NSPM will determine the evaluation criteria for an FTD that has been removed from active status for a prolonged period. The criteria will be based on the number of continuing qualification evaluations and quarterly inspections missed during the period of inactivity. For example, if the FTD were out of service for a 1 year period, it would be necessary to complete the entire QTG, since all of the quarterly evaluations would have been missed. The NSPM will also consider how the FTD was stored, whether parts were removed from the FTD and whether the FTD was disassembled.

j. The FTD will normally be requalified using the FAA-approved MQTG and the criteria that was in effect prior to its removal from qualification. However, inactive periods of 2 years or more will require re-qualification under the standards in effect and current at the time of requalification.

END INFORMATION

14. INSPECTION, CONTINUING QUALIFICATION, EVALUATION, AND MAINTENANCE REQUIREMENTS (§60.19).

BEGIN QPS REQUIREMENT

a. The sponsor must conduct a minimum of four evenly spaced inspections throughout the year. The objective test sequence and content of each inspection in this sequence must be developed by the sponsor and must be acceptable to the NSPM.

b. The description of the functional preflight check must be contained in the sponsor's QMS.

c. Record ''functional preflight'' in the FTD discrepancy log book or other acceptable location, including any item found to be missing, malfunctioning, or inoperative.

d. During the continuing qualification evaluation conducted by the NSPM, the sponsor must also provide a person knowledgeable about the operation of the aircraft and the operation of the FTD.

END QPS REQUIREMENTS

BEGIN INFORMATION

e. The sponsor's test sequence and the content of each quarterly inspection required in §60.19(a)(1) should include a balance and a mix from the objective test requirement areas listed as follows:

(1) Performance.

(2) Handling qualities.

(3) Motion system (where appropriate).

(4) Visual system (where appropriate).

(5) Sound system (where appropriate).

(6) Other FTD systems.

f. If the NSP evaluator plans to accomplish specific tests during a normal continuing qualification evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; but not less than 72 hours. Examples of such tests include latencies, control sweeps, or motion or visual system tests.

g. The continuing qualification evaluations described in §60.19(b) will normally require 4 hours of FTD time. However, flexibility is necessary to address abnormal situations or situations involving aircraft with additional levels of complexity (e.g., computer controlled aircraft). The sponsor should anticipate that some tests may require additional time. The continuing qualification evaluations will consist of the following:

(1) Review of the results of the quarterly inspections conducted by the sponsor since the last scheduled continuing qualification evaluation.

(2) A selection of approximately 8 to 15 objective tests from the MQTG that provide an adequate opportunity to evaluate the performance of the FTD. The tests chosen will

be performed either automatically or manually and should be able to be conducted within approximately one-third (1/3) of the allotted FTD time.

(3) A subjective evaluation of the FTD to perform a representative sampling of the tasks set out in attachment 3 of this appendix. This portion of the evaluation should take approximately two-thirds (2/3) of the allotted FTD time.

(4) An examination of the functions of the FTD may include the motion system, visual system, sound system as applicable, instructor operating station, and the normal functions and simulated malfunctions of the airplane systems. This examination is normally accomplished simultaneously with the subjective evaluation requirements.

h. The requirement established in §60.19(b)(4) regarding the frequency of NSPM-conducted continuing qualification evaluations for each FTD is typically 12 months. However, the establishment and satisfactory implementation of an approved QMS for a sponsor will provide a basis for adjusting the frequency of evaluations to exceed 12-month intervals.

15. LOGGING FTD DISCREPANCIES (§60.20)

No additional regulatory or informational material applies to §60.20. Logging FTD Discrepancies.

16. INTERIM QUALIFICATION OF FTDS FOR NEW AIRPLANE TYPES OR MODELS (§60.21)

No additional regulatory or informational material applies to §60.21, Interim Qualification of FTDs for New Airplane Types or Models.

END INFORMATION

17. MODIFICATIONS TO FTDS (§60.23)

BEGIN QPS REQUIREMENTS

a. The notification described in §60.23(c)(2) must include a complete description of the planned modification, with a description of the operational and engineering effect the proposed modification will have on the operation of the FTD and the results that are expected with the modification incorporated.

b. Prior to using the modified FTD:

(1) All the applicable objective tests completed with the modification incorporated, including any necessary updates to the MQTG (e.g., accomplishment of FSTD Directives) must be acceptable to the NSPM; and

(2) The sponsor must provide the NSPM with a statement signed by the MR that the factors listed in §60.15(b) are addressed by the appropriate personnel as described in that section.

END QPS REQUIREMENTS

BEGIN INFORMATION

c. FSTD Directives are considered modification of an FTD. See Attachment 4 of this appendix for a sample index of effective FSTD Directives.

END INFORMATION

18. OPERATION WITH MISSING, MALFUNCTIONING, OR INOPERATIVE COMPONENTS (§60.25)

BEGIN INFORMATION

a. The sponsor's responsibility with respect to §60.25(a) is satisfied when the sponsor fairly and accurately advises the user of the current status of an FTD, including any missing, malfunctioning, or inoperative (MMI) component(s).

b. It is the responsibility of the instructor, check airman, or representative of the administrator conducting training, testing, or checking to exercise reasonable and prudent judgment to determine if any MMI component is necessary for the satisfactory completion of a specific maneuver, procedure, or task.

c. If the 29th or 30th day of the 30-day period described in 60.25(b) is on a Saturday, a Sunday, or a holiday, the FAA will extend the deadline until the next business day.

d. In accordance with the authorization described in §60.25(b), the sponsor may develop a discrepancy prioritizing system to accomplish repairs based on the level of impact on the capability of the FTD. Repairs having a larger impact on the FTD's ability to provide the required training, evaluation, or flight experience will have a higher priority for repair or replacement.

END INFORMATION

19. AUTOMATIC LOSS OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§60.27)

BEGIN INFORMATION

If the sponsor provides a plan for how the FTD will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FTD is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing that required for requalification.

END INFORMATION

20. OTHER LOSSES OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§ 60.29)

BEGIN INFORMATION

If the sponsor provides a plan for how the FTD will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FTD is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing that required for requalification.

END INFORMATION

21. RECORDKEEPING AND REPORTING (§ 60.31)

BEGIN QPS REQUIREMENTS

a. FTD modifications can include hardware or software changes. For FTD modifications involving software programming changes, the record required by § 60.31(a)(2) must consist of the name of the aircraft system software, aerodynamic model, or engine model change, the date of the change, a summary of the change, and the reason for the change.

b. If a coded form for record keeping is used, it must provide for the preservation and retrieval of information with appropriate security or controls to prevent the inappropriate alteration of such records after the fact.

END QPS REQUIREMENTS

22. APPLICATIONS, LOGBOOKS, REPORTS, AND RECORDS: FRAUD, FALSIFICATION, OR INCORRECT STATEMENTS (§ 60.33)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

END INFORMATION

23. [RESERVED]

24. LEVELS OF FTD.

BEGIN INFORMATION

a. The following is a general description of each level of FTD. Detailed standards and tests for the various levels of FTDs are fully defined in Attachments 1 through 3 of this appendix.

(1) Level 4. A device that may have an open airplane-specific flight deck area, or an enclosed airplane-specific flight deck and at least one operating system. Air/ground logic is required (no aerodynamic programming required). All displays may be flat/LCD panel representations or actual representations of displays in the aircraft. All controls, switches, and knobs may be touch sensitive activation (not capable of manual manipulation of the flight controls) or may physically replicate the aircraft in control operation.

(2) Level 5. A device that may have an open airplane-specific flight deck area, or an enclosed airplane-specific flight deck; generic aerodynamic programming; at least one operating system; and control loading that is representative of the simulated airplane only at an approach speed and configuration. All displays may be flat/LCD panel representations or actual representations of displays in the aircraft. Primary and secondary flight controls (e.g., rudder, aileron, elevator, flaps, spoilers/speed brakes, engine controls, landing gear, nosewheel steering, trim, brakes) must be physical controls. All other controls, switches, and knobs may be touch sensitive activation.

(3) Level 6. A device that has an enclosed airplane-specific flight deck; airplane-specific aerodynamic programming; all applicable airplane systems operating; control loading that is representative of the simulated airplane throughout its ground and flight envelope; and significant sound representation. All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation.

END INFORMATION

25. FTD QUALIFICATION ON THE BASIS OF A BILATERAL AVIATION SAFETY AGREEMENT (BASA) (§ 60.37)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.37, FTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).

END INFORMATION

ATTACHMENT 1 TO APPENDIX B TO PART 60—GENERAL FTD REQUIREMENTS

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Certain requirements included in this appendix must be supported with an SOC as defined in Appendix F, which may include objective and subjective tests. The requirements for SOCs are indicated in the ''General FTD Requirements'' column in Table B1A of this appendix.

b. Table B1A describes the requirements for the indicated level of FTD. Many devices include operational systems or functions that exceed the requirements outlined in this section. In any event, all systems will be tested and evaluated in accordance with this appendix to ensure proper operation.

END QPS REQUIREMENTS

BEGIN INFORMATION

2. DISCUSSION

a. This attachment describes the general requirements for qualifying Level 4 through Level 6 FTDs. The sponsor should also consult the objectives tests in Attachment 2 of this appendix and the examination of functions and subjective tests listed in Attachment 3 of this appendix to determine the complete requirements for a specific level FTD.

b. The material contained in this attachment is divided into the following categories:

(1) General Flight deck Configuration.

(2) Programming.

(3) Equipment Operation.

(4) Equipment and facilities for instructor/evaluator functions.

(5) Motion System.

(6) Visual System.

(7) Sound System.

c. Table B1A provides the standards for the General FTD Requirements.

d. Table B1B provides the tasks that the sponsor will examine to determine whether the FTD satisfactorily meets the requirements for flight crew training, testing, and experience, and provides the tasks for which the simulator may be qualified.

e. Table B1C provides the functions that an instructor/check airman must be able to control in the simulator.

f. It is not required that all of the tasks that appear on the List of Qualified Tasks (part of the SOQ) be accomplished during the initial or continuing qualification evaluation.

END INFORMATION

TABLE B1A—MINIMUM FTD REQUIREMENTS

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| **1. General Flight Deck Configuration** | | | | | |
| 1.a. ..... | The FTD must have a flight deck that is a replica of the airplane simulated with controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the airplane. The direction of movement of controls and switches must be identical to that in the airplane. Pilot seat(s) must afford the capability for the occupant to be able to achieve the design ''eye position.'' Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Fire axes, extinguishers, and spare light bulbs must be available in the flight simulator, but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette. | | | X | For FTD purposes, the flight deck consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots' seats including additional, required flight crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, aircraft documents pouches are not considered essential and may be omitted. |

TABLE B1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| 1.b. ..... | The FTD must have equipment (e.g., instruments, panels, systems, circuit breakers, and controls) simulated sufficiently for the authorized training/checking events to be accomplished. The installed equipment must be located in a spatially correct location and may be in a flight deck or an open flight deck area. Additional equipment required for the authorized training/checking events must be available in the FTD, but may be located in a suitable location as near as practical to the spatially correct position. Actuation of equipment must replicate the appropriate function in the airplane. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette. | X | X | | |
| **2. Programming** | | | | | |
| 2.a. ..... | The FTD must provide the proper effect of aerodynamic changes for the combinations of drag and thrust normally encountered in flight. This must include the effect of change in airplane attitude, thrust, drag, altitude, temperature, and configuration.<br>Level 6 additionally requires the effects of changes in gross weight and center of gravity.<br>Level 5 requires only generic aerodynamic programming.<br>An SOC is required. | | X | X | |
| 2.b. ..... | The FTD must have the computer (analog or digital) capability (i.e., capacity, accuracy, resolution, and dynamic response) needed to meet the qualification level sought.<br>An SOC is required. | X | X | X | |
| 2.c. ..... | Relative responses of the flight deck instruments must be measured by latency tests, or transport delay tests, and may not exceed 300 milliseconds. The instruments must respond to abrupt input at the pilot's position within the allotted time, but not before the time when the airplane responds under the same conditions.<br>• Latency: The FTD instrument and, if applicable, the motion system and the visual system response must not be prior to that time when the airplane responds and may respond up to 300 milliseconds after that time under the same conditions.<br>• Transport Delay: As an alternative to the Latency requirement, a transport delay objective test may be used to demonstrate that the FTD system does not exceed the specified limit. The sponsor must measure all the delay encountered by a step signal migrating from the pilot's control through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the instrument display and, if applicable, the motion system, and the visual system. | | X | X | The intent is to verify that the FTD provides instrument cues that are, within the stated time delays, like the airplane responses. For airplane response, acceleration in the appropriate, corresponding rotational axis is preferred. Additional information regarding Latency and Transport Delay testing may be found in Appendix A, Attachment 2, paragraph 15. |
| **3. Equipment Operation** | | | | | |

TABLE B1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| 3.a. ..... | All relevant instrument indications involved in the simulation of the airplane must automatically respond to control movement or external disturbances to the simulated airplane; e.g., turbulence or winds. | | X | X | |
| 3.b. ..... | Navigation equipment must be installed and operate within the tolerances applicable for the airplane. | | X | X | |
| | Level 6 must also include communication equipment (inter-phone and air/ground) like that in the airplane and, if appropriate to the operation being conducted, an oxygen mask microphone system.<br>Level 5 need have only that navigation equipment necessary to fly an instrument approach. | | | | |
| 3.c. ..... | Installed systems must simulate the applicable airplane system operation, both on the ground and in flight. Installed systems must be operative to the extent that applicable normal, abnormal, and emergency operating procedures included in the sponsor's training programs can be accomplished.<br>Level 6 must simulate all applicable airplane flight, navigation, and systems operation.<br>Level 5 must have at least functional flight and navigational controls, displays, and instrumentation.<br>Level 4 must have at least one airplane system installed and functional. | X | X | X | |
| 3.d. ..... | The lighting environment for panels and instruments must be sufficient for the operation being conducted. | X | X | X | Back-lighted panels and instruments may be installed but are not required. |
| 3.e. ..... | The FTD must provide control forces and control travel that correspond to the airplane being simulated. Control forces must react in the same manner as in the airplane under the same flight conditions. | | | X | |
| 3.f. ..... | The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach. | | X | | |
| **4. Instructor or Evaluator Facilities** | | | | | |
| 4.a. ..... | In addition to the flight crewmember stations, suitable seating arrangements for an instructor/check airman and FAA Inspector must be available. These seats must provide adequate view of crewmember's panel(s). | X | X | X | These seats need not be a replica of an aircraft seat and may be as simple as an office chair placed in an appropriate position. |
| 4.b. ..... | The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions as appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls. | X | X | X | |
| **5. Motion System (not required)** | | | | | |

TABLE B1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| 5.a. ..... | The FTD may have a motion system, if desired, although it is not required. If a motion system is installed and additional training, testing, or checking credits are being sought on the basis of having a motion system, the motion system operation may not be distracting and must be coupled closely to provide integrated sensory cues. The motion system must also respond to abrupt input at the pilot's position within the allotted time, but not before the time when the airplane responds under the same conditions. | | X | X | The motion system standards set out in part 60, Appendix A for at least Level A simulators is acceptable. |
| 5.b. ..... | If a motion system is installed, it must be measured by latency tests or transport delay tests and may not exceed 300 milliseconds. Instrument response may not occur prior to motion onset. | | | X | The motion system standards set out in part 60, Appendix A for at least Level A simulators is acceptable. |
| **6. Visual System** | | | | | |
| 6.a. ..... | The FTD may have a visual system, if desired, although it is not required. If a visual system is installed, it must meet the following criteria: | X | X | X | |
| 6.a.1. ..... | The visual system must respond to abrupt input at the pilot's position.<br>An SOC is required. | X | X | | |
| 6.a.2. ..... | The visual system must be at least a single channel, non-collimated display.<br>An SOC is required. | X | X | X | |
| 6.a.3. ..... | The visual system must provide at least a field-of-view of 18° vertical / 24° horizontal for the pilot flying.<br>An SOC is required. | X | X | X | |
| 6.a.4. ..... | The visual system must provide for a maximum parallax of 10° per pilot.<br>An SOC is required. | X | X | X | |
| 6.a.5. ..... | The visual scene content may not be distracting<br>An SOC is required. | X | X | X | |
| 6.a.6. ..... | The minimum distance from the pilot's eye position to the surface of a direct view display may not be less than the distance to any front panel instrument.<br>An SOC is required. | X | X | X | |
| 6.a.7. ..... | The visual system must provide for a minimum resolution of 5 arc-minutes for both computed and displayed pixel size.<br>An SOC is required. | X | X | X | |

TABLE B1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| 6.b. ..... | If a visual system is installed and additional training, testing, or checking credits are being sought on the basis of having a visual system, a visual system meeting the standards set out for at least a Level A FFS (see Appendix A of this part) will be required. A ''direct-view,'' non-collimated visual system (with the other requirements for a Level A visual system met) may be considered satisfactory for those installations where the visual system design ''eye point'' is appropriately adjusted for each pilot's position such that the parallax error is at or less than 10° simultaneously for each pilot.<br>An SOC is required. | | | X | Directly projected, non-collimated visual displays may prove to be unacceptable for dual pilot applications. |
| **7. Sound System** | | | | | |
| 7.a. ..... | The FTD must simulate significant flight deck sounds resulting from pilot actions that correspond to those heard in the airplane. | | | X | |

TABLE B1B—TABLE OF TASKS VS. FTD LEVEL

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective Requirements—In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associated with that level of qualification. See Notes 1 and 2 at the end of the Table | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| **1. Preflight Procedures.** | | | | | |
| 1.a. ..... | Preflight Inspection (flight deck only) ..... | A | A | X | |
| 1.b. ..... | Engine Start ..... | A | A | X | |
| 1.c. ..... | Pre-takeoff Checks ..... | A | A | X | |
| **2. Takeoff and Departure Phase.** | | | | | |
| 2.a. ..... | Rejected Takeoff (requires visual system) ..... | .... | .... | A | |
| 2.b. ..... | Departure Procedure ..... | .... | X | X | |
| **3. In-flight Maneuvers.** | | | | | |
| 3.a. ..... | a. Steep Turns ..... | .... | X | X | |
| 3.b. ..... | b. Approaches to Stalls ..... | .... | A | X | |
| 3.c. ..... | c. Engine Failure (procedures only)—Multiengine Airplane. | .... | A | X | |
| 3.d. ..... | d. Engine Failure (procedures only)—Single-Engine Airplane. | .... | A | X | |
| 3.e. ..... | e. Specific Flight Characteristics incorporated into the user's FAA approved flight training program. | A | A | A | |
| **4. Instrument Procedures.** | | | | | |
| 4.a. ..... | Standard Terminal Arrival/Flight Management System Arrival. | .... | A | X | |
| 4.b. ..... | Holding ..... | .... | A | X | |

TABLE B1B—TABLE OF TASKS VS. FTD LEVEL—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective Requirements—In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associated with that level of qualification. See Notes 1 and 2 at the end of the Table | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| 4.c. | Precision Instrument, all engines operating | .... | A | X | e.g., Autopilot, Manual (Flt. Dir. Assisted), Manual (Raw Data). |
| 4.d. | Non-precision Instrument, all engines operating | .... | A | X | e.g., NDB, VOR, VOR/DME, VOR/TAC, RNAV, LOC, LOC/BC, ADF, and SDF. |
| 4.e. | Circling Approach (requires visual system) | .... | .... | A | |
| 4.f. | Missed Approach | .... | A | X | |
| **5. Normal and Abnormal Procedures.** | | | | | |
| 5.a. | Engine (including shutdown and restart—procedures only). | A | A | X | |
| 5.b. | Fuel System | A | A | X | |
| 5.c. | Electrical System | A | A | X | |
| 5.d. | Hydraulic System | A | A | X | |
| 5.e. | Environmental and Pressurization Systems | A | A | X | |
| 5.f. | Fire Detection and Extinguisher Systems | A | A | X | |
| 5.g. | Navigation and Avionics Systems | A | A | X | |
| 5.h. | Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems. | A | A | X | |
| 5.i. | Flight Control Systems | A | A | X | |
| 5.j. | Anti-ice and Deice Systems | A | A | X | |
| 5.k. | Aircraft and Personal Emergency Equipment | A | A | X | |
| **6. Emergency Procedures.** | | | | | |
| 6.a. | Emergency Descent (maximum rate) | .... | A | X | |
| 6.b. | Inflight Fire and Smoke Removal | .... | A | X | |
| 6.c. | Rapid Decompression | .... | A | X | |
| 6.d. | Emergency Evacuation | A | A | X | |
| **7. Postflight Procedures.** | | | | | |
| 7.a. | After-Landing Procedures | A | A | X | |
| 7.b. | Parking and Securing | A | A | X | |

**Note 1:** An ''A'' in the table indicates that the system, task, or procedure, although not required to be present, may be examined if the appropriate airplane system is simulated in the FTD and is working properly.

**Note 2:** Items not installed or not functional on the FTD and not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ.

TABLE B1C—TABLE OF FTD SYSTEM TASKS QPS REQUIREMENTS

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective Requirements<br>In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associated with that level of qualification. | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| **1. Instructor Operating Station (IOS).** | | | | | |

TABLE B1C—TABLE OF FTD SYSTEM TASKS QPS REQUIREMENTS—Continued

| QPS Requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective Requirements In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associated with that level of qualification. | FTD level | | | Notes |
| | | 4 | 5 | 6 | |
| 1.a. | Power switch(es) | X | X | X | |
| 1.b. | Airplane conditions | A | X | X | e.g., GW, CG, Fuel loading, Systems, Ground Crew. |
| 1.c. | Airports/Runways | X | X | X | e.g., Selection and Presets; Surface and Lighting controls if equipped with a visual system. |
| 1.d. | Environmental controls | X | X | X | e.g., Temp, Wind. |
| 1.e. | Airplane system malfunctions (Insertion/deletion) | A | X | X | |
| 1.f. | Locks, Freezes, and Repositioning | X | X | X | |
| 1.g. | Sound Controls. (On/off/adjustment) | X | X | X | |
| 1.h. | Motion/Control Loading System, as appropriate. On/off/emergency stop. | A | A | A | |
| **2. Observer Seats/Stations.** | | | | | |
| 2.a. | Position/Adjustment/Positive restraint system | X | X | X | |

**Note 1:** An ''A'' in the table indicates that the system, task, or procedure, although not required to be present, may be examined if the appropriate system is in the FTD and is working properly.

ATTACHMENT 2 TO APPENDIX B TO PART 60—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

BEGIN INFORMATION

1. DISCUSSION

a. For the purposes of this attachment, the flight conditions specified in the Flight Conditions Column of Table B2A, are defined as follows:

(1) Ground—on ground, independent of airplane configuration;

(2) Take-off—gear down with flaps/slats in any certified takeoff position;

(3) First segment climb—gear down with flaps/slats in any certified takeoff position (normally not above 50 ft AGL);

(4) Second segment climb—gear up with flaps/slats in any certified takeoff position (normally between 50 ft and 400 ft AGL);

(5) Clean—flaps/slats retracted and gear up;

(6) Cruise—clean configuration at cruise altitude and airspeed;

(7) Approach—gear up or down with flaps/slats at any normal approach position as recommended by the airplane manufacturer; and

(8) Landing—gear down with flaps/slats in any certified landing position.

b. The format for numbering the objective tests in Appendix A, Attachment 2, Table A2A, and the objective tests in Appendix B, Attachment 2, Table B2A, is identical. However, each test required for FFSs is not necessarily required for FTDs. Also, each test required for FTDs is not necessarily required for FFSs. Therefore, when a test number (or series of numbers) is not required, the term ''Reserved'' is used in the table at that location. Following this numbering format provides a degree of commonality between the two tables and substantially reduces the potential for confusion when referring to objective test numbers for either FFSs or FTDs.

c. The reader is encouraged to review the Airplane Flight Simulator Evaluation Handbook, Volumes I and II, published by the Royal Aeronautical Society, London, UK, and FAA AC 25–7, as amended, Flight Test Guide for Certification of Transport Category Airplanes, and AC 23–8, as amended, Flight Test Guide for Certification of Part 23 Airplanes, for references and examples regarding flight testing requirements and techniques.

d. If relevant winds are present in the objective data, the wind vector should be clearly noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for the test.

e. A Level 4 FTD does not require objective tests and therefore, Level 4 is not addressed in the following table.

END INFORMATION

BEGIN QPS REQUIREMENTS

2. TEST REQUIREMENTS

a. The ground and flight tests required for qualification are listed in Table B2A Objective Tests. Computer generated FTD test results must be provided for each test except where an alternate test is specifically authorized by the NSPM. If a flight condition or operating condition is required for the test but does not apply to the airplane being simulated or to the qualification level sought, it may be disregarded (e.g., an engine out missed approach for a single-engine airplane; a maneuver using reverse thrust for an airplane without reverse thrust capability). Each test result is compared against the validation data described in §60.13, and in Appendix B. The results must be produced on an appropriate recording device acceptable to the NSPM and must include FTD number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the validation data. Time histories are required unless otherwise indicated in Table B2A. All results must be labeled using the tolerances and units given.

b. Table B2A in this attachment sets out the test results required, including the parameters, tolerances, and flight conditions for FTD validation. Tolerances are provided for the listed tests because mathematical modeling and acquisition and development of reference data are often inexact. All tolerances listed in the following tables are applied to FTD performance. When two tolerance values are given for a parameter, the less restrictive may be used unless otherwise indicated. In those cases where a tolerance is expressed only as a percentage, the tolerance percentage applies to the maximum value of that parameter within its normal operating range as measured from the neutral or zero position unless otherwise indicated.

c. Certain tests included in this attachment must be supported with a SOC. In Table B2A, requirements for SOCs are indicated in the ''Test Details'' column.

d. When operational or engineering judgment is used in making assessments for flight test data applications for FTD validity, such judgment may not be limited to a single parameter. For example, data that exhibit rapid variations of the measured parameters may require interpolations or a ''best fit'' data section. All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match FTD to airplane data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

e. It is not acceptable to program the FTD so that the mathematical modeling is correct only at the validation test points. Unless noted otherwise, tests must represent airplane performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation. If a test is supported by aircraft data at one extreme weight or CG, another test supported by aircraft data at mid-conditions or as close as possible to the other extreme is necessary. Certain tests that are relevant only at one extreme CG or weight condition need not be repeated at the other extreme. The results of the tests for Level 6 are expected to be indicative of the device's performance and handling qualities throughout all of the following:

(1) The airplane weight and CG envelope;

(2) The operational envelope; and

(3) Varying atmospheric ambient and environmental conditions—including the extremes authorized for the respective airplane or set of airplanes.

f. When comparing the parameters listed to those of the airplane, sufficient data must also be provided to verify the correct flight condition and airplane configuration changes. For example, to show that control force is within the parameters for a static stability test, data to show the correct airspeed, power, thrust or torque, airplane configuration, altitude, and other appropriate datum identification parameters must also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the airplane, but airspeed, altitude, control input, airplane configuration, and other appropriate data must also be given. If comparing landing gear change dynamics, pitch, airspeed, and altitude may be used to establish a match to the airplane, but landing gear position must also be provided. All airspeed values must be properly annotated (e.g., indicated versus calibrated). In addition, the same variables must be used for comparison (e.g., compare inches to inches rather than inches to centimeters).

g. The QTG provided by the sponsor must clearly describe how the FTD will be set up and operated for each test. Each FTD subsystem may be tested independently, but overall integrated testing of the FTD must be accomplished to assure that the total FTD system meets the prescribed standards. A manual test procedure with explicit and detailed steps for completing each test must also be provided.

h. For previously qualified FTDs, the tests and tolerances of this attachment may be used in subsequent continuing qualification evaluations for any given test if the sponsor has submitted a proposed MQTG revision to the NSPM and has received NSPM approval.

i. FTDs are evaluated and qualified with an engine model simulating the airplane data supplier's flight test engine. For qualification of alternative engine models (either variations of the flight test engines or other manufacturer's engines) additional tests

with the alternative engine models may be required. This attachment contains guidelines for alternative engines.

j. Testing Computer Controlled Aircraft (CCA) simulators, or other highly augmented airplane simulators, flight test data is required for the Normal (N) and/or Non-normal (NN) control states, as indicated in this attachment. Where test results are independent of control state, Normal or Non-normal control data may be used. All tests in Table B2A require test results in the Normal control state unless specifically noted otherwise in the Test Details section following the CCA designation. The NSPM will determine what tests are appropriate for airplane simulation data. When making this determination, the NSPM may require other levels of control state degradation for specific airplane tests. Where Non-normal control states are required, test data must be provided for one or more Non-normal control states, and must include the least augmented state. Where applicable, flight test data must record Normal and Non-normal states for:

(1) Pilot controller deflections or electronically generated inputs, including location of input; and

(2) Flight control surface positions unless test results are not affected by, or are independent of, surface positions.

k. Tests of handling qualities must include validation of augmentation devices. FTDs for highly augmented airplanes will be validated both in the unaugmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. Requirements for testing will be mutually agreed to between the sponsor and the NSPM on a case-by-case basis.

l. Some tests will not be required for airplanes using airplane hardware in the FTD flight deck (e.g., ''side stick controller''). These exceptions are noted in Section 2 ''Handling Qualities'' in Table B2A of this attachment. However, in these cases, the sponsor must provide a statement that the airplane hardware meets the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

m. For objective test purposes, see Appendix F of this part for the definitions of ''Near maximum,'' ''Light,'' and ''Medium'' gross weight.

END QPS REQUIREMENTS

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BEGIN INFORMATION

n. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot test results'' in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

o. Refer to AC 120–27, ''Aircraft Weight and Balance'' and FAA–H–8083–1, ''Aircraft Weight and Balance Handbook'' for more information.

END INFORMATION

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TABLE B2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

| QPS requirements | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | Information |
| Entry No. | Title | | | | 5 | 6 | Notes |
| **1. Performance** | | | | | | | |
| 1.a. ..... | (Reserved) | | | | | | |
| 1.b. ..... | Takeoff | | | | | | |
| 1.b.1. ..... | Ground Acceleration Time .. | ±5% time or ±1 sec ..... | Takeoff ..... | Record acceleration time for a minimum of 80% of the segment from brake release to $V_R$.<br>Preliminary aircraft certification data may be used. | | X | This test is required only if RTO training credit is sought. |
| 1.b.2. through 1.b.6. | (Reserved) | | | | | | |
| 1.b.7. ..... | Rejected Takeoff ..... | ±5% time or ±1.5 sec ..... | Dry Runway ..... | Record time for at least 80% of the segment from initiation of the Rejected Takeoff to full stop. | | X | This test is required only if RTO training credit is sought. |
| 1.b.8. ..... | (Reserved) | | | | | | |
| 1.c. ..... | Climb | | | | | | |
| 1.c.1. ..... | Normal Climb all engines operating. | ±3 kt airspeed, ±5% or ±100 ft/min (0.5 m/sec) climb rate. | Clean ..... | Flight test data or airplane performance manual data may be used. Record at nominal climb speed and at nominal altitude. May be a snapshot test result. FTD performance must be recorded over an interval of at least 1,000 ft (300 m). | X | X | |
| 1.c.2. through 1.c.4. | (Reserved) | | | | | | |
| 1.d. ..... | (Reserved) | | | | | | |
| 1.e. ..... | (Reserved) | | | | | | |
| 1.f. ..... | Engines | | | | | | |

TABLE B2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | Information |
| Entry No. | Title | | | | 5 | 6 | Notes |
| 1.f.1. ..... | Acceleration ..... | Level 6: ±10% $T_t$, or ±0.25 sec.<br>Level 5: ±1 sec ..... | Approach or Landing ..... | Record engine power ($N_1$, $N_2$, EPR, Torque, Manifold Pressure) from idle to maximum takeoff power for a rapid (slam) throttle movement. | X | X | See Appendix F of this part for definitions of $T_i$ and $T_t$. |
| 1.f.2. ..... | Deceleration ..... | Level 6: ±10% $T_t$, or ±0.25 sec.<br>Level 5: ±1 sec ..... | Ground ..... | Record engine power ($N_1$, $N_2$, EPR, Torque, Manifold Pressure) from maximum takeoff power to idle for a rapid (slam) throttle movement. | X | X | See Appendix F of this part for definitions of $T_i$ and $T_t$. |
| **2. Handling Qualities** | | | | | | | |
| | For FTDs requiring Static tests at the controls (i.e., column, wheel, rudder pedal), special test fixtures will not be required during initial or upgrade evaluations if the sponsor's QTG/MQTG shows both test fixture results and the results of an alternative approach, such as computer plots produced concurrently, that show satisfactory agreement. Repeat of the alternative method during the initial or upgrade evaluation would then satisfy this test requirement. | | | | | | Testing of position versus force is not applicable if forces are generated solely by use of airplane hardware in the FTD. |
| 2.a. ..... | Static Control Tests | | | | | | |
| 2.a.1.a. ..... | Pitch Controller Position vs. Force and Surface Position Calibration. | ±2 lb (0.9 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2° elevator. | Ground ..... | Record results for an uninterrupted control sweep to the stops. | | X | |
| 2.a.1.b. ..... | Pitch Controller Position vs. Force. | ±2 lb (0.9 daN) breakout, ±10% or ±5 lb (2.2 daN) force. | As determined by sponsor .. | Record results during initial qualification evaluation for an uninterrupted control sweep to the stops. The recorded tolerances apply to subsequent comparisons on continuing qualification evaluations. | X | | Applicable only on continuing qualification evaluations. The intent is to design the control feel for Level 5 to be able to manually fly an instrument approach; and not to compare results to flight test or other such data. |
| 2.a.2.a. ..... | Roll Controller Position vs. Force and Surface Position Calibration. | ±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force, ±2° aileron, ±3° spoiler angle. | Ground ..... | Record results for an uninterrupted control sweep to the stops. | | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.a.2.b. ..... | Roll Controller Position vs. Force. | ±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force. | As determined by sponsor .. | Record results during initial qualification evaluation for an uninterrupted control sweep to the stops. The recorded tolerances apply to subsequent comparisons on continuing qualification evaluations. | X | | Applicable only on continuing qualification evaluations. The intent is to design the control feel for Level 5 to be able to manually fly an instrument approach; and not to compare results to flight test or other such data. |
| 2.a.3.a. ..... | Rudder Pedal Position vs. Force and Surface Position Calibration. | ±5 lb (2.2 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2° rudder angle. | Ground ..... | Record results for an uninterrupted control sweep to the stops. | | X | |
| 2.a.3.b. ..... | Rudder Pedal Position vs. Force. | ±5 lb (2.2 daN) breakout, ±10% or ±5 lb (2.2 daN) force. | As determined by sponsor .. | Record results during initial qualification evaluation for an uninterrupted control sweep to the stops. The recorded tolerances apply to subsequent comparisons on continuing qualification evaluations. | X | | Applicable only on continuing qualification evaluations. The intent is to design the control feel for Level 5 to be able to manually fly an instrument approach; and not to compare results to flight test or other such data. |
| 2.a.4. ..... | Nosewheel Steering Controller Force. | ±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force. | Ground ..... | Record results of an uninterrupted control sweep to the stops. | | X | |
| 2.a.5. ..... | Rudder Pedal Steering Calibration. | ±2° nosewheel angle ..... | Ground ..... | Record results of an uninterrupted control sweep to the stops. | | X | |
| 2.a.6. ..... | Pitch Trim Indicator vs. Surface Position Calibration. | ±0.5° of computed trim surface angle. | Ground ..... | | | X | The purpose of the test is to compare the FTD against design data or equivalent. |
| 2.a.7. ..... | (Reserved) | | | | | | |
| 2.a.8. ..... | Alignment of Flight deck Throttle Lever vs. Selected Engine Parameter. | ±5° of throttle lever angle or ±0.8 in (2 cm) for power control without angular travel, or ±3% N1, or ±0.03 EPR, or ±3% maximum rated manifold pressure, or ±3% torque. | Ground ..... | Requires simultaneous recording for all engines. The tolerances apply against airplane data and between engines. In the case of propeller powered airplanes, if a propeller lever is present, it must also be checked. For airplanes with throttle "detents," all detents must be presented. May be a series of snapshot test results. | | X | |

TABLE B2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | Information |
| Entry No. | Title | | | | 5 | 6 | Notes |
| 2.a.9. ..... | Brake Pedal Position vs. Force. | ±5 lb (2.2 daN) or 10% force. | Ground ..... | Two data points are required: Zero and maximum deflection. Computer output results may be used to show compliance. | | X | Test not required unless RTO credit is sought. |
| 2.b. ..... | (Reserved) | | | | | | |
| 2.c. ..... | Longitudinal Control Tests | | | | | | |
| Power setting is that required for level flight unless otherwise specified. | | | | | | | |
| 2.c.1. ..... | Power Change Force ..... | ±5 lb (2.2 daN) or, ±20% pitch conrol force. | Approach ..... | May be a series of snapshot test results. Power change dynamics test as described in test 2.c.1 of Table A2A of this part will be accepted. CCA: Test in Normal and Non-normal control states. | X | X | |
| 2.c.2. ..... | Flap/Slat Change Force ..... | ±5 lb (2.2 daN) or, ±20% pitch conrol force. | Takeoff through initial flap retraction, and approach to landing. | May be a series of snapshot test results. Flap/Slat change dynamics test as described in test 2.c.2 of Table A2A of this part will be accepted. CCA: Test in Normal and Non-normal control states. | X | X | |
| 2.c.3. ..... | (Reserved) | | | | | | |
| 2.c.4. ..... | Gear Change Force ..... | ±5 lb (2.2 daN) or, ±20% pitch conrol force. | Takeoff (retraction) and Approach (extension). | May be a series of snapshot test results. Gear change dynamics test as described in test 2.c.4 of Table A2A of this part will be accepted. CCA: Test in Normal and Non-normal control states. | X | X | |
| 2.c.5. ..... | Longitudinal Trim ..... | ±0.5° trim surface angle ±1° elevator ±1° pitch angle ±5% net thrust or equivalent. | Cruise, Approach, and Landing. | Record steady-state condition with wings level and thrust set for level flight. May be a series of snapshot tests Level 5 may use equivalent stick and trim controllers in lieu of elevator and trim surface. CCA: Test in Normal and Non-normal control states. | X | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.c.6. ..... | Longitudinal Maneuvering Stability (Stick Force/g). | ±5 lb (±2.2 daN) or ±10% pitch controller force Alternative method: ±1° or ±10% change of elevator. | Cruise, Approach, and Landing. | Continuous time history data or a series of snapshot tests may be used. Record results up to 30° of bank for approach and landing configurations. Record results for up to 45° of bank for the cruise configuration. The force tolerance is not applicable if forces are generated solely by the use of airplane hardware in the FTD. The alternative method applies to airplanes that do not exhibit "stick-force-per-g" characteristics. CCA: Test in Normal and Non-normal control states. | | | X |
| 2.c.7. ..... | Longitudinal Static Stability | ±5 lb (±2.2 daN) or ±10% pitch controller force. Alternative method: ±1° or ±10% change of elevator. | Approach ..... | May be a series of snapshot test results. Record results for at least 2 speeds above and 2 speeds below trim speed. The force tolerance is not applicable if forces are generated solely by the use of airplane hardware in the FTD. The alternative method applies to airplanes that do not exhibit speed stability characteristics. Level 5 must exhibit positive static stability, but need not comply with the numerical tolerance. CCA: Test in Normal and Non-normal control states. | X | X | |
| 2.c.8. ..... | Stall Warning (actuation of stall warning device.). | ±3 kts. airspeed, ±2° bank for speeds greater than actuation of stall warning device or initial buffet. | Second Segment Climb, and Approach or Landing. | The stall maneuver must be entered with thrust at or near idle power and wings level (1g). Record the stall warning signal and initial buffet if applicable. CCA: Test in Normal and Non-normal control states. | X | X | |
| 2.c.9.a. .... | Phugoid Dynamics ..... | ±10% period, ±10% of time to ½ or double amplitude or ±.02 of damping ratio. | Cruise ..... | The test must include whichever is less of the following: Three full cycles (six overshoots after the input is completed), or the number of cycles sufficient to determine time to ½ or double amplitude. CCA: Test in Non-normal control state. | X | | |
| 2.c.9.b. .... | Phugoid Dynamics ..... | ±10% period, Representative damping. | Cruise ..... | The test must include whichever is less of the following: Three full cycles (six overshoots after the input is completed), or the number of cycles sufficient to determine representative damping. CCA: Test in Non-normal control state. | X | | |

TABLE B2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | Information |
| Entry No. | Title | | | | 5 | 6 | Notes |
| 2.c.10. ..... | Short Period Dynamics ..... | ±1.5° pitch angle or ±2°/sec pitch rate, ±0.10g acceleration.. | Cruise ..... | CCA: Test in Non-normal control state. | | X | |
| 2.d. ..... | Lateral Directional Tests | | | | | | |
| Power setting is that required for level flight unless otherwise specified. | | | | | | | |
| 2.d.1. ..... | (Reserved) | | | | | | |
| 2.d.2. ..... | Roll Response (Rate) ..... | ±10% or ±2°/sec roll rate .... | Cruise, and Approach or Landing. | Record results for normal roll controller deflection (one-third of maximum roll controller travel). May be combined with step input of flight deck roll controller test (see 2.d.3.). | X | X | |
| 2.d.3. ..... | Roll Response to Flight deck Roll Controller Step Input. | ±10% or ±2° bank angle ..... | Approach or Landing ..... | Record from initiation of roll through 10 seconds after control is returned to neutral and released. May be combined with roll response (rate) test (see 2.d.2.). CCA: Test in Non-normal control state. | | X | |
| 2.d.4.a. ..... | Spiral Stability ..... | Correct trend and ±3° or ±10% bank angle in 30 seconds. | Cruise ..... | Record results for both directions. As an alternate test, demonstrate the lateral control required to maintain a steady turn with a bank angle of 30°. CCA: Test in Non-normal control state. | | X | Airplane data averaged from multiple tests in same direction may be used. |
| 2.d.4.b. ..... | Spiral Stability ..... | Correct trend ..... | Cruise ..... | CCA: Test in Non-normal control state. | X | | Airplane data averaged from multiple tests in same direction may be used. |
| 2.d.5. ..... | (Reserved) | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.d.6.a. .... | Rudder Response ..... | ±2°/sec or ±10% yaw rate .. | Approach or Landing ..... | A rudder step input of 20%–30% rudder pedal throw must be used. Not required if rudder input and response is shown in Dutch Roll test (test 2.d.7.). CCA: Test in Normal and Non-normal control states. | | | X | |
| 2.d.6.b. .... | Rudder Response ..... | Roll rate ±2°/sec, bank angle ±3°. | Approach or Landing ..... | May be roll response to a given rudder deflection. CCA: Test in Normal and Non-normal control states. | X | | | May be accomplished as a yaw response test, in which case the procedures and requirements of test 2.d.6.a. will apply. |
| 2.d.7. ..... | Dutch Roll (Yaw Damper OFF). | ±0.5 sec. or ±10% of period, ±10% of time to ½ or double amplitude or ±.02 of damping ratio. | Cruise, and Approach or Landing. | Record results for at least 6 complete cycles with stability augmentation OFF, or the number of cycles sufficient to determine time to ½ or double amplitude. CCA: Test in Non-normal control state. | | | | |
| 2.d.8. ..... | Steady State Sideslip ..... | For given rudder position ±2° bank angle, ±1° sideslip angle, ±10% or ±2° aileron, ±10% or ±5° spoiler or equivalent roll controller position or force. | Approach or Landing ..... | Use at least two rudder positions, one of which must be near maximum allowable rudder. Propeller driven airplanes must test in each direction. May be a series of snapshot test results. Sideslip angle is matched only for repeatability and only on continuing qualification evaluations. | X | X | | |
| 2.e. through 2.h. | (Reserved) | | | | | | | |
| 3. (Reserved) | | | | | | | | |
| 4. (Reserved) | | | | | | | | |
| 5. (Reserved) | | | | | | | | |
| 6. FTD System Response Time | | | | | | | | |
| 6.a. ..... | Latency. | | | | | | | |
| | | 300 ms (or less) after airplane response. | Take-off, cruise, and approach or landing. | One test is required in each axis (pitch, roll and yaw) for each of the three conditions (take-off, cruise, and approach or landing). | X | X | | |
| | Transport Delay | | | | | | | |

TABLE B2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | Information |
| Entry No. | Title | | | | 5 | 6 | Notes |
| | | 300 ms (or less) after controller movement. | N/A ..... | A separate test is required in each axis (pitch, roll, and yaw). | X | X | If Transport Delay is the chosen method to demonstrate relative responses, the sponsor and the NSPM will use the latency values to ensure proper simulator response when reviewing those existing tests where latency can be identified (e.g., short period, roll response, rudder response). |

BEGIN INFORMATION

3. FOR ADDITIONAL INFORMATION ON THE FOLLOWING TOPICS, PLEASE REFER TO APPENDIX A, ATTACHMENT 2, AND THE INDICATED PARAGRAPH WITHIN THAT ATTACHMENT

- Control Dynamics, paragraph 4.
- Motion System, paragraph 6.
- Sound System, paragraph 7.
- Engineering Simulator Validation Data, paragraph 9.
- Validation Test Tolerances, paragraph 11.
- Validation Data Road Map, paragraph 12.
- Acceptance Guidelines for Alternative Engines Data, paragraph 13.
- Acceptance Guidelines for Alternative Avionics, paragraph 14.
- Transport Delay Testing, paragraph 15.
- Continuing Qualification Evaluation Validation Data Presentation, paragraph 16.

END INFORMATION

4. ALTERNATIVE OBJECTIVE DATA FOR FTD LEVEL 5

BEGIN QPS REQUIREMENTS

a. This paragraph (including the following tables) is relevant only to FTD Level 5. It is provided because this level is required to simulate the performance and handling characteristics of a set of airplanes with similar characteristics, such as normal airspeed/altitude operating envelope and the same number and type of propulsion systems (engines).

b. Tables B2B through B2E reflect FTD performance standards that are acceptable to the FAA. A sponsor must demonstrate that a device performs within these parameters, as applicable. If a device does not meet the established performance parameters for some or for all of the applicable tests listed in Tables B2B through B2E, the sponsor may use NSP accepted flight test data for comparison purposes for those tests.

c. Sponsors using the data from Tables B2B through B2E must comply with the following:

(1) Submit a complete QTG, including results from all of the objective tests appropriate for the level of qualification sought as set out in Table B2A. The QTG must highlight those results that demonstrate the performance of the FTD is within the allowable performance ranges indicated in Tables B2B through B2E, as appropriate.

(2) The QTG test results must include all relevant information concerning the conditions under which the test was conducted; *e.g.*, gross weight, center of gravity, airspeed, power setting, altitude (climbing, descending, or level), temperature, configuration, and any other parameter that impacts the conduct of the test.

(3) The test results become the validation data against which the initial and all subsequent continuing qualification evaluations are compared. These subsequent evaluations will use the tolerances listed in Table B2A.

(4) Subjective testing of the device must be performed to determine that the device performs and handles like an airplane within the appropriate set of airplanes.

END QPS REQUIREMENTS

BEGIN INFORMATION

d. The reader is encouraged to consult the Airplane Flight Simulator Evaluation Handbook, Volumes I and II, published by the Royal Aeronautical Society, London, UK, and AC 25–7, Flight Test Guide for Certification of Transport Category Airplanes, and AC 23–8A, Flight Test Guide for Certification of Part 23 Airplanes, as amended, for references and examples regarding flight testing requirements and techniques.

END INFORMATION

TABLE B2B—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (RECIPROCATING) AIRPLANE

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| **1.** ..... | **Performance.** | |
| 1.c ..... | Climb | |
| 1.c.1. ..... | Normal climb with nominal gross weight, at best rate-of-climb airspeed. | Climb rate = 500–1200 fpm (2.5–6 m/sec). |
| 1.f. ..... | Engines. | |

TABLE B2B—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (RECIPROCATING) AIRPLANE—Continued

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| 1.f.1. ..... | Acceleration; idle to takeoff power ..... | 2–4 Seconds. |
| 1.f.2. ..... | Deceleration; takeoff power to idle ..... | 2–4 Seconds. |
| **2.** ..... | **Handling Qualities** | |
| 2.c. ..... | Longitudinal Tests | |
| 2.c.1. ..... | Power change force | |
| | (a) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Reduce power to flight idle. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Add power to maximum setting. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed.. | 5–15 lbs (2.2–6.6 daN) of force (Push). |
| 2.c.2. ..... | Flap/slat change force | |
| | (a) Trim for straight and level flight with flaps fully retracted at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Extend the flaps to 50% of full flap travel. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with flaps extended to 50% of full flap travel, at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Retract the flaps to zero. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Push). |
| 2.c.4. ..... | Gear change force | |
| | (a) Trim for straight and level flight with landing gear retracted at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Extend the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with landing gear extended, at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Retract the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Push). |
| 2.c.5. ..... | Longitudinal trim ..... | Must be able to trim longitudinal stick force to ''zero'' in each of the following configurations: cruise; approach; and landing. |
| 2.c.7. ..... | Longitudinal static stability ..... | Must exhibit positive static stability. |

TABLE B2B—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (RECIPROCATING) AIRPLANE—Continued

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| 2.c.8. ..... | Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of not more than three (3) knots per second. | |
| | (a) Landing configuration ..... | 40–60 knots; ±5° of bank. |
| | (b) Clean configuration ..... | Landing configuration speed + 10–20%. |
| 2.c.9.b. ..... | Phugoid dynamics ..... | Must have a phugoid with a period of 30–60 seconds. May not reach ½ or double amplitude in less than 2 cycles. |
| 2.d. ..... | Lateral Directional Tests. | |
| 2.d.2. ..... | Roll response (rate). Roll rate must be measured through at least 30° of roll. Aileron control must be deflected ⅓ (33.3 percent) of maximum travel. | Must have a roll rate of 40°–25°/second. |
| 2.d.4.b. ..... | Spiral stability. Cruise configuration and normal cruise airspeed. Establish a 20°–30° bank. When stabilized, neutralize the aileron control and release. Must be completed in both directions of turn. | Initial bank angle (±5°) after 20 seconds. |
| 2.d.6.b. ..... | Rudder response. Use 25 percent of maximum rudder deflection. (Applicable to approach or landing configuration.). | 2°–6°/second yaw rate. |
| 2.d.7. ..... | Dutch roll, yaw damper off. (Applicable to cruise and approach configurations.). | A period of 2–5 seconds; and ½–2 cycles. |
| 2.d.8. ..... | Steady state sideslip. Use 50 percent rudder deflection. (Applicable to approach and landing configurations.). | 2°–10° of bank; 4°–10° of sideslip; and 2°–10° of aileron. |
| **6.** ..... | **FTD System Response Time** | |
| 6.a. ..... | Latency. Flight deck instrument systems response to an abrupt pilot controller input. One test is required in each axis (pitch, roll, yaw). | 300 milliseconds or less. |

TABLE B2C—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, MULTI-ENGINE (RECIPROCATING) AIRPLANE

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| **1. Performance** | | |
| 1.c ..... | Climb | |
| 1.c.1. ..... | Normal climb with nominal gross weight, at best rate-of-climb airspeed. | Climb airspeed = 95–115 knots.<br>Climb rate = 500–1500 fpm (2.5–7.5 m/sec) |
| 1.f. ..... | Engines | |
| 1.f.1. ..... | Acceleration; idle to takeoff power ..... | 2–5 Seconds. |
| 1.f.2. ..... | Deceleration; takeoff power to idle ..... | 2–5 Seconds. |
| **2. Handling Qualities** | | |
| 2.c. ..... | Longitudinal Tests. | |

TABLE B2C—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, MULTI-ENGINE (RECIPROCATING) AIRPLANE—Continued

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| 2.c.1. ..... | Power change force. | |
| | (a) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Reduce power to flight idle. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 10–25 lbs (2.2–6.6 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Add power to maximum setting. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Push). |
| 2.c.2. ..... | Flap/slat change force. | |
| | (a) Trim for straight and level flight with flaps fully retracted at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Extend the flaps to 50% of full flap travel. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with flaps extended to 50% of full flap travel, at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Retract the flaps to zero. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Push). |
| 2.c.4. ..... | Gear change force. | |
| | (a) Trim for straight and level flight with landing gear retracted at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Extend the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with landing gear extended, at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Retract the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Push). |
| 2.c.4. ..... | Longitudinal trim ..... | Must be able to trim longitudinal stick force to ''zero'' in each of the following configurations: cruise; approach; and landing. |
| 2.c.7. ..... | Longitudinal static stability ..... | Must exhibit positive static stability. |
| 2.c.8. ..... | Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of not more than three (3) knots per second.<br>(a) Landing configuration ..... | 60–90 knots; ±5° of bank. |
| | (b) Clean configuration ..... | Landing configuration speed + 10–20%. |

TABLE B2C—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, MULTI-ENGINE (RECIPROCATING) AIRPLANE—Continued

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| 2.c.9.b. ..... | Phugoid dynamics ..... | Must have a phugoid with a period of 30–60 seconds. May not reach ½ or double amplitude in less than 2 cycles. |
| 2.d. ..... | Lateral Directional Tests | |
| 2.d.2. ..... | Roll response ..... Roll rate must be measured through at least 30° of roll. Aileron control must be deflected ⅓ (33.3 percent) of maximum travel. | Must have a roll rate of 4½–25½/second. |
| 2.d.4.b. ..... | Spiral stability ..... Cruise configuration and normal cruise airspeed. Establish a 20°–30° bank. When stabilized, neutralize the aileron control and release. Must be completed in both directions of turn. | Initial bank angle (±5°) after 20 seconds. |
| 2.d.6.b. ..... | Rudder response ..... Use 25 percent of maximum rudder deflection. (Applicable to approach landing configuration.) | 3°–6°/second yaw rate. |
| 2.d.7. ..... | Dutch roll, yaw damper off. (Applicable to cruise and approach configurations.). | A period of 2–5 seconds; and ½–2 cycles. |
| 2.d.8. ..... | Steady state sideslip ..... Use 50 percent rudder deflection. (Applicable to approach and landing configurations.) | 2°–10° of bank; 4–10 degrees of sideslip; and 2°–10° of aileron. |
| **6. FTD System Response Time** | | |
| 6.a. ..... | Flight deck instrument systems response to an abrupt pilot controller input. One test is required in each axis (pitch, roll, yaw). | 300 milliseconds or less. |

TABLE B2D—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (TURBO-PROPELLER) AIRPLANE

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable Test | | Authorized performance range |
| Entry No. | Title and procedure | |
| **1. Performance** | | |
| 1.c ..... | Climb. | |
| 1.c.1. ..... | Normal climb with nominal gross weight, at best rate-of-climb airspeed. | Climb airspeed = 95–115 knots.<br>Climb rate = 800–1800 fpm (4–9 m/sec). |
| 1.f. ..... | Engines | |
| 1.f.1. ..... | Acceleration; idle to takeoff power ..... | 4–8 Seconds. |
| 1.f.2. ..... | Deceleration; takeoff power to idle ..... | 3–7 Seconds. |
| **2. Handling Qualities** | | |
| 2.c. ..... | Longitudinal Tests | |
| 2.c.1. ..... | Power change force | |

TABLE B2D—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable Test | | Authorized performance range |
| Entry No. | Title and procedure | |
| | (a) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Reduce power to flight idle. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 8 lbs (3.5 daN) of Push force—8 lbs (3.5 daN) of Pull force. |
| | OR | |
| | (b) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Add power to maximum setting. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 12–22 lbs (5.3–9.7 daN) of force (Push). |
| 2.c.2. ..... | Flap/slat change force | |
| | (a) Trim for straight and level flight with flaps fully retracted at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Extend the flaps to 50% of full flap travel. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with flaps extended to 50% of full flap travel, at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Retract the flaps to zero. After stabilized, record stick force necessary to maintain original airspeed.. | 5–15 lbs (2.2–6.6 daN) of force (Push). |
| 2.c.4. ..... | Gear change force. | |
| | (a) Trim for straight and level flight with landing gear retracted at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Extend the landing gear. After stabilized, record stick force necessary to maintain original airspeed.. | 2–12 lbs (0.88–5.3 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with landing gear extended, at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Retract the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Push). |
| 2.b.5. ..... | Longitudinal trim ..... | Must be able to trim longitudinal stick force to ''zero'' in each of the following configurations: cruise; approach; and landing. |
| 2.c.7. ..... | Longitudinal static stability ..... | Must exhibit positive static stability. |
| 2.c.8. ..... | Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of not more than three (3) knots per second. | |
| | (a) Landing configuration ..... | 60–90 knots; ±5° of bank. |
| | (b) Clean configuration. ..... | Landing configuration speed + 10–20%. |

TABLE B2D—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

| QPS requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable Test | | Authorized performance range |
| Entry No. | Title and procedure | |
| 2.c.8.b. ..... | Phugoid dynamics .....<br>Must have a phugoid with a period of 30–60 seconds. May not reach ½ or double amplitude in less than 2 cycles. | |
| 2.d. ..... | Lateral Directional Tests | |
| 2.d.2. ..... | Roll response .....<br>Roll rate must be measured through at least 30° of roll. Aileron control must be deflected ⅓ (33.3 percent) of maximum travel. | Must have a roll rate of 4°–25°/second. |
| 2.d.4.b. ..... | Spiral stability .....<br>Cruise configuration and normal cruise airspeed. Establish a 20°–30° bank. When stabilized, neutralize the aileron control and release. Must be completed in both directions of turn. | Initial bank angle (±5°) after 20 seconds. |
| 2.d.6.b. ..... | Rudder response .....<br>Use 25 percent of maximum rudder deflection. (Applicable to approach or landing configuration.). | 3°–6°/second yaw rate. |
| 2.d.7. ..... | Dutch roll, yaw damper off .....<br>(Applicable to cruise and approach configurations.) | A period of 2–5 seconds; and ½–3 cycles. |
| 2.d.8. ..... | Steady state sideslip .....<br>Use 50 percent rudder deflection.<br>(Applicable to approach and landing configurations.) | 2°–10° of bank; 4°–10° of sideslip; and 2°–10° of aileron. |
| **6. FTD System Response Time** | | |
| 6.a. ..... | Flight deck instrument systems response to an abrupt pilot controller input. One test is required in each axis (pitch, roll, yaw). | 300 milliseconds or less. |

TABLE B2E—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 MULTI-ENGINE (TURBO-PROPELLER) AIRPLANE

| QPS Requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| **1. Performance** | | |
| 1.c ..... | Climb. | |
| 1.b.1. ..... | Normal climb with nominal gross weight, at best rate-of-climb airspeed. | Climb airspeed = 120–140 knots.<br>Climb rate = 1000–3000 fpm (5–15 m/sec). |
| 1.f. ..... | Engines | |
| 1.f.1. ..... | Acceleration; idle to takeoff power ..... | 2–6 Seconds. |
| 1.f.2. ..... | Deceleration; takeoff power to idle ..... | 1–5 Seconds. |
| **2. Handling Qualities** | | |
| 2.c. ..... | Longitudinal Tests | |
| 2.c.1. ..... | Power change force | |

TABLE B2E—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 MULTI-ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

| QPS Requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| | (a) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Reduce power to flight idle. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 8 lbs (3.5 daN) of Push force to 8 lbs (3.5 daN) of Pull force. |
| | OR | |
| | (b) Trim for straight and level flight at 80% of normal cruise airspeed with necessary power. Add power to maximum setting. Do not change trim or configuration. After stabilized, record column force necessary to maintain original airspeed. | 12–22 lbs (5.3–9.7 daN) of force (Push). |
| 2.c.2. ..... | Flap/slat change force | |
| | (a) Trim for straight and level flight with flaps fully retracted at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Extend the flaps to 50% of full flap travel. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with flaps extended to 50% of full flap travel, at a constant airspeed within the flaps-extended airspeed range. Do not adjust trim or power. Retract the flaps to zero. After stabilized, record stick force necessary to maintain original airspeed. | 5–15 lbs (2.2–6.6 daN) of force (Push). |
| 2.c.4. ..... | Gear change force | |
| | (a) Trim for straight and level flight with landing gear retracted at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Extend the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Pull). |
| | OR | |
| | (b) Trim for straight and level flight with landing gear extended, at a constant airspeed within the landing gear-extended airspeed range. Do not adjust trim or power. Retract the landing gear. After stabilized, record stick force necessary to maintain original airspeed. | 2–12 lbs (0.88–5.3 daN) of force (Push). |
| 2.b.5. ..... | Longitudinal trim ..... | Must be able to trim longitudinal stick force to ''zero'' in each of the following configurations: cruise; approach; and landing. |
| 2.c.7. ..... | Longitudinal static stability ..... | Must exhibit positive static stability. |
| 2.c.8. ..... | Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of not more than three (3) knots per second. | |
| | (a) Landing configuration ..... | 80–100 knots; # 5° of bank. |
| | (b) Clean configuration ..... | Landing configuration speed + 10–20%. |

TABLE B2E—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 MULTI-ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

| QPS Requirement<br>The performance parameters in this table must be used to program the FTD if flight test data is not used to program the FTD. | | |
|---|---|---|
| Applicable test | | Authorized performance range |
| Entry No. | Title and procedure | |
| 2.c.8.b. ..... | Phugoid dynamics ..... | Must have a phugoid with a period of 30–60 seconds. May not reach ½ or double amplitude in less than 2 cycles. |
| 2.d. ..... | Lateral Directional Tests | |
| 2.d.2. ..... | Roll response .....<br>Roll rate must be measured through at least 30° of roll. Aileron control must be deflected ⅓ (33.3 percent) of maximum travel. | Must have a roll rate of 4–25 degrees/second. |
| 2.d.4.b. ..... | Spiral stability .....<br>Cruise configuration and normal cruise airspeed. Establish a 20°–30° bank. When stabilized, neutralize the aileron control and release. Must be completed in both directions of turn. | Initial bank angle (±5°) after 20 seconds. |
| 2.d.6.b. ..... | Rudder response .....<br>Use 25 percent of maximum rudder deflection. (Applicable to approach or landing configuration.) | 3°–6° /second yaw rate. |
| 2.d.7. ..... | Dutch roll, yaw damper off .....<br>(Applicable to cruise and approach configurations.) | A period of 2–5 seconds; and ½–2 cycles. |
| 2.d.8. ..... | Steady state sideslip .....<br>Use 50 percent rudder deflection. (Applicable to approach and landing configurations.) | 2°–10° of bank;<br>4°–10° of sideslip; and<br>2°–10° of aileron. |
| **6. FTD System Response Time** | | |
| 6.a. ..... | Flight deck instrument systems response to an abrupt pilot controller input. One test is required in each axis (pitch, roll, yaw). | 300 milliseconds or less. |

END QPS REQUIREMENTS

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BEGIN QPS REQUIREMENTS

5. ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION: LEVEL 6 FTD ONLY

a. Sponsors are not required to use the alternative data sources, procedures, and instrumentation. However, a sponsor may choose to use one or more of the alternative sources, procedures, and instrumentation described in Table B2F.

END QPS REQUIREMENTS

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BEGIN INFORMATION

b. It has become standard practice for experienced FTD manufacturers to use such techniques as a means of establishing data bases for new FTD configurations while awaiting the availability of actual flight test data; and then comparing this new data with the newly available flight test data. The results of such comparisons have, as reported by some recognized and experienced simulation experts, become increasingly consistent and indicate that these techniques, applied with appropriate experience, are becoming dependably accurate for the development of aerodynamic models for use in Level 6 FTDs.

c. In reviewing this history, the NSPM has concluded that, with proper care, those who are experienced in the development of aerodynamic models for FTD application can successfully use these modeling techniques to acceptably alter the method by which flight test data may be acquired and, when applied to Level 6 FTDs, does not compromise the quality of that simulation.

d. The information in the table that follows (Table of Alternative Data Sources, Procedures, and Information: Level 6 FTD Only) is presented to describe an acceptable alternative to data sources for Level 6 FTD modeling and validation, and an acceptable alternative to the procedures and instrumentation found in the flight test methods traditionally accepted for gathering modeling and validation data.

(1) Alternative data sources that may be used for part or all of a data requirement are the Airplane Maintenance Manual, the Airplane Flight Manual (AFM), Airplane Design Data, the Type Inspection Report (TIR), Certification Data or acceptable supplemental flight test data.

(2) The NSPM recommends that use of the alternative instrumentation noted in Table B2F be coordinated with the NSPM prior to employment in a flight test or data gathering effort.

e. The NSPM position regarding the use of these alternative data sources, procedures, and instrumentation is based on three primary preconditions and presumptions regarding the objective data and FTD aerodynamic program modeling.

(1) Data gathered through the alternative means does not require angle of attack (AOA) measurements or control surface position measurements for any flight test. AOA can be sufficiently derived if the flight test program insures the collection of acceptable level, unaccelerated, trimmed flight data. Angle of attack may be validated by conducting the three basic ''fly-by'' trim tests. The FTD time history tests should begin in level, unaccelerated, and trimmed flight, and the results should be compared with the flight test pitch angle.

(2) A simulation controls system model should be rigorously defined and fully mature. It should also include accurate gearing and cable stretch characteristics (where applicable) that are determined from actual aircraft measurements. Such a model does not require control surface position measurements in the flight test objective data for Level 6 FTD applications.

f. Table B2F is not applicable to Computer Controlled Aircraft FTDs.

g. Utilization of these alternate data sources, procedures, and instrumentation does not relieve the sponsor from compliance with the balance of the information contained in this document relative to Level 6 FTDs.

h. The term ''inertial measurement system'' allows the use of a functional global positioning system (GPS).

END INFORMATION

TABLE B2F—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION LEVEL 6 FTD

| QPS Requirements<br>The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix B are not used. | | Information |
|---|---|---|
| Objective test reference number and title | Alternative data sources, procedures, and instrumentation | Notes |
| 1.b.1. ..... Performance. Takeoff. Ground acceleration time. | Data may be acquired through a synchronized video recording of a stop watch and the calibrated airplane airspeed indicator. Hand-record the flight conditions and airplane configuration. | This test is required only if RTO is sought. |
| 1.b.7. ..... Performance. Takeoff. Rejected takeoff. | Data may be acquired through a synchronized video recording of a stop watch and the calibrated airplane airspeed indicator. Hand-record the flight conditions and airplane configuration. | This test is required only if RTO is sought. |
| 1.c.1. ..... Performance. Climb. Normal climb all engines operating. | Data may be acquired with a synchronized video of calibrated airplane instruments and engine power throughout the climb range. | |
| 1.f.1. ..... Performance. Engines. Acceleration | Data may be acquired with a synchronized video recording of engine instruments and throttle position. | |
| 1.f.2. ..... Performance. Engines. Deceleration | Data may be acquired with a synchronized video recording of engine instruments and throttle position. | |

TABLE B2F—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION LEVEL 6 FTD—Continued

| QPS Requirements<br>The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix B are not used. | | Information |
|---|---|---|
| Objective test reference number and title | Alternative data sources, procedures, and instrumentation | Notes |
| 2.a.1.a. .....<br>Handling qualities.<br>Static control tests.<br>Pitch controller position vs. force and surface position calibration. | Surface position data may be acquired from flight data recorder (FDR) sensor or, if no FDR sensor, at selected, significant column positions (encompassing significant column position data points), acceptable to the NSPM, using a control surface protractor on the ground. Force data may be acquired by using a hand held force gauge at the same column position data points. | For airplanes with reversible control systems, surface position data acquisition should be accomplished with winds less than 5 kts. |
| 2.a.2.a. .....<br>Handling qualities.<br>Static control tests.<br>Wheel position vs. force and surface position calibration. | Surface position data may be acquired from flight data recorder (FDR) sensor or, if no FDR sensor, at selected, significant wheel positions (encompassing significant wheel position data points), acceptable to the NSPM, using a control surface protractor on the ground. Force data may be acquired by using a hand held force gauge at the same wheel position data points. | For airplanes with reversible control systems, surface position data acquisition should be accomplished with winds less than 5 kts. |
| 2.a.3.a. .....<br>Handling qualities.<br>Static control tests.<br>Rudder pedal position vs. force and surface position calibration. | Surface position data may be acquired from flight data recorder (FDR) sensor or, if no FDR sensor, at selected, significant rudder pedal positions (encompassing significant rudder pedal position data points), acceptable to the NSPM, using a control surface protractor on the ground. Force data may be acquired by using a hand held force gauge at the same rudder pedal position data points. | For airplanes with reversible control systems, surface position data acquisition should be accomplished with winds less than 5 kts. |
| 2.a.4. .....<br>Handling qualities.<br>Static control tests.<br>Nosewheel steering force. | Breakout data may be acquired with a hand held force gauge. The remainder of the force to the stops may be calculated if the force gauge and a protractor are used to measure force after breakout for at least 25% of the total displacement capability. | |
| 2.a.5. .....<br>Handling qualities.<br>Static control tests.<br>Rudder pedal steering calibration. | Data may be acquired through the use of force pads on the rudder pedals and a pedal position measurement device, together with design data for nosewheel position. | |
| 2.a.6. .....<br>Handling qualities.<br>Static control tests.<br>Pitch trim indicator vs. surface position calibration. | Data may be acquired through calculations. | |
| 2.a.8. .....<br>Handling qualities.<br>Static control tests.<br>Alignment of power lever angle vs. selected engine parameter (e.g., EPR, $N_1$, Torque, Manifold pressure). | Data may be acquired through the use of a temporary throttle quadrant scale to document throttle position. Use a synchronized video to record steady state instrument readings or hand-record steady state engine performance readings. | |
| 2.a.9. .....<br>Handling qualities.<br>Static control tests.<br>Brake pedal position vs. force. | Use of design or predicted data is acceptable. Data may be acquired by measuring deflection at ''zero'' and at ''maximum.'' | |

TABLE B2F—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION LEVEL 6 FTD—Continued

| QPS Requirements<br>The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix B are not used. | | Information |
|---|---|---|
| Objective test reference number and title | Alternative data sources, procedures, and instrumentation | Notes |
| 2.c.1. ..... Handling qualities. Longitudinal control tests. Power change force. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments, throttle position, and the force/position measurements of flight deck controls. | Power change dynamics test is acceptable using the same data acquisition methodology. |
| 2.c.2. ..... Handling qualities. Longitudinal control tests. Flap/slat change force. | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated airplane instruments, flap/slat position, and the force/position measurements of flight deck controls. | Flap/slat change dynamics test is acceptable using the same data acquisition methodology. |
| 2.c.4. ..... Handling qualities. Longitudinal control tests. Gear change force. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments, gear position, and the force/position measurements of flight deck controls. | Gear change dynamics test is acceptable using the same data acquisition methodology. |
| 2.c.5. ..... Handling qualities. Longitudinal control tests. Longitudinal trim. | Data may be acquired through use of an inertial measurement system and a synchronized video of flight deck controls position (previously calibrated to show related surface position) and engine instrument readings. | |
| 2.c.6. ..... Handling qualities. Longitudinal control tests. Longitudinal maneuvering stability (stick force/g). | Data may be acquired through the use of an inertial measurement system and a synchronized video of the calibrated airplane instruments; a temporary, high resolution bank angle scale affixed to the attitude indicator; and a wheel and column force measurement indication. | |
| 2.c.7. ..... Handling qualities. Longitudinal control tests. Longitudinal static stability | Data may be acquired through the use of a synchronized video of the airplane flight instruments and a hand held force gauge. | |
| 2.c.8. ..... Handling qualities. Longitudinal control tests. Stall Warning (activation of stall warning device). | Data may be acquired through a synchronized video recording of a stop watch and the calibrated airplane airspeed indicator. Hand-record the flight conditions and airplane configuration. | Airspeeds may be cross checked with those in the TIR and AFM. |
| 2.c.9.a. ..... Handling qualities. Longitudinal control tests. Phugoid dynamics. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments and the force/position measurements of flight deck controls. | |
| 2.c.10. ..... Handling qualities. Longitudinal control tests. Short period dynamics. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments and the force/position measurements of flight deck controls. | |
| 2.c.11. ..... Handling qualities. Longitudinal control tests. Gear and flap/slat operating times. | May use design data, production flight test schedule, or maintenance specification, together with an SOC. | |
| 2.d.2. ..... Handling qualities. Lateral directional tests. Roll response (rate). | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments and the force/position measurements of flight deck lateral controls. | |

TABLE B2F—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION LEVEL 6 FTD—Continued

| QPS Requirements<br>The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix B are not used. | | Information |
|---|---|---|
| Objective test reference number and title | Alternative data sources, procedures, and instrumentation | Notes |
| 2.d.3. .....<br>Handling qualities.<br>Lateral directional tests.<br>(a) Roll overshoot.<br>OR<br>(b) Roll response to flight deck roll controller step input. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments and the force/position measurements of flight deck lateral controls. | |
| 2.d.4. .....<br>Handling qualities.<br>Lateral directional tests.<br>Spiral stability. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments; the force/position measurements of flight deck controls; and a stop watch. | |
| 2.d.6.a. .....<br>Handling qualities.<br>Lateral directional tests.<br>Rudder response. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments; the force/position measurements of rudder pedals. | |
| 2.d.7. .....<br>Handling qualities.<br>Lateral directional tests.<br>Dutch roll, (yaw damper OFF). | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments and the force/position measurements of flight deck controls. | |
| 2.d.8. .....<br>Handling qualities.<br>Lateral directional tests.<br>Steady state sideslip. | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments and the force/position measurements of flight deck controls. | |

## ATTACHMENT 3 TO APPENDIX B TO PART 60—FLIGHT TRAINING DEVICE (FTD) SUBJECTIVE EVALUATION

BEGIN INFORMATION

### 1. DISCUSSION

a. The subjective tests provide a basis for evaluating the capability of the FTD to perform over a typical utilization period. The items listed in the Table of Functions and Subjective Tests are used to determine whether the FTD competently simulates each required maneuver, procedure, or task; and verifying correct operation of the FTD controls, instruments, and systems. The tasks do not limit or exceed the authorizations for use of a given level of FTD as described on the SOQ or as approved by the TPAA. All items in the following paragraphs are subject to examination.

b. All simulated airplane systems functions will be assessed for normal and, where appropriate, alternate operations. Simulated airplane systems are listed separately under ''Any Flight Phase'' to ensure appropriate attention to systems checks. Operational navigation systems (including inertial navigation systems, global positioning systems, or other long-range systems) and the associated electronic display systems will be evaluated if installed. The NSP pilot will include in his report to the TPAA, the effect of the system operation and any system limitation.

c. At the request of the TPAA, the NSP Pilot may assess the FTD for a special aspect of a sponsor's training program during the functions and subjective portion of an evaluation. Such an assessment may include a portion of a specific operation (e.g., a Line Oriented Flight Training (LOFT) scenario) or special emphasis items in the sponsor's training program. Unless directly related to a requirement for the qualification level, the results of such an evaluation would not affect the qualification of the FTD.

END INFORMATION

TABLE B3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| Tasks in this table are subject to evaluation if appropriate for the airplane system or systems simulated as indicated in the SOQ Configuration List as defined in Appendix B, Attachment 2 of this part. | |
| **1. Preflight** | |
| | Accomplish a functions check of all installed switches, indicators, systems, and equipment at all crewmembers' and instructors' stations, and determine that the flight deck (or flight deck area) design and functions replicate the appropriate airplane. |
| **2. Surface Operations (pre-takeoff)** | |
| 2.a. ..... | Engine start: |
| 2.a.1. ..... | Normal start. |
| 2.a.2. ..... | Alternative procedures start. |
| 2.a.3. ..... | Abnormal procedures start/shut down. |
| 2.b. ..... | Pushback/Powerback (powerback requires visual system). |
| **3. Takeoff (requires appropriate visual system as set out in Table B1A, item 6; Appendix B, Attachment 1.)** | |
| 3.a. ..... | Instrument takeoff: |
| 3.a.1. ..... | Engine checks (e.g., engine parameter relationships, propeller/mixture controls). |
| 3.a.2. ..... | Acceleration characteristics. |
| 3.a.3. ..... | Nosewheel/rudder steering. |
| 3.a.4. ..... | Landing gear, wing flap, leading edge device operation. |
| 3.b. ..... | Rejected takeoff: |
| 3.b.1. ..... | Deceleration characteristics. |
| 3.b.2. ..... | Brakes/engine reverser/ground spoiler operation. |
| 3.b.3. ..... | Nosewheel/rudder steering. |
| **4. In-Flight Operations** | |
| 4.a. ..... | Normal climb. |
| 4.b. ..... | Cruise: |
| 4.b.1. ..... | Demonstration of performance characteristics (speed vs. power). |
| 4.b.2. ..... | Normal turns. |
| 4.b.3. ..... | Demonstration of high altitude handling. |
| 4.b.4. ..... | Demonstration of high airspeed handling/overspeed warning. |
| 4.b.5. ..... | Demonstration of Mach effects on control and trim. |
| 4.b.6. ..... | Steep turns. |
| 4.b.7. ..... | In-Flight engine shutdown (procedures only). |
| 4.b.8. ..... | In-Flight engine restart (procedures only). |
| 4.b.9. ..... | Specific flight characteristics. |
| 4.b.10. ..... | Response to loss of flight control power. |
| 4.b.11. ..... | Response to other flight control system failure modes. |
| 4.b.12. ..... | Operations during icing conditions. |

TABLE B3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 4.b.13. ..... | Effects of airframe/engine icing. |
| 4.c. ..... | Other flight phase: |
| 4.c.1. ..... | Approach to stalls in the following configurations: |
| 4.c.1.a. ..... | Cruise. |
| 4.c.1.b. ..... | Takeoff or approach. |
| 4.c.1.c. ..... | Landing. |
| 4.c.2. ..... | High angle of attack maneuvers in the following configurations: |
| 4.c.2.a. ..... | Cruise. |
| 4.c.2.b. ..... | Takeoff or approach. |
| 4.c.2.c. ..... | Landing. |
| 4.c.3. ..... | Slow flight. |
| 4.c.4. ..... | Holding. |
| **5. Approaches** | |
| 5.a. | Non-precision Instrument Approaches: |
| 5.a.1. ..... | With use of autopilot and autothrottle, as applicable. |
| 5.a.2. ..... | Without use of autopilot and autothrottle, as applicable. |
| 5.a.3. ..... | With 10 knot tail wind. |
| 5.a.4. ..... | With 10 knot crosswind. |
| 5.b. ..... | Precision Instrument Approaches: |
| 5.b.1. ..... | With use of autopilot, autothrottle, and autoland, as applicable. |
| 5.b.2. ..... | Without use of autopilot, autothrottle, and autoland, as applicable. |
| 5.b.3. ..... | With 10 knot tail wind. |
| 5.b.4. ..... | With 10 knot crosswind. |
| **6. Missed Approach** | |
| 6.a. ..... | Manually controlled. |
| 6.b. ..... | Automatically controlled (if applicable). |
| **7. Any Flight Phase, as appropriate** | |
| 7.a. ..... | Normal system operation (installed systems). |
| 7.b. ..... | Abnormal/Emergency system operation (installed systems). |
| 7.c. ..... | Flap operation. |
| 7.d. ..... | Landing gear operation. |
| 7.e. ..... | Engine Shutdown and Parking. |
| 7.e.1. ..... | Systems operation. |
| 7.e.2. ..... | Parking brake operation. |
| **8. Instructor Operating Station (IOS), as appropriate.** Functions in this section are subject to evaluation only if appropriate for the airplane and/or installed on the specific FTD involved | |

TABLE B3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 8.a. ..... | Power Switch(es). |
| 8.b. ..... | Airplane conditions. |
| 8.b.1. ..... | Gross weight, center of gravity, and fuel loading and allocation. |
| 8.b.2. ..... | Airplane systems status. |
| 8.b.3. ..... | Ground crew functions (e.g., external power, push back). |
| 8.c. ..... | Airports. |
| 8.c.1. ..... | Selection. |
| 8.c.2. ..... | Runway selection. |
| 8.c.3. ..... | Preset positions (e.g., ramp, over FAF). |
| 8.d. ..... | Environmental controls. |
| 8.d.1. ..... | Temperature. |
| 8.d.2. ..... | Climate conditions (e.g., ice, rain). |
| 8.d.3. ..... | Wind speed and direction. |
| 8.e. ..... | Airplane system malfunctions. |
| 8.e.1. ..... | Insertion/deletion. |
| 8.e.2. ..... | Problem clear. |
| 8.f. ..... | Locks, Freezes, and Repositioning. |
| 8.f.1. ..... | Problem (all) freeze/release. |
| 8.f.2. ..... | Position (geographic) freeze/release. |
| 8.f.3. ..... | Repositioning (locations, freezes, and releases). |
| 8.f.4. ..... | Ground speed control. |
| 8.f.5. ..... | Remote IOS, if installed. |
| **9. Sound Controls. On/off/adjustment** | |
| **10. Control Loading System (as applicable) On/off/emergency stop.** | |
| **11. Observer Stations.** | |
| 11.a. ..... | Position. |
| 11.b. ..... | Adjustments. |
| **End QPS Requirements** | |

TABLE B3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 5 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks<br>Tasks in this table are subject to evaluation if appropriate for the airplane system or systems simulated as indicated in the SOQ Configuration List as defined in Appendix B, Attachment 2 of this part. |
| **1. Preflight** | |
| | Accomplish a functions check of all installed switches, indicators, systems, and equipment at all crewmembers' and instructors' stations, and determine that the flight deck (or flight deck area) design and functions replicate the appropriate airplane. |
| **2. Surface Operations (pre-takeoff)** | |

TABLE B3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 5 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks<br>Tasks in this table are subject to evaluation if appropriate for the airplane system or systems simulated as indicated in the SOQ Configuration List as defined in Appendix B, Attachment 2 of this part. |
| 2.a. ..... | Engine start (if installed): |
| 2.a.1. ..... | Normal start. |
| 2.a.2. ..... | Alternative procedures start. |
| 2.a.3. ..... | Abnormal/Emergency procedures start/shut down. |
| **3. In-Flight Operations** | |
| 3.a. ..... | Normal climb. |
| 3.b. ..... | Cruise: |
| 3.b.1. ..... | Performance characteristics (speed vs. power). |
| 3.b.2. ..... | Normal turns. |
| 3.c. ..... | Normal descent. |
| **4. Approaches** | |
| 4.a. ..... | Coupled instrument approach maneuvers (as applicable for the systems installed). |
| **5. Any Flight Phase** | |
| 5.a. ..... | Normal system operation (Installed systems). |
| 5.b. ..... | Abnormal/Emergency system operation (Installed systems). |
| 5.c. ..... | Flap operation. |
| 5.d. ..... | Landing gear operation |
| 5.e. ..... | Engine Shutdown and Parking (if installed). |
| 5.e.1. ..... | Systems operation. |
| 5.e.2. ..... | Parking brake operation. |
| **6. Instructor Operating Station (IOS)** | |
| 6.a. ..... | Power Switch(es). |
| 6.b. ..... | Preset positions—ground, air. |
| 6.c. ..... | Airplane system malfunctions (Installed systems). |
| 6.c.1. ..... | Insertion/deletion. |
| 6.c.2. ..... | Problem clear. |

TABLE B3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 4 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks<br>Tasks in this table are subject to evaluation if appropriate for the airplane system or systems simulated as indicated in the SOQ Configuration List as defined in Appendix B, Attachment 2 of this part. |
| 1. ..... | Level 4 FTDs are required to have at least one operational system. The NSPM will accomplish a functions check of all installed systems, switches, indicators, and equipment at all crewmembers' and instructors' stations, and determine that the flight deck (or flight deck area) design and functions replicate the appropriate airplane. |

ATTACHMENT 4 TO APPENDIX B TO PART 60—SAMPLE DOCUMENTS

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BEGIN INFORMATION

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Title of Sample

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Figure B4F Sample Statement of Qualification—Configuration List
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**Attachment 4 to Appendix B to Part 60—**
**Figure B4A – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation.**
**INFORMATION**

Date _____

Edward D. Cook, Ph.D.
Manager, National Simulator Program
Federal Aviation Administration
100 Hartsfield Centre Parkway. Suite 400
Atlanta, GA 30354

Dear Dr. Cook:

**RE: Request for Initial/Upgrade Evaluation Date**

This is to advise you of our intent to request an (initial or upgrade) evaluation of our (FTD Manufacturer), (Aircraft Type/Level) Flight Training Device (FTD), (FAA ID Number, if previously qualified), located in (City, State) at the (Facility) on (Proposed Evaluation Date). (The proposed evaluation date shall not be more than 180 days following the date of this letter.) The FTD will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FTD will be sponsored as follows; (Select One)

☐ The FTD will be used within the sponsor's FAA approved training program and placed on the sponsor's Training/Operations Specifications.

☐ The FTD will be used for dry lease only.

We agree to provide the formal request for the evaluation to your staff as follows: (check one)

☐ For QTG tests run at the factory, not later, than 45 days prior to the proposed evaluation date with the additional "l/3 on-site" tests provided not later than 14 days prior to the proposed evaluation date.

☐ For QTG tests run on-site, not later than 30 days prior to the proposed evaluation date.

We understand that the formal request will contain the following documents:

4. Sponsor's Letter of Request (*Company Compliance Letter*).
5. Principal Operations Inspector (POI) or Training Center Program Manager's (TCPM) endorsement.
6. Complete QTG.

*If we are unable to meet the above requirements, we understand this may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation.*

(The sponsor should add additional comments as necessary).

Please contact (Name Telephone and Fax Number of Sponsor's Contact) to confirm the date for this initial evaluation. We understand a member of your National Simulator Program staff will respond to this request within 14 days.

A copy of this letter of intent has been provided to (Name), the Principal Operations Inspector (POI) and/or Training Center Program Manager (TCPM).

Sincerely,

Attachment: FTD Information and Characteristics Form
cc: POI/TCPM

**Attachment 4 to Appendix B to Part 60—**
**Figure B4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**
**INFORMATION**

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ | **Physical Address:** | ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | ____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:**____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐**Yes**: | **Date of Manufacture**: | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** ____ | |
| **Engine model(s) and data revision:** ____ | | **Source of aerodynamic model:** ____ | |
| **FMS identification and revision level:** ____ | | **Source of aerodynamic coefficient data:** ____ | |
| **Visual system manufacturer/model:** ____ | | **Aerodynamic data revision number:** ____ | |
| **Flight control data revision:** ____ | | **Visual system display:** ____ | |
| **Mot ion system manufacturer/type:** ____ | | **FSTD computer(s) identification:** ____ | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | |
| **NAA FSTD ID No:** | ____ | **Last NAA Evaluation Date:** | ____ |
| **NAA Qualification Level:** | ____ | | |
| **NAA Qualification Basis:** | ____ | | |
| **Visual System Manufacturer and Type:** | ____ | **FSTD Seats Available:** ____ | **Motion System Manufacturer and Type:** ____: |

**Attachment 4 to Appendix B to Part 60—**
**Figure B4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**
**INFORMATION**

| Aircraft Equipment: | Engine Type(s): | Flight Instrumentation: | Engine Instrumentation: |
|---|---|---|---|
| | _____<br>_____ | ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS<br>☐ TCAS ☐ GPWS ☐ Plain View<br>☐ GPS ☐ FMS Type: __<br>☐ WX Radar ☐ Other: __ | ☐ EICAS ☐ FADEC<br>☐ Other: __ |

| | | | |
|---|---|---|---|
| **Airport Models:** | 3.6.1 _____<br>Airport Designator | 3.6.2_____<br>Airport Designator | 3.6.3 _____<br>Airport Designator |
| **Circle to Land:** | 3. 7.1 _____<br>Airport Designator | 3. 7.2_____<br>Approach | 3. 7.3 _____<br>Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____<br>Airport Designator | 3.8 .2_____<br>Approach | 3. 8.3 _____<br>Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |
| **Proficiency Checks** (135/121/142) | ☐ | _____ |
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |

**Attachment 4 to Appendix B to Part 60—**
**Figure B4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**
**INFORMATION**

| | | |
|---|---|---|
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III** * (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix B to Part 60—**
**Figure B4C – Sample Letter of Compliance**
**INFORMATION**

(Date)

Mr. (Name of Training Program Approval Authority):
(Name of FAA FSDO)
(Address)
(City/State/Zip)

Dear Mr. (Name of TPAA):

**RE: Letter of Compliance**

(Operator Sponsor Name) requests evaluation of our (Aircraft Type) FTD for Level (__) qualification. The (FTD Manufacturer Name) FTD with (Visual System Manufacturer Name/Model) system is fully defined on the FTD Information page of the accompanying Qualification Test Guide (QTG). We have completed the tests of the FTD and certify that it meets all applicable requirements of FAR parts 121, 125, or 135), and the guidance of (AC 120-40B or 14 CFR Part 60). Appropriate hardware and software configuration control procedures have been established. Our Pilot(s), (Name(s)), who are qualified on (Aircraft Type) aircraft have assessed the FTD and have found that it conforms to the (Operator/Sponsor) (Aircraft Type) flight deck configuration and that the simulated systems and subsystems function equivalently to those in the aircraft. The above named pilot(s) have also assessed the performance and the flying qualities of the FTD and find that it represents the respective aircraft.

(Added Comments may be placed here)

Sincerely,
(Sponsor Representative)

cc:
FAA, National Simulator Program

**Attachment 4 to Appendix B to Part 60—**
**Figure B4D – Sample Qualification Test Guide Cover Page**
**INFORMATION**

SPONSOR NAME

SPONSOR ADDRESS

FAA QUALIFICATION TEST GUIDE

(SPECIFIC AIRPLANE MODEL)
*for example*
Stratos BA797-320A

(Type of FTD)

(FTD Identification Including Manufacturer, Serial Number, Visual System Used)

(FTD Level)

(Qualification Performance Standard Used)

(FTD Location)

FAA Initial Evaluation

Date: _____

_____ Date: _____
(Sponsor)

_____ Date: _____
Manager, National
Simulator Program, FAA

**Attachment 4 to Appendix B to Part 60—**
**Figure B4E – Sample Statement of Qualification - Certificate**
**INFORMATION**

Federal Aviation Administration
National Simulator Program

# *Certificate of Qualification*

**This is to certify that representatives of the National Simulator Program**
**Completed an evaluation of the**

## Go-Fast Airlines
## Farnsworth Z-100 Flight Training Device

FAA Identification Number 998

And pursuant to 14 CFR Part 60 found it to meet its original qualification basis, AC 120-45A (MM/DD/YY)

**The Master Qualification Test Guide and the attached**
**Configuration List and Restrictions List**
**Provide the Qualification Basis for this device to operate at**
Level 6

**Until March 31, 2010**

**Unless sooner rescinded or extended by the National Simulator Program Manager**

February 15, *2009* — (date)

*B. Williamson* — (for the NSPM)

**Attachment 4 to Appendix B to Part 60—**
**Figure B4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

# CERTIFICATE OF QUALIFICATION
# CONFIGURATION LIST

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ ____ | **Physical Address:** | ____ ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| | | | |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | ____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:**____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| | | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐ **Yes:** | **Date of Manufacture:** | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** ____ | |
| **Engine model(s) and data revision:** ____ | | **Source of aerodynamic model:** ____ | |
| **FMS identification and revision level:** ____ | | **Source of aerodynamic coefficient data:** ____ | |
| **Visual system manufacturer/model:** ____ | | **Aerodynamic data revision number:** ____ | |
| **Flight control data revision:** ____ | | **Visual system display:** ____ | |
| **Mot ion system manufacturer/type:** ____ | | **FSTD computer(s) identification:** ____ | |
| | | | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | |
| **NAA FSTD ID No:** | ____ | **Last NAA Evaluation Date:** | ____ |
| **NAA Qualification Level:** | ____ | | |
| **NAA Qualification Basis:** | ____ | | |

**Attachment 4 to Appendix B to Part 60—**
**Figure B4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

| | | | | | |
|---|---|---|---|---|---|
| **Visual System Manufacturer and Type:** | _____ | **FSTD Seats Available:** _____ | **Motion System Manufacturer and Type:** | _____: | |
| **Aircraft Equipment:** | **Engine Type(s):** _____ _____ | **Flight Instrumentation:** ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS ☐ TCAS ☐ GPWS ☐ Plain View ☐ GPS ☐ FMS Type: __ ☐ WX Radar ☐ Other: __ | | **Engine Instrumentation:** ☐ EICAS ☐ FADEC ☐ Other: __ | |

| | | | |
|---|---|---|---|
| **Airport Models:** | 3.6.1 _____ Airport Designator | 3.6.2_____ Airport Designator | 3.6.3 _____ Airport Designator |
| **Circle to Land:** | 3. 7.1 _____ Airport Designator | 3. 7.2_____ Approach | 3. 7.3 _____ Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____ Airport Designator | 3.8 .2_____ Approach | 3. 8.3 _____ Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |

**Attachment 4 to Appendix B to Part 60—**
**Figure B4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

| | | |
|---|---|---|
| **Proficiency Checks** (135/121/142) | ☐ | _____ |
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III** * (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix B to Part 60—**
**Figure B4G – Sample Statement of Qualification;– List of Qualified Tasks**
**INFORMATION**

**CERTIFICATE OF QUALIFICATION**
**List of Qualified Tasks**

Go Fast Airline Training -- Farnsworth Z-100 -- Level D -- FAA ID# 999

| **The FTD is qualified to perform all of the tasks listed in Appendix 1, Table B1B for its assigned level of qualification *except* for the following listed tasks.** |
|---|

***Qualified for all tasks in Table B1B, for which the sponsor has requested qualification, except for the following:***

| | |
|---|---|
| 4.e. | Circling Approach |
| 6. (a) | Emergency Descent (maximum rate) |
| 6. (b) | Inflight Fire and Smoke Removal |
| 6. (c) | Rapid Decompression |
| 6. (d) | Emergency Evacuation |

***Additional tasks for which this FTD is qualified (i.e., in addition to the list in Table B1B):***

NONE

**Attachment 4 to Appendix B to Part 60—**
**Figure B4H – Sample Continuing Qualification Evaluation Requirements Page**
**INFORMATION**

| **Continuing qualification Evaluation Requirements**<br>***Completed at conclusion of Initial Evaluation*** | |
|---|---|
| Continuing qualification Evaluations to be conducted each<br><br>_(fill in)__ months<br><br>Allotting _____ hours of FTD time.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

| **Revision:**<br>Based on (enter reasoning): | |
|---|---|
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

| **Revision:**<br>Based on (enter reasoning): | |
|---|---|
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

(Repeat as Necessary)

**Attachment 4 to Appendix B to Part 60—**
**Figure B4I – Sample MQTG Index of Effective FSTD Directives**
**INFORMATION**

| Index of Effective FSTD Directives Filed in this Section | | | |
|---|---|---|---|
| **Number** | **Effective Date** | **Date of Notification** | **Details** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Continue as Necessary....

[Doc. No. FAA–2002–12461, 73 FR 26490, May 9, 2008]

## APPENDIX C TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FULL FLIGHT SIMULATORS

BEGIN INFORMATION

This appendix establishes the standards for Helicopter FFS evaluation and qualification. The NSPM is responsible for the development, application, and implementation of the standards contained within this appendix. The procedures and criteria specified in this appendix will be used by the NSPM, or a person assigned by the NSPM, when conducting helicopter FFS evaluations.

TABLE OF CONTENTS

1. Introduction.
2. Applicability (§60.1) and (§60.2).
3. Definitions (§60.3).
4. Qualification Performance Standards (§60.4).
5. Quality Management System (§60.5).
6. Sponsor Qualification Requirements (§60.7).
7. Additional Responsibilities of the Sponsor (§60.9).
8. FFS Use (§60.11).
9. FFS Objective Data Requirements (§60.13).
10. Special Equipment and Personnel Requirements for Qualification of the FFS (§60.14).
11. Initial (and Upgrade) Qualification Requirements (§60.15).
12. Additional Qualifications for a Currently Qualified FFS (§60.16).
13. Previously Qualified FFSs (§60.17).
14. Inspection, Continuing Qualification Evaluation, and Maintenance Requirements (§60.19).
15. Logging FFS Discrepancies (§60.20).
16. Interim Qualification of FFSs for New Helicopter Types or Models (§60.21).
17. Modifications to FFSs (§60.23).
18. Operations with Missing, Malfunctioning, or Inoperative Components (§60.25).
19. Automatic Loss of Qualification and Procedures for Restoration of Qualification (§60.27).
20. Other Losses of Qualification and Procedures for Restoration of Qualification (§60.29).
21. Record Keeping and Reporting (§60.31).
22. Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements (§60.33).
23. [Reserved]
24. [Reserved]
25. FFS Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA) (§60.37).
Attachment 1 to Appendix C to Part 60—General Simulator Requirements.
Attachment 2 to Appendix C to Part 60—FFS Objective Tests.

Attachment 3 to Appendix C to Part 60—Simulator Subjective Evaluation.
Attachment 4 to Appendix C to Part 60—Sample Documents.
Attachment 5 to Appendix C to Part 60—FSTD Directives Applicable to Helicopter FFSs

END INFORMATION

## 1. INTRODUCTION

BEGIN INFORMATION

a. This appendix contains background information as well as regulatory and informative material as described later in this section. To assist the reader in determining what areas are required and what areas are permissive, the text in this appendix is divided into two sections: ''QPS Requirements'' and ''Information.'' The QPS Requirements sections contain details regarding compliance with the part 60 rule language. These details are regulatory, but are found only in this appendix. The Information sections contain material that is advisory in nature, and designed to give the user general information about the regulation.

b. Questions regarding the contents of this publication should be sent to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Service, National Simulator Program Staff, AFS–205, 100 Hartsfield Centre Parkway, Suite 400, Atlanta, Georgia, 30354. Telephone contact numbers for the NSP are: phone, 404–832–4700; fax, 404–761–8906. The general e-mail address for the NSP office is: *9-aso-avr-simteam@faa.gov*. The NSP Internet Web site address is: *http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/nsp/*. On this Web Site you will find an NSP personnel list with telephone and e-mail contact information for each NSP staff member, a list of qualified flight simulation devices, ACs, a description of the qualification process, NSP policy, and an NSP ''In-Works'' section. Also linked from this site are additional information sources, handbook bulletins, frequently asked questions, a listing and text of the Federal Aviation Regulations, Flight Standards Inspector's handbooks, and other FAA links.

c. The NSPM encourages the use of electronic media for all communication, including any record, report, request, test, or statement required by this appendix. The electronic media used must have adequate security provisions and be acceptable to the NSPM. The NSPM recommends inquiries on system compatibility, and minimum system requirements are also included on the NSP Web site.

d. Related Reading References.

(1) 14 CFR part 60.
(2) 14 CFR part 61.
(3) 14 CFR part 63.
(4) 14 CFR part 119.
(5) 14 CFR part 121.
(6) 14 CFR part 125.
(7) 14 CFR part 135.
(8) 14 CFR part 141.
(9) 14 CFR part 142.
(10) AC 120–35, as amended, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.
(11) AC 120–57, as amended, Surface Movement Guidance and Control System (SMGCS).
(12) AC 120–63, as amended, Helicopter Simulator Qualification.
(13) AC 150/5300–13, as amended, Airport Design.
(14) AC 150/5340–1, as amended, Standards for Airport Markings.
(15) AC 150/5340–4, as amended, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.
(16) AC 150/5340–19, as amended, Taxiway Centerline Lighting System.
(17) AC 150/5340–24, as amended, Runway and Taxiway Edge Lighting System.
(18) AC 150/5345–28, as amended, Precision Approach Path Indicator (PAPI) Systems
(19) AC 150/5390–2, as amended, Heliport Design
(20) International Air Transport Association document, ''Flight Simulator Design and Performance Data Requirements,'' as amended.
(21) AC 29–2, as amended, Flight Test Guide for Certification of Transport Category Rotorcraft.
(22) AC 27–1, as amended, Flight Test Guide for Certification of Normal Category Rotorcraft.
(23) International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, as amended.
(24) Airplane Flight Simulator Evaluation Handbook, Volume I, as amended and Volume II, as amended, The Royal Aeronautical Society, London, UK.
(25) FAA Publication FAA–S–8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).
(26) The FAA Aeronautical Information Manual (AIM). An electronic version of the AIM is on the Internet at *http://www.faa.gov/atpubs*.
(27) Aeronautical Radio, Inc. (ARINC) document number 436, titled *Guidelines For Electronic Qualification Test Guide* (as amended).
(28) Aeronautical Radio, Inc. (ARINC) document 610, *Guidance for Design and Integration of Aircraft Avionics Equipment in Simulators* (as amended).

END INFORMATION

2. APPLICABILITY (§§ 60.1 AND 60.2)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.1, Applicability, or to § 60.2, Applicability of sponsor rules to person who are not sponsors and who are engaged in certain unauthorized activities.

END INFORMATION

3. DEFINITIONS (§ 60.3)

BEGIN INFORMATION

See Appendix F of this part for a list of definitions and abbreviations from part 1 and part 60, including the appropriate appendices of part 60.

END INFORMATION

4. QUALIFICATION PERFORMANCE STANDARDS (§ 60.4)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.4, Qualification Performance Standards.

END INFORMATION

5. QUALITY MANAGEMENT SYSTEM (§ 60.5)

BEGIN INFORMATION

See Appendix E of this part for additional regulatory and informational material regarding Quality Management Systems.

END INFORMATION

6. SPONSOR QUALIFICATION REQUIREMENTS (§ 60.7)

BEGIN INFORMATION

a. The intent of the language in § 60.7(b) is to have a specific FFS, identified by the sponsor, used at least once in an FAA-approved flight training program for the helicopter simulated during the 12-month period described. The identification of the specific FFS may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FFS at least once during the prescribed period. There is no minimum number of hours or minimum FFS periods required.

b. The following examples describe acceptable operational practices:

(1) Example One.

(a) A sponsor is sponsoring a single, specific FFS for its own use, in its own facility or elsewhere—this single FFS forms the basis for the sponsorship. The sponsor uses that FFS at least once in each 12-month period in that sponsor's FAA-approved flight training program for the helicopter simulated. This 12-month period is established according to the following schedule:

(i) If the FFS was qualified prior to May 30, 2008, the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with § 60.19 after May 30, 2008, and continues for each subsequent 12-month period;

(ii) A device qualified on or after May 30, 2008, will be required to undergo an initial or upgrade evaluation in accordance with § 60.15. Once the initial or upgrade evaluation is complete, the first continuing qualification evaluation will be conducted within 6 months. The 12 month continuing qualification evaluation cycle begins on that date and continues for each subsequent 12-month period.

(b) There is no minimum number of hours of FFS use required.

(c) The identification of the specific FFS may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FFS at least once during the prescribed period.

(2) Example Two.

(a) A sponsor sponsors an additional number of FFSs, in its facility or elsewhere. Each additionally sponsored FFS must be—

(i) Used by the sponsor in the sponsor's FAA-approved flight training program for the helicopter simulated (as described in § 60.7(d)(1)); or

(ii) Used by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the helicopter simulated (as described in § 60.7(d)(1)). This 12-month period is established in the same manner as in example one; or

(iii) Provided a statement each year from a qualified pilot, (after having flown the helicopter, not the subject FFS or another FFS, during the preceding 12-month period) stating that the subject FFS's performance and handling qualities represent the helicopter (as described in § 60.7(d)(2)). This statement is provided at least once in each 12-month period established in the same manner as in example one.

(b) There is no minimum number of hours of FFS use required.

(3) Example Three.

(a) A sponsor in New York (in this example, a Part 142 certificate holder) establishes ''satellite'' training centers in Chicago and Moscow.

(b) The satellite function means that the Chicago and Moscow centers must operate under the New York center's certificate (in accordance with all of the New York center's practices, procedures, and policies; *e.g.*, instructor and/or technician training/checking requirements, record keeping, QMS program).

(c) All of the FFSs in the Chicago and Moscow centers could be dry-leased (*i.e.*, the certificate holder does not have and use FAA-approved flight training programs for the FFSs in the Chicago and Moscow centers) because—

(i) Each FFS in the Chicago center and each FFS in the Moscow center is used at least once each 12-month period by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the helicopter (as described in §60.7(d)(1)); OR

(ii) A statement is obtained from a qualified pilot (having flown the helicopter, not the subject FFS or another FFS during the preceding 12-month period) stating that the performance and handling qualities of each FFS in the Chicago and Moscow centers represents the helicopter (as described in §60.7(d)(2)).

END INFORMATION

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7. Additional Responsibilities of the Sponsor (§60.9).

BEGIN INFORMATION

The phrase ''as soon as practicable'' in §60.9(a) means without unnecessarily disrupting or delaying beyond a reasonable time the training, evaluation, or experience being conducted in the FFS.

END INFORMATION

---

8. FFS USE (§60.11)

---

BEGIN INFORMATION

No additional regulatory or informational material applies to §60.11, FFS Use.

END INFORMATION

---

9. FFS OBJECTIVE DATA REQUIREMENTS (§60.13)

---

BEGIN QPS REQUIREMENTS

a. Flight test data used to validate FFS performance and handling qualities must have been gathered in accordance with a flight test program containing the following:

(1) A flight test plan consisting of:

(a) The maneuvers and procedures required for aircraft certification and simulation programming and validation

(b) For each maneuver or procedure—

(i) The procedures and control input the flight test pilot and/or engineer used.

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

(iv) The helicopter configuration, including weight and center of gravity.

(v) The data to be gathered.

(vi) All other information necessary to recreate the flight test conditions in the FFS.

(2) Appropriately qualified flight test personnel.

(3) An understanding of the accuracy of the data to be gathered using appropriate alternative data sources, procedures, and instrumentation that is traceable to a recognized standard as described in Attachment 2, Table C2D of this appendix.

(4) Appropriate and sufficient data acquisition equipment or system(s), including appropriate data reduction and analysis methods and techniques, acceptable to the FAA's Aircraft Certification Service.

b. The data, regardless of source, must be presented:

(1) In a format that supports the FFS validation process;

(2) In a manner that is clearly readable and annotated correctly and completely;

(3) With resolution sufficient to determine compliance with the tolerances set forth in Attachment 2, Table C2A of this appendix.

(4) With any necessary instructions or other details provided, such as Stability Augmentation System (SAS) or throttle position; and

(5) Without alteration, adjustments, or bias. Data may be corrected to address known data calibration errors provided that an explanation of the methods used to correct the errors appears in the QTG. The corrected data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation.

c. After completion of any additional flight test, a flight test report must be submitted in support of the validation data. The report must contain sufficient data and rationale to support qualification of the FFS at the level requested.

d. As required by §60.13(f), the sponsor must notify the NSPM when it becomes aware that an addition to, an amendment to, or a revision of data that may relate to FFS performance or handling characteristics is

available. The data referred to in this paragraph is data used to validate the performance, handling qualities, or other characteristics of the aircraft, including data related to any relevant changes occurring after the type certificate was issued. The sponsor must—

(1) Within 10 calendar days, notify the NSPM of the existence of this data; and

(2) Within 45 calendar days, notify the NSPM of—

(a) The schedule to incorporate this data into the FFS; or

(b) The reason for not incorporating this data into the FFS.

e. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot test results'' in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

END QPS REQUIREMENTS

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BEGIN INFORMATION

f. The FFS sponsor is encouraged to maintain a liaison with the manufacturer of the aircraft being simulated (or with the holder of the aircraft type certificate for the aircraft being simulated if the manufacturer is no longer in business), and, if appropriate, with the person who supplied the aircraft data package for the FFS in order to facilitate the notification required by §60.13(f).

g. It is the intent of the NSPM that for new aircraft entering service, at a point well in advance of preparation of the QTG, the sponsor should submit to the NSPM for approval, a descriptive document (see Table C2D, Sample Validation Data Roadmap for Helicopters) containing the plan for acquiring the validation data, including data sources. This document should clearly identify sources of data for all required tests, a description of the validity of these data for a specific engine type and thrust rating configuration, and the revision levels of all avionics affecting the performance or flying qualities of the aircraft. Additionally, this document should provide other information, such as the rationale or explanation for cases where data or data parameters are missing, instances where engineering simulation data are used or where flight test methods require further explanations. It should also provide a brief narrative describing the cause and effect of any deviation from data requirements. The aircraft manufacturer may provide this document.

h. There is no requirement for any flight test data supplier to submit a flight test plan or program prior to gathering flight test data. However, the NSPM notes that inexperienced data gatherers often provide data that is irrelevant, improperly marked, or lacking adequate justification for selection. Other problems include inadequate information regarding initial conditions or test maneuvers. The NSPM has been forced to refuse these data submissions as validation data for an FFS evaluation. It is for this reason that the NSPM recommends that any data supplier not previously experienced in this area review the data necessary for programming and for validating the performance of the FFS, and discuss the flight test plan anticipated for acquiring such data with the NSPM well in advance of commencing the flight tests.

i. The NSPM will consider, on a case-by-case basis, whether to approve supplemental validation data derived from flight data recording systems such as a Quick Access Recorder or Flight Data Recorder.

END INFORMATION

10. SPECIAL EQUIPMENT AND PERSONNEL REQUIREMENTS FOR QUALIFICATION OF THE FFS (§60.14)

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BEGIN INFORMATION

a. In the event that the NSPM determines that special equipment or specifically qualified persons will be required to conduct an evaluation, the NSPM will make every attempt to notify the sponsor at least one (1) week, but in no case less than 72 hours, in advance of the evaluation. Examples of special equipment include spot photometers, flight control measurement devices, and sound analyzers. Examples of specially qualified personnel include individuals specifically qualified to install or use any special equipment when its use is required.

b. Examples of a special evaluation include an evaluation conducted after an FFS is moved, at the request of the TPAA, or as a result of comments received from users of the FFS that raise questions about the continued qualification or use of the FFS.

END INFORMATION

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11. INITIAL (AND UPGRADE) QUALIFICATION REQUIREMENTS (§60.15)

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BEGIN QPS REQUIREMENTS

a. In order to be qualified at a particular qualification level, the FFS must:

(1) Meet the general requirements listed in Attachment 1 of this appendix;

(2) Meet the objective testing requirements listed in Attachment 2 of this appendix; and

(3) Satisfactorily accomplish the subjective tests listed in Attachment 3 of this appendix.

b. The request described in §60.15(a) must include all of the following:

(1) A statement that the FFS meets all of the applicable provisions of this part and all applicable provisions of the QPS.

(2) A confirmation that the sponsor will forward to the NSPM the statement described in §60.15(b) in such time as to be received no later than 5 business days prior to the scheduled evaluation and may be forwarded to the NSPM via traditional or electronic means.

(3) A QTG, acceptable to the NSPM, that includes all of the following:

(a) Objective data obtained from aircraft testing or another approved source.

(b) Correlating objective test results obtained from the performance of the FFS as prescribed in the appropriate QPS.

(c) The result of FFS subjective tests prescribed in the appropriate QPS.

(d) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

c. The QTG described in paragraph (a)(3) of this section, must provide the documented proof of compliance with the simulator objective tests in Attachment 2, Table C2A of this appendix.

d. The QTG is prepared and submitted by the sponsor, or the sponsor's agent on behalf of the sponsor, to the NSPM for review and approval, and must include, for each objective test:

(1) Parameters, tolerances, and flight conditions.

(2) Pertinent and complete instructions for the conduct of automatic and manual tests.

(3) A means of comparing the FFS test results to the objective data.

(4) Any other information as necessary, to assist in the evaluation of the test results.

(5) Other information appropriate to the qualification level of the FFS.

e. The QTG described in paragraphs (a)(3) and (b) of this section, must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 4, Figure C4C, of this appendix, for a sample QTG cover page).

(2) A continuing qualification evaluation schedule requirements page. This page will be used by the NSPM to establish and record the frequency with which continuing qualification evaluations must be conducted and any subsequent changes that may be determined by the NSPM in accordance with §60.19. See Attachment 4 of this appendix, Figure C4G, for a sample Continuing Qualification Evaluation Requirements page.

(3) An FFS information page that provides the information listed in this paragraph (see Attachment 4, Figure C4B, of this appendix for a sample FFS information page). For convertible FFSs, the sponsor must submit a separate page for each configuration of the FFS.

(a) The sponsor's FFS identification number or code.

(b) The helicopter model and series being simulated.

(c) The aerodynamic data revision number or reference.

(d) The source of the basic aerodynamic model and the aerodynamic coefficient data used to modify the basic model.

(e) The engine model(s) and its data revision number or reference.

(f) The flight control data revision number or reference.

(g) The flight management system identification and revision level.

(h) The FFS model and manufacturer.

(i) The date of FFS manufacture.

(j) The FFS computer identification.

(k) The visual system model and manufacturer, including display type.

(l) The motion system type and manufacturer, including degrees of freedom.

(4) A Table of Contents.

(5) A log of revisions and a list of effective pages.

(6) List of all relevant data references.

(7) A glossary of terms and symbols used (including sign conventions and units).

(8) Statements of compliance and capability (SOCs) with certain requirements.

(9) Recording procedures or equipment required to accomplish the objective tests.

(10) The following information for each objective test designated in Attachment 2 of this appendix, Table C2A, as applicable to the qualification level sought:

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating FFS objective test results.

(g) List of all relevant parameters driven or constrained during the automatically conducted test(s).

(h) List of all relevant parameters driven or constrained during the manually conducted test(s).

(i) Tolerances for relevant parameters.

(j) Source of Validation Data (document and page number).

(k) Copy of the Validation Data (if located in a separate binder, a cross reference for the identification and page number for pertinent data location must be provided).

(l) Simulator Objective Test Results as obtained by the sponsor. Each test result must reflect the date completed and must be clearly labeled as a product of the device being tested.

f. A convertible FFS is addressed as a separate FFS for each model and series helicopter to which it will be converted and for the FAA qualification level sought. If a sponsor seeks qualification for two or more models of a helicopter type using a convertible FFS, the sponsor must submit a QTG for each helicopter model, or a QTG for the first helicopter model and a supplement to that QTG for each additional helicopter model. The NSPM will conduct evaluations for each helicopter model.

g. Form and manner of presentation of objective test results in the QTG:

(1) The sponsor's FFS test results must be recorded in a manner acceptable to the NSPM, that allows easy comparison of the FFS test results to the validation data (e.g., use of a multi-channel recorder, line printer, cross plotting, overlays, transparencies).

(2) FFS results must be labeled using terminology common to helicopter parameters as opposed to computer software identifications.

(3) Validation data documents included in a QTG may be photographically reduced only if such reduction will not alter the graphic scaling or cause difficulties in scale interpretation or resolution.

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in Attachment 2, Table C2A of this appendix.

(5) Tests involving time histories, data sheets (or transparencies thereof) and FFS test results must be clearly marked with appropriate reference points to ensure an accurate comparison between the FFS and the helicopter with respect to time. Time histories recorded via a line printer are to be clearly identified for cross plotting on the helicopter data. Over-plots must not obscure the reference data.

h. The sponsor may elect to complete the QTG objective and subjective tests at the manufacturer's facility or at the sponsor's training facility. If the tests are conducted at the manufacturer's facility, the sponsor must repeat at least one-third of the tests at the sponsor's training facility in order to substantiate FFS performance. The QTG must be clearly annotated to indicate when and where each test was accomplished. Tests conducted at the manufacturer's facility and at the sponsor's training facility must be conducted after the FFS is assembled with systems and sub-systems functional and operating in an interactive manner. The test results must be submitted to the NSPM.

i. The sponsor must maintain a copy of the MQTG at the FFS location.

j. All FFSs for which the initial qualification is conducted after May 30, 2014, must have an electronic MQTG (eMQTG) including all objective data obtained from helicopter testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the FFS (reformatted or digitized) as prescribed in this appendix. The eMQTG must also contain the general FFS performance or demonstration results (reformatted or digitized) prescribed in this appendix, and a description of the equipment necessary to perform the initial qualification evaluation and the continuing qualification evaluations. The eMQTG must include the original validation data used to validate FFS performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original time-history plots that were provided by the data supplier. A copy of the eMQTG must be provided to the NSPM.

k. All other FFSs not covered in subparagraph ''j'' must have an electronic copy of the MQTG by May 30, 2014. An electronic copy of the MQTG must be provided to the NSPM. This may be provided by an electronic scan presented in a Portable Document File (PDF), or similar format acceptable to the NSPM.

l. During the initial (or upgrade) qualification evaluation conducted by the NSPM, the sponsor must also provide a person who is a user of the device (e.g., a qualified pilot or instructor pilot with flight time experience in that aircraft) and knowledgeable about the operation of the aircraft and the operation of the FFS.

END QPS REQUIREMENTS

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BEGIN INFORMATION

m. Only those FFSs that are sponsored by a certificate holder as defined in Appendix F of this part will be evaluated by the NSPM. However, other FFS evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

n. The NSPM will conduct an evaluation for each configuration, and each FFS must be evaluated as completely as possible. To ensure a thorough and uniform evaluation, each FFS is subjected to the general simulator requirements in Attachment 1 of this appendix, the objective tests listed in Attachment 2 of this appendix, and the subjective tests listed in Attachment 3 of this appendix. The evaluations described herein will include, but not necessarily be limited to the following:

(1) Helicopter responses, including longitudinal and lateral-directional control responses (see Attachment 2 of this appendix).

(2) Performance in authorized portions of the simulated helicopter's operating envelope, to include tasks evaluated by the NSPM in the areas of surface operations, takeoff, climb, cruise, descent, approach, and landing as well as abnormal and emergency

operations (see Attachment 2 of this appendix).

(3) Control checks (see Attachment 1 and Attachment 2 of this appendix).

(4) Flight deck configuration (see Attachment 1 of this appendix).

(5) Pilot, flight engineer, and instructor station functions checks (see Attachment 1 and Attachment 3 of this appendix).

(6) Helicopter systems and sub-systems (as appropriate) as compared to the helicopter simulated (see Attachment 1 and Attachment 3 of this appendix).

(7) FFS systems and sub-systems, including force cueing (motion), visual, and aural (sound) systems, as appropriate (see Attachment 1 and Attachment 2 of this appendix).

(8) Certain additional requirements, depending upon the qualification level sought, including equipment or circumstances that may become hazardous to the occupants. The sponsor may be subject to Occupational Safety and Health Administration requirements.

o. The NSPM administers the objective and subjective tests, which includes an examination of functions. The tests include a qualitative assessment of the FFS by an NSP pilot. The NSP evaluation team leader may assign other qualified personnel to assist in accomplishing the functions examination and/or the objective and subjective tests performed during an evaluation when required.

(1) Objective tests provide a basis for measuring and evaluating FFS performance and determining compliance with the requirements of this part.

(2) Subjective tests provide a basis for:

(a) Evaluating the capability of the FFS to perform over a typical utilization period;

(b) Determining that the FFS satisfactorily simulates each required task;

(c) Verifying correct operation of the FFS controls, instruments, and systems; and

(d) Demonstrating compliance with the requirements of this part.

p. The tolerances for the test parameters listed in Attachment 2 of this appendix reflect the range of tolerances acceptable to the NSPM for FFS validation and are not to be confused with design tolerances specified for FFS manufacture. In making decisions regarding tests and test results, the NSPM relies on the use of operational and engineering judgment in the application of data (including consideration of the way in which the flight test was flown and way the data was gathered and applied), data presentations, and the applicable tolerances for each test.

q. In addition to the scheduled continuing qualification evaluation, each FFS is subject to evaluations conducted by the NSPM at any time without prior notification to the sponsor. Such evaluations would be accomplished in a normal manner (i.e., requiring exclusive use of the FFS for the conduct of objective and subjective tests and an examination of functions) if the FFS is not being used for flight crewmember training, testing, or checking. However, if the FFS were being used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the FFS evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the FFS along with the student(s) and observing the operation of the FFS during the training, testing, or checking activities.

r. Problems with objective test results are handled as follows:

(1) If a problem with an objective test result is detected by the NSP evaluation team during an evaluation, the test may be repeated or the QTG may be amended.

(2) If it is determined that the results of an objective test do not support the level requested but do support a lower level, the NSPM may qualify the FFS at that lower level. For example, if a Level D evaluation is requested and the FFS fails to meet sound test tolerances, it could be qualified at Level C.

s. After an FFS is successfully evaluated, the NSPM issues a certificate of qualification (COQ) to the sponsor. The NSPM recommends the FFS to the TPAA, who will approve the FFS for use in a flight training program. The COQ will be issued at the satisfactory conclusion of the initial or continuing qualification evaluation and will list the tasks for which the FFS is qualified, referencing the tasks described in Table C1B in Attachment 1 of this appendix. However, it is the sponsor's responsibility to obtain TPAA approval prior to using the FFS in an FAA-approved flight training program.

t. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within ten (10) working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made. A sponsor may schedule an evaluation date as early as 6 months in advance. However, there may be a delay of 45 days or more in rescheduling and completing the evaluation if the sponsor is unable to meet the scheduled date. See Attachment 4, of this appendix, Figure C4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation.

u. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in Attachment 2, FFS Objective Tests, Table C2A of this appendix.

v. Contact the NSPM or visit the NSPM Web site for additional information regarding the preferred qualifications of pilots used to meet the requirements of §60.15(d).

w. Examples of the exclusions for which the FFS might not have been subjectively

tested by the sponsor or the NSPM and for which qualification might not be sought or granted, as described in §60.15(g)(6), include takeoffs and landing from slopes and pinnacles.

END INFORMATION

12. ADDITIONAL QUALIFICATIONS FOR A CURRENTLY QUALIFIED FFS (§60.16)

No additional regulatory or informational material applies to §60.16, Additional Qualifications for a Currently Qualified FFS.

13. PREVIOUSLY QUALIFIED FFSS (§60.17)

BEGIN QPS REQUIREMENTS

a. In instances where a sponsor plans to remove an FFS from active status for a period of less than two years, the following procedures apply:

(1) The NSPM must be notified in writing and the notification must include an estimate of the period that the FFS will be inactive.

(2) Continuing Qualification evaluations will not be scheduled during the inactive period.

(3) The NSPM will remove the FFS from the list of qualified FSTDs on a mutually established date not later than the date on which the first missed continuing qualification evaluation would have been scheduled.

(4) Before the FFS is restored to qualified status, it must be evaluated by the NSPM. The evaluation content and the time required to accomplish the evaluation is based on the number of continuing qualification evaluations and sponsor-conducted quarterly inspections missed during the period of inactivity.

(5) The sponsor must notify the NSPM of any changes to the original scheduled time out of service.

b. Simulators qualified prior to May 30, 2008, are not required to meet the general simulation requirements, the objective test requirements, and the subjective test requirements of attachments 1, 2, and 3, of this appendix as long as the simulator continues to meet the test requirements contained in the MQTG developed under the original qualification basis.

c. After May 30, 2009, each visual scene or airport model beyond the minimum required for the FFS qualification level that is installed in and available for use in a qualified FFS must meet the requirements described in Attachment 3 of this appendix.

d. Simulators qualified prior to May 30, 2008, may be updated. If an evaluation is deemed appropriate or necessary by the NSPM after such an update, the evaluation will not require an evaluation to standards beyond those against which the simulator was originally qualified.

END QPS REQUIREMENTS

BEGIN INFORMATION

e. Other certificate holders or persons desiring to use an FFS may contract with FFS sponsors to use FFSs previously qualified at a particular level for a helicopter type and approved for use within an FAA-approved flight training program. Such FFSs are not required to undergo an additional qualification process, except as described in §60.16.

f. Each FFS user must obtain approval from the appropriate TPAA to use any FFS in an FAA-approved flight training program.

g. The intent of the requirement listed in §60.17(b), for each FFS to have an SOQ within 6 years, is to have the availability of that statement (including the configuration list and the limitations to authorizations) to provide a complete picture of the FFS inventory regulated by the FAA. The issuance of the statement will not require any additional evaluation or require any adjustment to the evaluation basis for the FFS.

h. Downgrading of an FFS is a permanent change in qualification level and will necessitate the issuance of a revised SOQ to reflect the revised qualification level, as appropriate. If a temporary restriction is placed on an FFS because of a missing, malfunctioning, or inoperative component or ongoing repairs, the restriction is not a permanent change in qualification level. Instead, the restriction is temporary and is removed when the reason for the restriction has been resolved.

i. The NSPM will determine the evaluation criteria for an FFS that has been removed from active status. The criteria will be based on the number of continuing qualification evaluations and quarterly inspections missed during the period of inactivity. For example, if the FFS were out of service for a 1 year period, it would be necessary to complete the entire QTG, since all of the quarterly evaluations would have been missed. The NSPM will also consider how the FFS was stored, whether parts were removed from the FFS and whether the FFS was disassembled.

j. The FFS will normally be requalified using the FAA-approved MQTG and the criteria that was in effect prior to its removal from qualification. However, inactive periods of 2 years or more will require requalification under the standards in effect and current at the time of requalification.

END INFORMATION

14. INSPECTION, CONTINUING QUALIFICATION EVALUATION, AND MAINTENANCE REQUIREMENTS (§60.19)

BEGIN QPS REQUIREMENTS

a. The sponsor must conduct a minimum of four evenly spaced inspections throughout the year. The objective test sequence and content of each inspection must be developed by the sponsor and must be acceptable to the NSPM.

b. The description of the functional preflight check must be contained in the sponsor's QMS.

c. Record ''functional preflight'' in the FFS discrepancy log book or other acceptable location, including any item found to be missing, malfunctioning, or inoperative.

d. During the continuing qualification evaluation conducted by the NSPM, the sponsor must also provide a person knowledgeable about the operation of the aircraft and the operation of the FFS.

e. The NSPM will conduct continuing qualification evaluations every 12 months unless:

(1) The NSPM becomes aware of discrepancies or performance problems with the device that warrants more frequent evaluations; or

(2) The sponsor implements a QMS that justifies less frequent evaluations. However, in no case shall the frequency of a continuing qualification evaluation exceed 36 months.

END QPS REQUIREMENTS

BEGIN INFORMATION

f. The sponsor's test sequence and the content of each quarterly inspection required in §60.19(a)(1) should include a balance and a mix from the objective test requirement areas listed as follows:

(1) Performance.
(2) Handling qualities.
(3) Motion system (where appropriate).
(4) Visual system (where appropriate).
(5) Sound system (where appropriate).
(6) Other FFS systems.

g. If the NSP evaluator plans to accomplish specific tests during a normal continuing qualification evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; but not less than 72 hours. Examples of such tests include latencies, control dynamics, sounds and vibrations, motion, and/or some visual system tests.

h. The continuing qualification evaluations, described in §60.19(b), will normally require 4 hours of FFS time. However, flexibility is necessary to address abnormal situations or situations involving aircraft with additional levels of complexity (*e.g.*, computer controlled aircraft). The sponsor should anticipate that some tests may require additional time. The continuing qualification evaluations will consist of the following:

(1) Review of the results of the quarterly inspections conducted by the sponsor since the last scheduled continuing qualification evaluation.

(2) A selection of approximately 8 to 15 objective tests from the MQTG that provide an adequate opportunity to evaluate the performance of the FFS. The tests chosen will be performed either automatically or manually and should be able to be conducted within approximately one-third (1/3) of the allotted FFS time.

(3) A subjective evaluation of the FFS to perform a representative sampling of the tasks set out in attachment 3 of this appendix. This portion of the evaluation should take approximately two-thirds (2/3) of the allotted FFS time.

(4) An examination of the functions of the FFS may include the motion system, visual system, sound system, instructor operating station, and the normal functions and simulated malfunctions of the simulated helicopter systems. This examination is normally accomplished simultaneously with the subjective evaluation requirements.

END INFORMATION

15. LOGGING FFS DISCREPANCIES (§60.20)

BEGIN INFORMATION

No additional regulatory or informational material applies to §60.20. Logging FFS Discrepancies.

END INFORMATION

16. INTERIM QUALIFICATION OF FFSS FOR NEW HELICOPTER TYPES OR MODELS (§60.21)

BEGIN INFORMATION

No additional regulatory or informational material applies to §60.21, Interim Qualification of FFSs for New Helicopter Types or Models.

END INFORMATION

17. MODIFICATIONS TO FFSS (§60.23)

BEGIN QPS REQUIREMENTS

a. The notification described in §60.23(c)(2) must include a complete description of the planned modification, with a description of the operational and engineering effect the proposed modification will have on the operation of the FFS and the results that are expected with the modification incorporated.

b. Prior to using the modified FFS:

(1) All the applicable objective tests completed with the modification incorporated, including any necessary updates to the MQTG (*e.g.*, accomplishment of FSTD Directives) must be acceptable to the NSPM; and

(2) The sponsor must provide the NSPM with a statement signed by the MR that the factors listed in §60.15(b) are addressed by the appropriate personnel as described in that section.

END QPS REQUIREMENTS

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BEGIN INFORMATION

(3) FSTD Directives are considered modifications of an FFS. See Attachment 4 of this appendix for a sample index of effective FSTD Directives. See Attachment 6 of this appendix for a list of all effective FSTD Directives applicable to Helicopter FFSs.

END INFORMATION

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18. OPERATION WITH MISSING, MALFUNCTIONING, OR INOPERATIVE COMPONENTS (§60.25)

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BEGIN INFORMATION

a. The sponsor's responsibility with respect to §60.25(a) is satisfied when the sponsor fairly and accurately advises the user of the current status of an FFS, including any missing, malfunctioning, or inoperative (MMI) component(s).

b. It is the responsibility of the instructor, check airman, or representative of the administrator conducting training, testing, or checking to exercise reasonable and prudent judgment to determine if any MMI component is necessary for the satisfactory completion of a specific maneuver, procedure, or task.

c. If the 29th or 30th day of the 30-day period described in §60.25(b) is on a Saturday, a Sunday, or a holiday, the FAA will extend the deadline until the next business day.

d. In accordance with the authorization described in §60.25(b), the sponsor may develop a discrepancy prioritizing system to accomplish repairs based on the level of impact on the capability of the FFS. Repairs having a larger impact on FFS capability to provide the required training, evaluation, or flight experience will have a higher priority for repair or replacement.

END INFORMATION

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19. AUTOMATIC LOSS OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§60.27)

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BEGIN INFORMATION

If the sponsor provides a plan for how the FFS will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FFS is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing required for requalification.

END INFORMATION

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20. OTHER LOSSES OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§60.29)

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BEGIN INFORMATION

If the sponsor provides a plan for how the FFS will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FFS is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing required for requalification.

END INFORMATION

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21. RECORD KEEPING AND REPORTING (§60.31)

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BEGIN QPS REQUIREMENTS

a. FFS modifications can include hardware or software changes. For FFS modifications involving software programming changes, the record required by §60.31(a)(2) must consist of the name of the aircraft system software, aerodynamic model, or engine model change, the date of the change, a summary of the change, and the reason for the change.

b. If a coded form for record keeping is used, it must provide for the preservation and retrieval of information with appropriate security or controls to prevent the inappropriate alteration of such records after the fact.

END QPS REQUIREMENTS

22. APPLICATIONS, LOGBOOKS, REPORTS, AND RECORDS: FRAUD, FALSIFICATION, OR INCORRECT STATEMENTS (§ 60.33)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

23. [RESERVED]

24. [RESERVED]

25. FFS QUALIFICATION ON THE BASIS OF A BILATERAL AVIATION SAFETY AGREEMENT (BASA) (§ 60.37)

No additional regulatory or informational material applies to § 60.37, FFS Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).

END INFORMATION

## ATTACHMENT 1 TO APPENDIX C TO PART 60—GENERAL SIMULATOR REQUIREMENTS

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Certain requirements included in this appendix must be supported with an SOC as defined in Appendix F of this part, which may include objective and subjective tests. The requirements for SOCs are indicated in the ''General Simulator Requirements'' column in Table C1A of this appendix.

b. Table C1A describes the requirements for the indicated level of FFS. Many devices include operational systems or functions that exceed the requirements outlined in this section. However, all systems will be tested and evaluated in accordance with this appendix to ensure proper operation.

END QPS REQUIREMENTS

BEGIN INFORMATION

2. DISCUSSION

a. This attachment describes the general simulator requirements for qualifying a helicopter FFS. The sponsor should also consult the objective tests in Attachment 2 of this appendix and the examination of functions and subjective tests listed in Attachment 3 of this appendix to determine the complete requirements for a specific level simulator.

b. The material contained in this attachment is divided into the following categories:

(1) General flight deck configuration.

(2) Simulator programming.

(3) Equipment operation.

(4) Equipment and facilities for instructor/evaluator functions.

(5) Motion system.

(6) Visual system.

(7) Sound system.

c. Table C1A provides the standards for the General Simulator Requirements.

d. Table C1B provides the tasks that the sponsor will examine to determine whether the FFS satisfactorily meets the requirements for flight crew training, testing, and experience, and provides the tasks for which the simulator may be qualified.

e. Table C1C provides the functions that an instructor/check airman must be able to control in the simulator.

f. It is not required that all of the tasks that appear on the List of Qualified Tasks (part of the SOQ) be accomplished during the initial or continuing qualification evaluation.

g. Table C1A addresses only Levels B, C, and D helicopter simulators because there are no Level A Helicopter simulators.

END INFORMATION

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 1. ..... | **General Flight Deck Configuration** | | | | |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 1.a. ..... | The simulator must have a flight deck that is a replica of the helicopter being simulated.<br>The simulator must have controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the helicopter. The direction of movement of controls and switches must be identical to that in the helicopter. Pilot seats must afford the capability for the occupant to be able to achieve the design ''eye position'' established for the helicopter being simulated. Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Fire axes, extinguishers, and spare light bulbs must be available in the FFS but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette. | X | X | X | For simulator purposes, the flight deck consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots' seats including additional, required flight crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, and aircraft documents pouches are not considered essential and may be omitted. |
| 1.b. ..... | Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate. | X | X | X | |
| **2.** ..... | **Programming** | | | | |
| 2.a. ..... | A flight dynamics model that accounts for various combinations of air speed and power normally encountered in flight must correspond to actual flight conditions, including the effect of change in helicopter attitude, aerodynamic and propulsive forces and moments, altitude, temperature, mass, center of gravity location, and configuration.<br>An SOC is required | X | X | X | |
| 2.b. ..... | The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought.<br>An SOC is required | X | X | X | |
| 2.c. ..... | Ground handling (where appropriate) and aerodynamic programming must include the following:. | | | | |
| 2.c.1. ..... | Ground effect .....<br>Level B does not require hover programming<br>An SOC is required | X | X | X | Applicable areas include flare and touch down from a running landing as well as for in-ground-effect (IGE) hover. A reasonable simulation of ground effect includes modeling of lift, drag, pitching moment, trim, and power while in ground effect. |
| 2.c.2. ..... | Ground reaction .....<br>Level B does not require hover programming<br>An SOC is required | X | X | X | Reaction of the helicopter upon contact with the landing surface during landing (e.g., strut deflection, tire or skid friction, side forces) may differ with changes in gross weight, airspeed, rate of descent on touchdown, and slide slip. |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 2.d. ..... | The simulator must provide for manual and automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests as prescribed in Attachment 2 of this appendix.<br>An SOC is required | | X | X | This may include an automated system, which could be used for conducting at least a portion of the QTG tests. Automatic ''flagging'' of out-of-tolerance situations is encouraged. |
| 2.e. ..... | The relative responses of the motion system, visual system, and flight deck instruments must be measured by latency tests or transport delay tests. Motion onset must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. Test results must be within the following limits: | | | | The intent is to verify that the simulator provides instrument, motion, and visual cues that are like the helicopter responses within the stated time delays. It is preferable motion onset occur before the start of the visual scene change (the start of the scan of the first video field containing different information). For helicopter response, acceleration in the appropriate corresponding rotational axis is preferred. |
| 2.e.1. ..... | Response must be within 150 milliseconds of the helicopter response. | X | | | |
| 2.e.2. ..... | Response must be within 100 milliseconds of the helicopter response. | | X | X | |
| 2.f. ..... | The simulator must simulate brake and tire failure dynamics (including antiskid failure, if appropriate).<br>An SOC is required. ..... | | X | X | The simulator should represent the motion (in the appropriate axes) and the directional control characteristics of the helicopter when experiencing simulated brake or tire failures. |
| 2.g. ..... | The aerodynamic modeling in the simulator must include:.<br>(1) Ground effect,<br>(2) Effects of airframe and rotor icing (if applicable),<br>(3) Aerodynamic interference effects between the rotor wake and fuselage,<br>(4) Influence of the rotor on control and stabilization systems,<br>(5) Representations of settling with power, and<br>(6) Retreating blade stall.<br>An SOC is required. | | X | X | See Attachment 2 of this appendix for further information on ground effect. |
| 2.h. ..... | The simulator must provide for realistic mass properties, including gross weight, center of gravity, and moments of inertia as a function of payload and fuel loading.<br>An SOC is required. | X | X | X | |
| **3.** ..... | **Equipment Operation** | | | | |
| 3.a. ..... | All relevant instrument indications involved in the simulation of the helicopter must automatically respond to control movement or external disturbances to the simulated helicopter; e.g., turbulence or windshear. Numerical values must be presented in the appropriate units. | X | X | X | |
| 3.b. ..... | Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the helicopter being simulated. | X | X | X | See Attachment 3 of this appendix for further information regarding long-range navigation equipment. |
| 3.c. ..... | Simulated helicopter systems must operate as the helicopter systems operate under normal, abnormal, and emergency operating conditions on the ground and in flight. | X | X | X | |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 3.d. ..... | The simulator must provide pilot controls with control forces and control travel that correspond to the simulated helicopter. The simulator must also react in the same manner as the helicopter under the same flight conditions. | X | X | X | |
| 3.e. ..... | Simulator control feel dynamics must replicate the helicopter simulated. This must be determined by comparing a recording of the control feel dynamics of the simulator to helicopter measurements. For initial and upgrade evaluations, the control dynamic characteristics must be measured and recorded directly from the flight deck controls, and must be accomplished in takeoff, cruise, and landing conditions and configurations. | | X | X | |
| **4.** ..... | **Instructor/Evaluator Facilities** | | | | |
| 4.a. ..... | In addition to the flight crewmember stations, the simulator must have at least two suitable seats for the instructor/check airman and FAA inspector. These seats must provide adequate vision to the pilot's panel and forward windows. All seats other than flight crew seats need not represent those found in the helicopter but must be adequately secured to the floor and equipped with similar positive restraint devices. | X | X | X | The NSPM will consider alternatives to this standard for additional seats based on unique flight deck configurations. |
| 4.b. ..... | The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions into the simulated helicopter systems as described in the sponsor's FAA-approved training program, or as described in the relevant operating manual as appropriate. | X | X | X | |
| 4.c. ..... | The simulator must have instructor controls for all environmental effects expected to be available at the IOS; e.g., clouds, visibility, icing, precipitation, temperature, storm cells, and wind speed and direction. | X | X | X | |
| 4.d. ..... | The simulator must provide the instructor or evaluator the ability to present ground and air hazards. | | X | X | For example, another aircraft crossing the active runway and converging airborne traffic. |
| 4.e. ..... | The simulator must provide the instructor or evaluator the ability to present the effect of re-circulating dust, water vapor, or snow conditions that develop as a result of rotor downwash. | | X | X | This is a selectable condition that is not required for all operations on or near the surface. |
| **5.** ..... | **Motion System** | | | | |
| 5.a. ..... | The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in a helicopter. | X | X | X | For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated helicopter. |
| 5.b. ..... | The simulator must have a motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave).<br>An SOC is required. | X | | | |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 5.c. ..... | The simulator must have a motion (force cueing) system that produces cues at least equivalent to those of a six-degrees-of-freedom, synergistic platform motion system (i.e., pitch, roll, yaw, heave, sway, and surge).<br>An SOC is required. | | X | X | |
| 5.d. ..... | The simulator must provide for the recording of the motion system response time.<br>An SOC is required. | X | X | X | |
| 5.e. ..... | The simulator must provide motion effects programming to include the following:. | | | | |
| | (1) Runway rumble, oleo deflections, effects of ground speed, uneven runway, characteristics. | X | X | X | |
| | (2) Buffets due to transverse flow effects. | | | | |
| | (3) Buffet during extension and retraction of landing gear. | | | | |
| | (4) Buffet due to retreating blade stall. | | | | |
| | (5) Buffet due to vortex ring (settling with power). | | | | |
| | (6) Representative cues resulting from touchdown. | | | | |
| | (7) High speed rotor vibrations. | | | | |
| | (8) Tire failure dynamics ..... | | X | X | |
| | (9) Engine malfunction and engine damage | | | | |
| | (10) Airframe ground strike | | | | |
| | (11) Motion vibrations that result from atmospheric disturbances. | | | X | For air turbulence, general purpose disturbance models are acceptable if, when used, they produce test results that approximate demonstrable flight test data. |
| 5.f. ..... | The simulator must provide characteristic motion vibrations that result from operation of the helicopter (for example, retreating blade stall, extended landing gear, settling with power) in so far as vibration marks an event or helicopter state, which can be sensed in the flight deck. | | | X | The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to helicopter data. |
| **6.** ..... | **Visual System** ..... | | | | Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained. |
| 6.a. ..... | The simulator must have a visual system providing an out-of-the-flight deck view. | X | X | X | |
| 6.b. ..... | The simulator must provide a continuous field-of-view of at least 75° horizontally and 30° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC must explain the geometry of the installation.<br>An SOC is required. | X | | | |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 6.c. ..... | The simulator must provide a continuous visual field-of-view of at least 146° horizontally and 36° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage.<br>An SOC must explain the geometry of the installation. Capability for a field-of-view in excess of the minimum is not required for qualification at Level C. However, where specific tasks require extended fields of view beyond the 146° by 36° (e.g., to accommodate the use of ''chin windows'' where the accommodation is either integral with or separate from the primary visual system display), then the extended fields of view must be provided. When considering the installation and use of augmented fields of view, the sponsor must meet with the NSPM to determine the training, testing, checking, and experience tasks for which the augmented field-of-view capability may be required.<br>An SOC is required. | | X | | Optimization of the vertical field-of-view may be considered with respect to the specific helicopter flight deck cut-off angle. The sponsor may request the NSPM to evaluate the FFS for specific authorization(s) for the following:<br>(1) Specific areas within the database needing higher resolution to support landings, take-offs and ground cushion exercises and training away from a heliport, including elevated heliport, helidecks and confined areas.<br>(2) For cross-country flights, sufficient scene details to allow for ground to map navigation over a sector length equal to 30 minutes at an average cruise speed.<br>(3) For offshore airborne radar approaches (ARA), harmonized visual/radar representations of installations. |
| 6.d. ..... | The simulator must provide a continuous visual field-of-view of at least 176° horizontally and 56° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC must explain the geometry of the installation. Capability for a field-of-view in excess of the minimum is not required for qualification at Level D. However, where specific tasks require extended fields of view beyond the 176° by 56° (e.g., to accommodate the use of ''chin windows'' where the accommodation is either integral with or separate from the primary visual system display), then the extended fields of view must be provided. When considering the installation and use of augmented fields of view, the sponsor must meet with the NSPM to determine the training, testing, checking, and experience tasks for which the augmented field-of-view capability may be required.<br>An SOC is required. | | | X | Optimization of the vertical field-of-view may be considered with respect to the specific helicopter flight deck cut-off angle.The sponsor may request the NSPM to evaluate the FFS for specific authorization(s) for the following:<br>(1) Specific areas within the database needing higher resolution to support landings, take-offs and ground cushion exercises and training away from a heliport, including elevated heliport, helidecks and confined areas.<br>(2) For cross-country flights, sufficient scene details to allow for ground to map navigation over a sector length equal to 30 minutes at an average cruise speed.<br>(3) For offshore airborne radar approaches (ARA), harmonized visual/radar representations of installations. |
| 6.e. ..... | The visual system must be free from optical discontinuities and artifacts that create non-realistic cues. | X | X | X | Nonrealistic cues might include image ''swimming'' and image ''roll-off,'' that may lead a pilot to make incorrect assessments of speed, acceleration and/or situational awareness. |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 6.f. ..... | The simulator must have operational landing lights for night scenes.Where used, dusk (or twilight) scenes require operational landing lights.. | X | X | X | |
| 6.g. ..... | The simulator must have instructor controls for the following:<br>(1) Visibility in statute miles (kilometers) and runway visual range (RVR) in ft. (meters).<br>(2) Airport or landing area selection<br>(3) Airport or landing area lighting | X | X | X | |
| 6.h. ..... | Each airport scene displayed must include the following:<br>(1) Airport runways and taxiways<br>(2) Runway definition<br>(a) Runway surface and markings<br>(b) Lighting for the runway in use, including runway threshold, edge, centerline, touchdown zone, VASI (or PAPI), and approach lighting of appropriate colors, as appropriate<br>(c) Taxiway lights | X | X | X | |
| 6.i. ..... | The simulator must provide visual system compatibility with dynamic response programming. | X | X | X | |
| 6.j. ..... | The simulator must show that the segment of the ground visible from the simulator flight deck is the same as from the helicopter flight deck (within established tolerances) when at the correct airspeed and altitude above the touchdown zone. | X | X | X | This will show the modeling accuracy of the scene with respect to a predetermined position from the end of the runway ''in use.'' |
| 6.k. ..... | The simulator must provide visual cues necessary to assess rate of change of height, height AGL, and translational displacement and rates during takeoffs and landings. | X | | | |
| 6.l. ..... | The simulator must provide visual cues necessary to assess rate of change of height, height AGL, as well as translational displacement and rates during takeoff, low altitude/low airspeed maneuvering, hover, and landing. | | X | X | |
| 6.m. ..... | The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude. | X | X | X | Visual attitude vs. simulator attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator. |
| 6.n ..... | The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity.<br>An SOC is required. | | X | X | |
| 6.o. ..... | The simulator must be capable of producing at least 10 levels of occulting. | | X | X | |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 6.p. ..... | Night Visual Scenes. The simulator must provide night visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Night scenes, as a minimum, must provide presentations of sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting, and airport signage, to conduct a visual approach, a landing, and airport movement (taxi). Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by helicopter landing lights. | X | X | X | |
| 6.q. ..... | Dusk (Twilight) Visual Scenes. The simulator must provide dusk (or twilight) visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Dusk (or twilight) scenes, as a minimum, must provide full color presentations of reduced ambient intensity, sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage, to conduct a visual approach, landing and airport movement (taxi). Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by representative aircraft lighting (e.g., landing lights). If provided, directional horizon lighting must have correct orientation and be consistent with surface shading effects. Total scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 15,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects.<br>An SOC is required. | | X | X | |
| 6.r. ..... | Daylight Visual Scenes. The simulator must have daylight visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. No ambient lighting may ''washout'' the displayed visual scene. Total scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 6,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects. The visual display must be free of apparent and distracting quantization and other distracting visual effects while the simulator is in motion.<br>An SOC is required. | | X | X | |
| 6.s ..... | The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots. | | X | X | For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features. |

TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

| Entry No. | QPS requirements | Simulator levels | | | Information |
|---|---|---|---|---|---|
| | General simulator requirements | B | C | D | Notes |
| 6.t. ..... | The simulator must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff and during approach and landing. Representations need only be presented at and below an altitude of 2,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport. | | X | X | |
| 6.u. ..... | The simulator must present visual scenes of wet and snow-covered runways, including runway lighting reflections for wet conditions, and partially obscured lights for snow conditions. | | X | X | The NSPM will consider suitable alternative effects. |
| 6.v. ..... | The simulator must present realistic color and directionality of all airport lighting. | | X | X | |
| **7.** ..... | **Sound System** | | | | |
| 7.a. ..... | The simulator must provide flight deck sounds that result from pilot actions that correspond to those that occur in the helicopter. | X | X | X | |
| 7.b. ..... | Volume control, if installed, must have an indication of the sound level setting. | X | X | X | |
| 7.c. ..... | The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant helicopter noises perceptible to the pilot during normal and abnormal operations, and include the sound of a crash (when the simulator is landed in an unusual attitude or in excess of the structural gear limitations); normal engine sounds; and the sounds of gear extension and retraction.<br>An SOC is required. | | X | X | |
| 7.d. ..... | The simulator must provide realistic amplitude and frequency of flight deck noises and sounds. Simulator performance must be recorded, compared to amplitude and frequency of the same sounds recorded in the helicopter, and made a part of the QTG. | | | X | |

TABLE C1B—TABLE OF TASKS VS. SIMULATOR LEVEL

| Entry No. | QPS requirements<br>Subjective requirements<br>The simulator must be able to perform the tasks associated with that level of qualification. | Simulator levels | | | Information<br>Notes |
|---|---|---|---|---|---|
| | | B | C | D | |
| **1. Preflight Procedures** | | | | | |
| 1.a. ..... | Preflight Inspection (Flight deck Only) switches, indicators, systems, and equipment. | X | X | X | |
| 1.b. ..... | APU/Engine start and run-up. | | | | |
| 1.b.1. ..... | Normal start procedures ..... | X | X | X | |
| 1.b.2. ..... | Alternate start procedures ..... | X | X | X | |
| 1.b.3. ..... | Abnormal starts and shutdowns (hot start, hung start) ..... | X | X | X | |
| 1.c. ..... | Taxiing—Ground ..... | X | X | X | |

TABLE C1B—TABLE OF TASKS VS. SIMULATOR LEVEL—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective requirements The simulator must be able to perform the tasks associated with that level of qualification. | Simulator levels | | | Notes |
| | | B | C | D | |
| 1.d. ..... | Taxiing—Hover ..... | X | X | X | |
| 1.e. ..... | Pre-takeoff Checks ..... | X | X | X | |
| **2. Takeoff and Departure Phase** | | | | | |
| 2.a. ..... | Normal takeoff. | | | | |
| 2.a.1. ..... | From ground ..... | X | X | X | |
| 2.a.2. ..... | From hover ..... | | X | X | |
| 2.a.3. ..... | Running ..... | X | X | X | |
| 2.b. ..... | Instrument ..... | X | X | X | |
| 2.c. ..... | Powerplant Failure During Takeoff ..... | X | X | X | |
| 2.d. ..... | Rejected Takeoff ..... | X | X | X | |
| 2.e. ..... | Instrument Departure ..... | X | X | X | |
| **3. Climb** | | | | | |
| 3.a. ..... | Normal ..... | X | X | X | |
| 3.b. ..... | Obstacle clearance ..... | X | X | X | |
| 3.c. ..... | Vertical ..... | X | X | X | |
| 3.d. ..... | One engine inoperative ..... | X | X | X | |
| **4. In-flight Maneuvers** | | | | | |
| 4.a. ..... | Turns (timed, normal, steep) ..... | X | X | X | |
| 4.b. ..... | Powerplant Failure—Multiengine Helicopters ..... | X | X | X | |
| 4.c. ..... | Powerplant Failure—Single-Engine Helicopters ..... | X | X | X | |
| 4.d. ..... | Recovery From Unusual Attitudes ..... | X | X | X | |
| 4.e. ..... | Settling with Power ..... | X | X | X | |
| 4.f. ..... | Specific Flight Characteristics incorporated into the user's FAA approved flight training program. | A | A | A | |
| **5. Instrument Procedures** | | | | | |
| 5.a. ..... | Instrument Arrival ..... | X | X | X | |
| 5.b. ..... | Holding ..... | X | X | X | |
| 5.c. ..... | Precision Instrument Approach. | | | | |
| 5.c.1. ..... | Normal—All engines operating ..... | X | X | X | |
| 5.c.2. ..... | Manually controlled—One or more engines inoperative ..... | X | X | X | |
| 5.d. ..... | Non-precision Instrument Approach ..... | X | X | X | |
| 5.e. ..... | Missed Approach. | | | | |
| 5.e.1. ..... | All engines operating ..... | X | X | X | |
| 5.e.2. ..... | One or more engines inoperative ..... | X | X | X | |
| 5.e.3. ..... | Stability augmentation system failure ..... | X | X | X | |

TABLE C1B—TABLE OF TASKS VS. SIMULATOR LEVEL—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective requirements The simulator must be able to perform the tasks associated with that level of qualification. | Simulator levels | | | Notes |
| | | B | C | D | |
| **6. Landings and Approaches to Landings** | | | | | |
| 6.a. ..... | Visual Approaches (normal, steep, shallow) ..... | X | X | X | |
| 6.b. ..... | Landings. | | | | |
| 6.b.1. ..... | Normal/crosswind. | | | | |
| 6.b.1.a. ..... | Running ..... | X | X | X | |
| 6.b.1.b. ..... | From Hover ..... | | X | X | |
| 6.b.2. ..... | One or more engines inoperative ..... | X | X | X | |
| 6.b.3. ..... | Rejected Landing ..... | X | X | X | |
| **7. Normal and Abnormal Procedures** | | | | | |
| 7.a. ..... | Powerplant ..... | X | X | X | |
| 7.b. ..... | Fuel System ..... | X | X | X | |
| 7.c. ..... | Electrical System ..... | X | X | X | |
| 7.d. ..... | Hydraulic System ..... | X | X | X | |
| 7.e. ..... | Environmental System(s) ..... | X | X | X | |
| 7.f. ..... | Fire Detection and Extinguisher Systems ..... | X | X | X | |
| 7.g. ..... | Navigation and Aviation Systems ..... | X | X | X | |
| 7.h. ..... | Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems. | X | X | X | |
| 7.i. ..... | Flight Control Systems ..... | X | X | X | |
| 7.j. ..... | Anti-ice and Deice Systems ..... | X | X | X | |
| 7.k. ..... | Aircraft and Personal Emergency Equipment ..... | X | X | X | |
| 7.l. ..... | Special Missions tasks (e.g., Night Vision goggles, Forward Looking Infrared System, External Loads and as listed on the SOQ). | A | A | X | |
| **8. Emergency procedures (as applicable)** | | | | | |
| 8.a. ..... | Emergency Descent ..... | X | X | X | |
| 8.b. ..... | Inflight Fire and Smoke Removal ..... | X | X | X | |
| 8.c. ..... | Emergency Evacuation ..... | X | X | X | |
| 8.d. ..... | Ditching ..... | X | X | X | |
| 8.e. ..... | Autorotative Landing ..... | X | X | X | |
| 8.f. ..... | Retreating blade stall recovery ..... | X | X | X | |
| 8.g. ..... | Mast bumping ..... | X | X | X | |
| 8.h. ..... | Loss of tail rotor effectiveness ..... | X | X | X | |
| 8.i. ..... | Vortex recovery ..... | X | X | X | |
| **9. Postflight Procedures** | | | | | |
| 9.a ..... | After-Landing Procedures ..... | X | X | X | |

TABLE C1B—TABLE OF TASKS VS. SIMULATOR LEVEL—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective requirements The simulator must be able to perform the tasks associated with that level of qualification. | Simulator levels | | | Notes |
| | | B | C | D | |
| 9.b. ..... | Parking and Securing. | | | | |
| 9.b.1. ..... | Rotor brake operation ..... | X | X | X | |
| 9.b.2. ..... | Abnormal/emergency procedures ..... | X | X | X | |

**Note:** An ''A'' in the table indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FFS and is working properly

TABLE C1C—TABLE OF TASKS VS. SIMULATOR LEVEL

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Subjective requirements The simulator must be able to perform the tasks associated with that level of qualification. | Simulator levels | | | Notes |
| | | B | C | D | |
| **1.** ..... | **Instructor Operating Station (IOS), as appropriate** | | | | |
| 1.a. ..... | Power switch(es) ..... | X | X | X | |
| 1.b. ..... | Helicopter conditions ..... | X | X | X | e.g., GW, CG, Fuel loading, Systems, Ground Crew. |
| 1.c. ..... | Airports/Heliports/Helicopter Landing Areas ..... | X | X | X | e.g., Selection, Surface, Presets, Lighting controls |
| 1.d. ..... | Environmental controls. ..... | X | X | X | e.g., Clouds, Visibility, RVR, Temp, Wind, Ice, Snow, Rain, and Windshear. |
| 1.e. ..... | Helicopter system malfunctions (Insertion/deletion) ..... | X | X | X | |
| 1.f. ..... | Locks, Freezes, and Repositioning ..... | X | X | X | |
| **2.** ..... | **Sound Controls.** | | | | |
| 2.a. ..... | On/off/adjustment ..... | X | X | X | |
| **3.** ..... | **Motion/Control Loading System** | | | | |
| 3.a. ..... | On/off/emergency stop ..... | X | X | X | |
| **4.** ..... | **Observer Seats/Stations** | | | | |
| 4.a. ..... | Position/Adjustment/Positive restraint system ..... | X | X | X | |

ATTACHMENT 2 TO APPENDIX C TO PART 60—FFS OBJECTIVE TESTS

BEGIN INFORMATION

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1. INTRODUCTION

a. If relevant winds are present in the objective data, the wind vector (magnitude and direction) should be clearly noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for the test.

b. The NSPM will not evaluate any simulator unless the required SOC indicates that the motion system is designed and manufactured to safely operate within the simulator's maximum excursion, acceleration, and velocity capabilities (see Motion System in the following table).

c. Table C2A addresses helicopter simulators at Levels B, C, and D because there are no Level A Helicopter simulators.

END INFORMATION

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BEGIN QPS REQUIREMENTS

2. TEST REQUIREMENTS

a. The ground and flight tests required for qualification are listed in Table of C2A, FFS Objective Tests. Computer-generated simulator test results must be provided for each test except where an alternative test is specifically authorized by the NSPM. If a flight condition or operating condition is required for the test but does not apply to the helicopter being simulated or to the qualification level sought, it may be disregarded (*e.g.*, an engine out missed approach for a single-engine helicopter, or a hover test for a Level B simulator). Each test result is compared against the validation data described in §60.13 and in this appendix. Although use of a driver program designed to automatically accomplish the tests is encouraged for all simulators and required for Level C and Level D simulators, each test must be able to be accomplished manually while recording all appropriate parameters. The results must be produced on an appropriate recording device acceptable to the NSPM and must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the validation data. Time histories are required unless otherwise indicated in Table C2A. All results must be labeled using the tolerances and units given.

b. Table C2A sets out the test results required, including the parameters, tolerances, and flight conditions for simulator validation. Tolerances are provided for the listed tests because mathematical modeling and acquisition/development of reference data are often inexact. All tolerances listed in the following tables are applied to simulator performance. When two tolerance values are given for a parameter, the less restrictive value may be used unless otherwise indicated. In those cases where a tolerance is expressed only as a percentage, the tolerance percentage applies to the maximum value of that parameter within its normal operating range as measured from the neutral or zero position unless otherwise indicated.

c. Certain tests included in this attachment must be supported with an SOC. In Table C2A, requirements for SOCs are indicated in the ''Test Details'' column.

d. When operational or engineering judgment is used in making assessments for flight test data applications for simulator validity, such judgment may not be limited to a single parameter. For example, data that exhibit rapid variations of the measured parameters may require interpolations or a ''best fit'' data selection. All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match simulator to helicopter data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

e. The FFS may not be programmed so that the mathematical modeling is correct only at the validation test points. Unless noted otherwise, simulator tests must represent helicopter performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation. If a test is supported by helicopter data at one extreme weight or CG, another test supported by helicopter data at mid-conditions or as close as possible to the other extreme must be included. Certain tests that are relevant only at one extreme CG or weight condition need not be repeated at the other extreme. Tests of handling qualities must include validation of augmentation devices.

f. When comparing the parameters listed to those of the helicopter, sufficient data must also be provided to verify the correct flight condition and helicopter configuration changes. For example, to show that control force is within ±0.5 pound (0.22 daN) in a static stability test, data to show the correct airspeed, power, thrust or torque, helicopter configuration, altitude, and other appropriate datum identification parameters must also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the helicopter, but airspeed, altitude, control input, helicopter configuration, and other appropriate data must also be given. All airspeed values must be properly annotated (e.g., indicated versus calibrated). In addition, the same variables must be used for comparison (e.g., compare inches to inches rather than inches to centimeters).

g. The QTG provided by the sponsor must clearly describe how the simulator will be set up and operated for each test. Each simulator subsystem may be tested independently, but overall integrated testing of the simulator must be accomplished to assure that the total simulator system meets the prescribed standards. A manual test procedure with explicit and detailed steps for completing each test must also be provided.

h. For previously qualified simulators, the tests and tolerances of this attachment may be used in subsequent continuing qualification evaluations for any given test if the sponsor has submitted a proposed MQTG revision to the NSPM and has received NSPM approval.

i. Motion System Tests:

(a) The minimum excursions, accelerations, and velocities for pitch, roll, and yaw must be measurable about a single, common reference point and must be achieved by driving one degree of freedom at a time.

(b) The minimum excursions, accelerations, and velocities for heave, sway, and surge may be measured about different, identifiable reference points and must be achieved by driving one degree of freedom at a time.

j. Tests of handling qualities must include validation of augmentation devices. FFSs for highly augmented helicopters will be validated both in the unaugmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. For those performance and static handling qualities tests where the primary concern is control position in the unaugmented configuration, unaugmented data are not required if the design of the system precludes any affect on control position. In those instances where the unaugmented helicopter response is divergent and non-repeatable, it may not be feasible to meet the specified tolerances. Alternative requirements for testing will be mutually agreed upon by the sponsor and the NSPM on a case-by-case basis.

k. Some tests will not be required for helicopters using helicopter hardware in the simulator flight deck (e.g., ''helicopter modular controller''). These exceptions are noted in Table C2A of this attachment. However, in these cases, the sponsor must provide a statement that the helicopter hardware meets the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

l. In cases where light-class helicopters are being simulated, prior coordination with the NSPM on acceptable weight ranges is required. The terms ''light'', ''medium'', and ''near maximum'', as defined in Appendix F of this part, may not be appropriate for the simulation of light-class helicopters.

END QPS REQUIREMENTS

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BEGIN INFORMATION

m. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot test results'' in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot''. The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

n. For references on basic operating weight, see AC 120–27, Aircraft Weight and Balance; and FAA–H–8083–1, Aircraft Weight and Balance Handbook.

END INFORMATION

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TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| **1. Performance** | | | | | | | | |
| 1.a. ..... | Engine Assessment | | | | | | | |
| 1.a.1. ..... | Start Operations | | | | | | | |
| 1.a.1.a ..... | Engine start and acceleration (transient). | Light Off Time—±10% or ±1 sec., Torque—±5%, Rotor Speed—±3%, Fuel Flow—±10%, Gas Generator Speed—±5%, Power Turbine Speed—±5%, Gas Turbine Temp.—±30 °C. | Ground with the Rotor Brake Used and Not Used, if applicable. | Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM. | X | X | X | |
| 1.a.1.b. ..... | Steady State Idle and Operating RPM conditions. | Torque—±3%, Rotor Speed—±1.5%, Fuel Flow—±5%, Gas Generator Speed—±2%, Power Turbine Speed—±2%, Turbine Gas Temp.—±20 °C. | Ground ..... | Record both steady state idle and operating RPM conditions. May be a series of snapshot tests. | X | X | X | |
| 1.a.2. ..... | Power Turbine Speed Trim ... | ±10% of total change of power turbine speed, or ±0.5% change of rotor speed. | Ground ..... | Record engine response to trim system actuation in both directions. | X | X | X | |
| 1.a.3. ..... | Engine and Rotor Speed Governing. | Torque—±5%, Rotor Speed—1.5%. | Climb and descent ..... | Record results using a step input to the collective. May be conducted concurrently with climb and descent performance tests. | X | X | X | |
| 1.b. ..... | Surface Operations | | | | | | | |
| 1.b.1. ..... | Minimum Radius Turn ..... | ±3 ft. (0.9m) or 20% of helicopter turn radius. | Ground ..... | If brakes are used, brake pedal position and brake system pressure must be matched to the helicopter flight test value. | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.b.2. ..... | Rate of Turn vs. Pedal Deflection, Brake Application, or Nosewheel Angle, as applicable. | ±10% or ±2°/sec. Turn Rate. | Ground Takeoff ..... | If brakes are used, brake pedal position and brake system pressure must be matched to the helicopter flight test value. | X | X | X | |
| 1.b.3. ..... | Taxi ..... | Pitch Angle—±1.5°, Torque—±3%, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | Ground ..... | Record results for control position and pitch attitude during ground taxi for a specific ground speed, wind speed and direction, and density altitude. | X | X | X | |
| 1.b.4. ..... | Brake Effectiveness ..... | ±10% of time and distance. | Ground ..... | | X | X | X | |
| 1.c. ..... | Takeoff<br>When the speed range for the following tests is less than 40 knots, the applicable airspeed tolerance may be applied to either airspeed or ground speed, as appropriate. | | | | | | | |
| 1.c.1. ..... | All Engines ..... | Airspeed—±3 kt, Altitude—±20 ft (6.1m), Torque—±3%, Rotor Speed—±1.5%, Vertical Velocity—±100 fpm (0.50m/sec) or 10%, Pitch Attitude—±1.5°, Bank Attitude—±2°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Ground/Takeoff and Initial Segment of Climb. | Record results of takeoff flight path as appropriate to helicopter model simulated (running takeoff for Level B, takeoff from a hover for Level C and D). For Level B, the criteria apply only to those segments at airspeeds above effective translational lift. Results must be recorded from the initiation of the takeoff to at least 200 ft (61m) AGL. | X | X | X | |
| 1.c.2. ..... | One Engine Inoperative continued takeoff. | Airspeed—±3 kt, Altitude—±20 ft (6.1m), Torque—±3%, Rotor Speed—±1.5%, Vertical Velocity—±100 fpm (0.50m/sec) or 10%, Pitch Attitude—±1.5°, Bank Attitude—±2°, Heading—±2°, Longitudinal Control Position—±10% Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Ground/Takeoff, and Initial Segment of Climb. | Record takeoff flight path as appropriate to helicopter model simulated. Results must be recorded from the initiation of the takeoff to at least 200 ft (61m) AGL. | X | X | X | Because several kinds of takeoff procedures can be performed, the specific type of takeoff profile should be recorded to ensure the proper takeoff profile comparison test is used. |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 1.c.3. | One Engine inoperative, rejected take off. | Airspeed—±3 kt, Altitude—±20 ft (6.1m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Roll angle—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%, Distance—±7.5% or ±30m (100ft). | Ground, Takeoff | Time history from the take off point to touch down. Test conditions near limiting performance. | | X | X | |
| 1.d. | Hover | | | | | | | |
| | Performance | Torque—±3%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | In Ground Effect (IGE); and Out of Ground Effect (OGE). | Record results for light and heavy gross weights. May be a series of snapshot tests. | | X | X | |
| 1.e. | Vertical Climb | | | | | | | |
| | Performance | Vertical Velocity—±100 fpm (0.50 m/sec) or ±10%, Directional Control Position—±5%, Collective Control Position—±5%. | From OGE Hover | Record results for light and heavy gross weights. May be a series of snapshot tests. | | X | X | |
| 1.f. | Level Flight | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Performance and Trimmed Flight Control Positions. | Torque—±3%, Pitch Attitude—±1.5°, Sideslip Angle—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | Cruise (Augmentation On and Off). | Record results for two gross weight and CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests. | X | X | X | This test validates performance at speeds above maximum endurance airspeed. |
| 1.g. ..... | Climb | | | | | | | |
| | Performance and Trimmed Flight Control Positions. | Vertical Velocity—±100 fpm (6.1m/sec) or ±10%, Pitch Attitude—±1.5°, Sideslip Angle—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | All engines operating; One engine inoperative; Augmentation System(s) On and Off. | Record results for two gross weight and CG combinations. The data presented must be for normal climb power conditions. May be a series of snapshot tests. | X | X | X | |
| 1.h. ..... | Descent | | | | | | | |
| 1.h.1. ..... | Descent Performance and Trimmed Flight Control Positions. | Torque—±3%, Pitch Attitude—±1.5°, Sideslip Angle—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | At or near 1,000 fpm (5 m/sec) rate of descent (RoD) at normal approach speed. Augmentation System(s) On and Off. | Results must be recorded for two gross weight and CG combinations. May be a series of snapshot tests. | X | X | X | |
| 1.h.2. ..... | Autorotation Performance and Trimmed Flight Control Positions. | Pitch Attitude—±1.5°, Sideslip Angle—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%, Vertical Velocity—±100 fpm or 10%, Rotor Speed—±1.5%. | Steady descents. Augmentation System(s) On and Off. | Record results for two gross weight conditions. Data must be recorded for normal operating RPM. (Rotor speed tolerance applies only if collective control position is full down.) Data must be recorded for speeds from 50 kts, ±5 kts, through at least maximum glide distance airspeed, or maximum allowable autorotation airspeed, whichever is slower. May be a series of snapshot tests. | X | X | X | |
| 1.i. ..... | Autorotation | | | | | | | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| | Entry | Rotor Speed—±3%, Pitch Attitude—±2°, Roll Attitude—±3°, Yaw Attitude—±5°, Airspeed—±5 kts., Vertical Velocity—±200 fpm (1.00 m/sec) or 10%. | Cruise or Climb | Record results of a rapid throttle reduction to idle. If the cruise condition is selected, comparison must be made for the maximum range airspeed. If the climb condition is selected, comparison must be made for the maximum rate of climb airspeed at or near maximum continuous power. | | X | X | |
| 1.j. | Landing<br>When the speed range for tests 1.j.1., 1.j.2., or 1.j.3. is less than 40 knots, the applicable airspeed tolerance may be applied to either airspeed or ground speed, as appropriate. | | | | | | | |
| 1.j.1. | All Engines | Airspeed—±3 kts., Altitude—±20 ft. (6.1m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Approach | Record results of the approach and landing profile as appropriate to the helicopter model simulated (running landing for Level B, or approach to a hover for Level C and D). For Level B, the criteria apply only to those segments at airspeeds above effective translational lift. | X | X | X | |
| 1.j.2. | One Engine Inoperative. | Airspeed—±3 kts., Altitude—±20 ft. (6.1m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Approach | Record results for both Category A and Category B approaches and landing as appropriate to helicopter model simulated. For Level B, the criteria apply only to those segments at airspeeds above effective translational lift. | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.j.3. | Balked Landing | Airspeed—±3 kts, Altitude—±20 ft. (6.1m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Approach | Record the results for the maneuver initiated from a stabilized approach at the landing decision point (LDP). | X | | | |
| 1.j.4. | Autorotational Landing. | Torque—±3%, Rotor Speed—±3%, Vertical Velocity—±100 fpm (0.50m/sec) or 10%, Pitch Attitude—±2°, Bank Attitude—±2°, Heading—±5°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Landing | Record the results of an autorotational deceleration and landing from a stabilized autorotational descent, to touch down. If flight test data containing all required parameters for a complete power-off landing is not available from the aircraft manufacturer for this test and other qualified flight test personnel are not available to acquire this data, the sponsor may coordinate with the NSPM to determine if it is appropriate to accept alternative testing means. | | X | X | Alternative approaches for acquiring this data may be acceptable, depending on the aircraft as well as the personnel and the data recording, reduction, and interpretation facilities to be used, are: (1) a simulated autorotational flare and reduction of rate of descent (ROD) at altitude; or (2) a power-on termination following an autorotational approach and flare. |

**2. Handling Qualities**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.a. | Control System Mechanical Characteristics | | | | | | |
| | For simulators requiring Static or Dynamic tests at the controls (i.e., cyclic, collective, and pedal), special test fixtures will not be required during initial or upgrade evaluations if the sponsor's QTG/MQTG shows both test fixture results and the results of an alternative approach, such as computer plots produced concurrently showing satisfactory agreement. Repeat of the alternative method during the initial or upgrade evaluation satisfies this test requirement. For initial and upgrade evaluations, the control dynamic characteristics must be measured at and recorded directly from the flight deck controls, and must be accomplished in hover, climb, cruise, and autorotation. | | | | | Contact the NSPM for clarification of any issue regarding helicopters with reversible controls or where the required validation data is not attainable. | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 2.a.1. ..... | Cyclic ..... | Breakout—±0.25 lbs. (0.112 daN) or 25%; Force—±1.0 lb. (0.224 daN) or 10%. | Ground; Static conditions with the hydraulic system (if applicable) pressurized; supplemental hydraulic pressurization system may be used. Trim On and Off. Friction Off Augmentation (if applicable) On and Off. | Record results for an uninterrupted control sweep to the stops. (This test does not apply if aircraft hardware modular controllers are used.) | X | X | X | Flight Test Data for this test does not require the rotor to be engaged/turning. The phrase "if applicable" regarding stability augmentation systems means if an augmentation system is available and if this system may be operational on the ground under static conditions as described here. |
| 2.a.2. ..... | Collective/Pedals ..... | Breakout—±0.5 lb. (0.224 daN) or 25%; Force—±1.0 lb. (0.224 daN) or 10%. | Ground; Static conditions with the hydraulic system (if applicable) pressurized; supplemental hydraulic pressurization system may be used. Trim On and Off. Friction Off. Augmentation (if applicable) On and Off. | Record results for an uninterrupted control sweep to the stops. | X | X | X | Flight Test Data for this test does not require the rotor to be engaged/turning. The phrase "if applicable" regarding stability augmentation system means if a stability augmentation system is available and if this system may be operational on the ground under static conditions as described here. |
| 2.a.3. ..... | Brake Pedal Force vs. Position. | ±5 lbs. (2.224 daN) or 10%. | Ground; Static conditions. | | X | X | X | |
| 2.a.4. ..... | Trim System Rate (all applicable systems). | Rate—±10%. | Ground; Static conditions. Trim On, Friction Off. | The tolerance applies to the recorded value of the trim rate. | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.a.5. ..... | Control Dynamics (all axes) .. | ±10% of time for first zero crossing and ±10 (N + 1)% of period thereafter, ±10% of amplitude of first overshoot, 20% of amplitude of 2nd and subsequent overshoots greater than 5% of initial displacement, ±1 overshoot. | Hover/Cruise, Trim On, Friction Off. | Results must be recorded for a normal control displacement in both directions in each axis. | | X | X | Typically, control displacement of 25% to 50% is necessary for proper excitation. Control Dynamics for irreversible control systems may be evaluated in a ground/static condition. Additional information on control dynamics is found later in this attachment. "N" is the sequential period of a full cycle of oscillation. |
| 2.a.6. ..... | Control System Freeplay ..... | ±0.10 inches (±2.5 mm). | Ground; Static conditions; with the hydraulic system (if applicable) pressurized; supplemental hydraulic pressurization system may be used. | Record and compare results for all controls. | X | X | X | Flight Test Data for this test does not require the rotor to be engaged/turning. |
| 2.b. ..... | Low Airspeed Handling Qualities | | | | | | | |
| 2.b.1. ..... | Trimmed Flight Control Positions. | Torque—±3%, Pitch Attitude—±1.5°, Bank Attitude—±2°, Longitudinal Control Position—±5%. Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | Translational Flight IGE—Sideward, rearward, and forward flight. Augmentation On and Off. | Record results for several airspeed increments to the translational airspeed limits and for 45 kts. forward airspeed. May be a series of snapshot tests. | | X | X | |
| 2.b.2. ..... | Critical Azimuth ..... | Torque—±3%, Pitch Attitude—±1.5°, Bank Attitude—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | Stationary Hover. Augmentation On and Off. | Record results for three relative wind directions (including the most critical case) in the critical quadrant. May be a series of snapshot tests. | | X | X | |
| 2.b.3. ..... | Control Response | | | | | | | |
| 2.b.3.a. ..... | Longitudinal ..... | Pitch Rate—±10% or ±2°/sec., Pitch Attitude Change—±10% or 1.5°. | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | | X | X | This is a "short time" test conducted in a hover, in ground effect, without entering translational flight, to provide better visual reference. |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 2.b.3.b. ..... | Lateral ..... | Roll Rate—±10% or ±3°/sec., Roll Attitude Change—±10% or ±3°. | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | | X | X | This is a "short time" test conducted in a hover, in ground effect, without entering translational flight, to provide better visual reference. |
| 2.b.3.c. ..... | Directional ..... | Yaw Rate—±10% or ±2°/sec., Heading Change—±10% or ±2°. | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | | X | X | This is a "short time" test conducted in a hover, in ground effect, without entering translational flight, to provide better visual reference. |
| 2.b.3.d. ..... | Vertical ..... | Normal Acceleration—±0.1 g. | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | | X | X | |
| 2.c. ..... | Longitudinal Handling Qualities | | | | | | | |
| 2.c.1. ..... | Control Response ..... | Pitch Rate—±10% or ±2°/sec., Pitch Attitude Change—±10% or ±1.5°. | Cruise Augmentation On and Off. | Results must be recorded for two cruise airspeeds to include minimum power required speed. Record data for a step control input. The Off-axis response must show correct trend for unaugmented cases. | X | X | X | |
| 2.c.2. ..... | Static Stability ..... | Longitudinal Control Position: ±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Force: ±0.5 lb. (0.223 daN) or ±10%. | Cruise or Climb. Autorotation. Augmentation On and Off. | Record results for a minimum of two speeds on each side of the trim speed. May be a series of snapshot tests. | X | X | X | |
| 2.c.3. ..... | Dynamic Stability | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.c.3.a. ..... | Long-Term Response. | ±10% of calculated period, ±10% of time to ½ or double amplitude, or ±0.02 of damping ratio.For non-periodic responses, the time history must be matched within ±3° pitch; and ±5 kts airspeed over a 20 sec period following release of the controls. | Cruise Augmentation On and Off. | For periodic responses, record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. The test may be terminated prior to 20 sec. if the test pilot determines that the results are becoming uncontrollably divergent. | X | | X | The response may be unrepeatable throughout the stated time for certain helicopters. In these cases, the test should show at least that a divergence is identifiable. For example: Displacing the cyclic for a given time normally excites this test or until a given pitch attitude is achieved and then return the cyclic to the original position. For non-periodic responses, results should show the same convergent or divergent character as the flight test data. |
| 2.c.3.b. ..... | Short-Term Response. | ±1.5° Pitch or ±2°/sec. Pitch Rate. ±0.1 g Normal Acceleration. | Cruise or Climb. Augmentation On and Off. | Record results for at least two airspeeds. | X | X | X | A control doublet inserted at the natural frequency of the aircraft normally excites this test. However, while input doublets are preferred over pulse inputs for Augmentation-Off tests, for Augmentation-On tests, when the short-term response exhibits 1st-order or deadbeat characteristics, longitudinal pulse inputs may produce a more coherent response. |
| 2.c.4. ..... | Maneuvering Stability. | Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Forces—±0.5 lb. (0.223 daN) or ±10%. | Cruise or Climb. Augmentation On and Off. | Record results for at least two airspeeds at 30°–45° roll angle. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests. | X | X | X | |
| 2.d. ..... | Lateral and Directional Handling Qualities | | | | | | | |
| 2.d.1. ..... | Control Response | | | | | | | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 2.d.1.a ..... | Lateral ..... | Roll Rate—±10% or ±3°/sec., Roll Attitude Change—±10% or ±3°. | Cruise Augmentation On and Off. | Record results for at least two airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | X | X | X | |
| 2.d.1.b. ..... | Directional ..... | Yaw Rate—±10% or ±2°/sec., Yaw Attitude Change—±10% or ±2°. | Cruise Augmentation On and Off. | Record data for at least two airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | X | X | X | |
| 2.d.2. ..... | Directional Static Stability. | Lateral Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Lateral Control Force—±0.5 lb. (0.223 daN) or 10%, Roll Attitude—±1.5, Directional Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Directional Control Force—±1 lb. (0.448 daN) or 10%, Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm), Vertical Velocity—±100 fpm (0.50m/sec) or 10%. | Cruise; or Climb (may use Descent instead of Climb if desired), Augmentation On and Off. | Record results for at least two sideslip angles on either side of the trim point. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests. | X | X | X | This is a steady heading sideslip test at a fixed collective position. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.d.3. ..... | Dynamic Lateral and Directional Stability | | | | | | | |
| 2.d.3.a. ..... | Lateral-Directional Oscillations. | ±0.5 sec. or ±10% of period, ±10% of time to ½ or double amplitude or ±0.02 of damping ratio, ±20% or ±1 sec of time difference between peaks of bank and sideslip. For non-periodic responses, the time history must be matched within ±10 knots Airspeed; ±5°/s Roll Rate or ±5° Roll Attitude; ±4°/s Yaw Rate or ±4° Yaw Angle over a 20 sec period roll angle following release of the controls. | Cruise or Climb. Augmentation On and Off. | Record results for at least two airspeeds. The test must be initiated with a cyclic or a pedal doublet input. Record results for six full cycles (12 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. The test may be terminated prior to 20 sec if the test pilot determines that the results are becoming uncontrollably divergent. | X | X | X | |
| 2.d.3.b. ..... | Spiral Stability. | ±2° or ±10% roll angle. | Cruise or Climb. Augmentation On and Off. | Record the results of a release from pedal only or cyclic only turns for 20 sec. Results must be recorded from turns in both directions. Terminate check at zero roll angle or when the test pilot determines that the attitude is becoming uncontrollably divergent. | X | X | X | |
| 2.d.3.c. ..... | Adverse/Proverse Yaw. | Correct Trend, ±2° transient sideslip angle. | Cruise or Climb. Augmentation On and Off. | Record the time history of initial entry into cyclic only turns, using only a moderate rate for cyclic input. Results must be recorded for turns in both directions. | X | X | X | |
| **3. Motion System** | | | | | | | | |
| 3.a. ..... | Frequency response | | | | | | | |
| | | Based on Simulator Capability. | N/A ..... | Required as part of the MQTG. The test must demonstrate frequency response of the motion system as specified by the applicant for flight simulator qualification. | X | X | X | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 3.b. ..... | Leg Balance | | | | | | | |
| | Leg Balance ..... | Based on Simulator Capability. | N/A ..... | Required as part of the MQTG. The test must demonstrate motion system leg balance as specified by the applicant for flight simulator qualification. | X | X | X | |
| 3.c. ..... | Turn Around | | | | | | | |
| | Turn Around ..... | Based on Simulator Capability. | N/A ..... | Required as part of the MQTG. The test must demonstrate a smooth turn-around (shift to opposite direction of movement) of the motion system as specified by the applicant for flight simulator qualification. | X | X | X | |
| 3.d. ..... | Motion system repeatability | | | | | | | |
| | | With the same input signal, the test results must be repeatable to within ±0.05g actual platform linear acceleration in each axis. | Accomplished in both the ''ground'' mode and in the ''flight'' mode of the motion system operation. | Required as part of the MQTG. The test is accomplished by injecting a motion signal to generate movement of the platform. The input must be such that the rotational accelerations, rotational rates, and linear accelerations are inserted before the transfer from helicopter center of gravity to the pilot reference point with a minimum amplitude of 5°/sec/sec, 10°/sec and 0.3g, respectively. | X | X | X | See Paragraph 6.c. in this attachment for additional information. Note: if there is no difference in the model for ''ground'' and ''flight'' operation of the motion system, this should be described in an SOC and will not require tests in both modes. |
| 3.e. ..... | Motion cueing performance signature | | | | | | | |

| | | | | Required as part of MQTG. These tests must be run with the motion buffet mode disabled. | | | | See paragraph 6.d., of this attachment, Motion cueing performance signature. |
|---|---|---|---|---|---|---|---|---|
| 3.e.1. ..... | Takeoff (all engines). | As specified by the sponsor for flight simulator qualification. | Ground ..... | Pitch attitude due to initial climb must dominate over cab tilt due to longitudinal acceleration. | X | X X | | Associated to test number 1.c.1. |
| 3.e.2. ..... | Hover performance (IGE and OGE). | As specified by the sponsor for flight simulator qualification. | Ground ..... | | | X X | | Associated to test number 1.d. |
| 3.e.3. ..... | Autorotation (entry). | As specified by the sponsor for flight simulator qualification. | Flight ..... | | | X X | | Associated to test number 1.i. |
| 3.e.4. ..... | Landing (all engines). | As specified by the sponsor for flight simulator qualification. | Flight ..... | | X | X X | | Associated to test number 1.j.1. |
| 3.e.5. ..... | Autorotation (landing). | As specified by the sponsor for flight simulator qualification. | Flight ..... | | | X X | | Associated to test number 1.j.4. |
| 3.e.6. ..... | Control Response | | | | | | | |
| 3.e.6.a. ..... | Longitudinal ..... | As specified by the sponsor for flight simulator qualification. | Flight ..... | | X | X X | | Associated to test number 2.c.1. |
| 3.e.6.b. ..... | Lateral. ..... | As specified by the sponsor for flight simulator qualification. | Ground ..... | | X | X X | | Associated to test number 2.d.1.a. |
| 3.e.6.c. ..... | Directional ..... | As specified by the sponsor for flight simulator qualification. | | | X | X X | | Associated to test number 2.d.1.c. |
| 3.f. ..... | Characteristic Motion (Vibration) Cues—For all of the following tests, the simulator test results must exhibit the overall appearance and trends of the helicopter data, with at least three (3) of the predominant frequency "spikes" being present within ±2 Hz. | | | | .... | .... | | Characteristic motion cues may be separate from the "main" motion system. |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 3.f.1. ..... | Vibrations—to include 1/Rev and n/Rev vibrations (where "n" is the number of main rotor blades). | + 3db to −6db or ±10% of nominal vibration level in flight cruise and correct trend (see comment). | (a) On ground (idle);<br>(b) In flight | Characteristic vibrations include those that result from operation of the helicopter (for example, high airspeed, retreating blade stall, extended landing gear, vortex ring or settling with power) in so far as vibration marks an event or helicopter state, which can be sensed in the flight deck.<br>[See Table C1A, table entries 5.e. and 5.f.] | | | X | Correct trend refers to a comparison of vibration amplitudes between different maneuvers; e.g., if the 1/rev vibration amplitude in the helicopter is higher during steady state turns than in level flight this increasing trend should be demonstrated in the simulator. Additional examples of vibrations may include:<br>(a) Low & High speed transition to and from hover;<br>(b) Level flight;<br>(c) Climb and descent (including vertical climb;<br>(d) Auto-rotation;<br>(e) Steady Turns. |
| 3.f.2. ..... | Buffet—Test against recorded results for characteristic buffet motion that can be sensed in the flight deck. | + 3db to −6db or ±10% of nominal vibration level in flight cruise and correct trend (see comment). | On ground and in flight. | Characteristic buffets include those that result from operation of the helicopter (for example, high airspeed, retreating blade stall, extended landing gear, vortex ring or settling with power) in so far as a buffet marks an event or helicopter state, which can be sensed in the flight deck.<br>[See Table C1A, table entries 5.e. and 5.f.] | | | X | The recorded test results for characteristic buffets should allow the checking of relative amplitude for different frequencies.<br>For atmospheric disturbance, general purpose models are acceptable which approximate demonstrable flight test data. |
| **4. Visual System** | | | | | | | | |
| 4.a. ..... | Visual System Response Time: (Choose either test 4.a.1. or 4.a.2. to satisfy test 4.a., Visual System Response Time Test. This test is also sufficient for motion system response timing and flight deck instrument response timing.) | | | | | | | |
| 4.a.1. ..... | Latency | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 150 ms (or less) after helicopter response. | Takeoff, climb, and descent. | One test is required in each axis (pitch, roll and yaw) for each of the three conditions (take-off, cruise, and approach or landing). | X | | | |
| | 100 ms (or less) after helicopter response. | Climb, cruise, descent, and hover. | One test is required in each axis (pitch, roll and yaw) for each of the three conditions (take-off, cruise, and approach or landing). | | X | X | |
| 4.a.2. ..... | Transport Delay | | | | | | |
| | | | | | | | If Transport Delay is the chosen method to demonstrate relative responses, the sponsor and the NSPM will use the latency values to ensure proper simulator response when reviewing those existing tests where latency can be identified (e.g., short period, roll response, rudder response). |
| | 150 ms (or less) after controller movement. | N/A ..... | A separate test is required in each axis (pitch, roll, and yaw). | X | | | |
| | 100 ms (or less) after controller movement. | N/A ..... | A separate test is required in each axis (pitch, roll, and yaw).. | | X | X | |
| 4.b. ..... | Field-of-view | | | | | | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 4.b.1. ..... | Continuous field-of-view. | The simulator must provide a continuous field-of-view of at least 75° horizontally and 30° vertically per pilot seat or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. Both pilot seat visual systems must be operable simultaneously. Wide-angle systems providing cross-flight deck viewing (for both pilots simultaneously) must provide a minimum field-of-view of at least 146° horizontally and 36° vertically. Any geometric error between the Image Generator eye point and the pilot eye point must be 8° or less. | N/A ..... | An SOC is required and must explain the geometry of the installation.<br>Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained. | X | | | Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. Field-of-view may be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4.b.2. ..... | Continuous field-of-view. | The simulator must provide a continuous field-of-view of at least 146° horizontally and 36° vertically or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. Any geometric error between the Image Generator eye point and the pilot eye point must be 8° or less. | N/A ..... | An SOC is required and must explain the geometry of the installation.<br>Horizontal field-of-view of at least 146° (including not less than 73° measured either side of the center of the design eye point). Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained.<br>Vertical field-of-view of at least 36° measured from the pilot's and co-pilot's eye point. | X | | Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. Field-of-view may be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. |
| 4.b.3. ..... | Continuous field-of-view. | Continuous field-of-view of at least 176° horizontal and 56° vertical field-of-view for each pilot simultaneously. Any geometric error between the Image Generator eye point and the pilot eye point must be 8° or less. | N/A ..... | An SOC is required and must explain the geometry of the installation.<br>Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. Horizontal field-of-view must be at least 176° (including not less than 88° either side of the center of the design eye point). Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained.<br>Vertical field-of-view must not be less than a total of 56° measured from the pilot's and co-pilot's eye point. | | X | The horizontal field-of-view is traditionally described as a 180° field-of-view. However, the field-of-view is technically no less than 176°. Field-of-view may be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | Information |
|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | Notes |
| Entry No. | Title | | | | B C D | | |
| 4.c. | Surface contrast ratio. | Not less than 5:1. | N/A | The ratio is calculated by dividing the brightness level of the center, bright square (providing at least 2 foot-lamberts or 7 cd/m$^2$) by the brightness level of any adjacent dark square. | X | | Measurements may be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5 per square, with a white square in the center of each channel. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.d. | Highlight brightness. | Not less than six (6) foot-lamberts (20 cd/m$^2$). | N/A | Measure the brightness of the center, white square while superimposing a highlight on that white square. The use of calligraphic capabilities to enhance the raster brightness is acceptable; however, measuring light points is not acceptable. | X | | Measurements may be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5 per square, with a white square in the center of each channel. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.e. | Surface resolution. | Not greater than two (2) arc minutes. | N/A | An SOC is required and must include the appropriate calculations and an explanation of those calculations. Level B requires surface resolution not greater than three (3) arc minutes. | | X | X | When the eye is positioned on a 3° glide slope at the slant range distances indicated with white runway markings on a black runway surface, the eye will subtend two (2) arc minutes: (1) A slant range of 6,876 ft with stripes 150 ft long and 16 ft wide, spaced 4 ft apart. (2) For Configuration A, a slant range of 5,157 feet with stripes 150 ft long and 12 ft wide, spaced 3 ft apart. (3) For Configuration B, a slant range of 9,884 feet, with stripes 150 ft long and 5.75 ft wide, spaced 5.75 ft apart. |
| 4.f. | Light point size | Not greater than five (5) arc minutes. | N/A | An SOC is required and must include the relevant calculations and an explanation of those calculations. | | X | X | Light point size may be measured using a test pattern consisting of a centrally located single row of light points reduced in length until modulation is just discernible in each visual channel. A row of 48 lights will form a 4° angle or less. |
| 4.g. | Light point contrast ratio. | | | | | | | A 1° spot photometer may be used to measure a square of at least 1° filled with light points (where light point modulation is just discernible) and compare the results to the measured adjacent background. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.g.1. | | Not less than 10:1 | N/A | An SOC is required and must include the relevant calculations. | X | | | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 4.g.2. ..... | | Not less than 25:1 ..... | N/A ..... | An SOC is required and must include the relevant calculations. | | X | X | |
| 4.h. ..... | Visual ground segment | | | | | | | |
| | | The visible segment in the simulator must be ±20% of the segment computed to be visible from the helicopter flight deck. This tolerance may be applied at the far end of the displayed segment. However, lights and ground objects computed to be visible from the helicopter flight deck at the near end of the visible segment must be visible in the simulator. | Landing configuration, with the aircraft trimmed for the appropriate airspeed, where the MLG are at 100 ft (30 m) above the plane of the touchdown zone, on the electronic glide slope with an RVR value set at 1,200 ft (350 m). | The QTG must contain appropriate calculations and a drawing showing the data used to establish the helicopter location and the segment of the ground that is visible considering design eye point, the helicopter attitude, flight deck cut-off angle, and a visibility of 1200 ft (350 m) RVR. Simulator performance must be measured against the QTG calculations. The data submitted must include at least the following: | X | X | X | Pre-positioning for this test is encouraged, and may be achieved via manual or autopilot control to the desired position. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | (1) Static helicopter dimensions as follows:<br>(i) Horizontal and vertical distance from main landing gear (MLG) to glideslope reception antenna.<br>(ii) Horizontal and vertical distance from MLG to pilot's eyepoint.<br>(iii) Static flight deck cutoff angle.<br>(2) Approach data as follows:<br>(i) Identification of runway.<br>(ii) Horizontal distance from runway threshold to glideslope intercept with runway.<br>(iii) Glideslope angle.<br>(iv) Helicopter pitch angle on approach.<br>(3) Helicopter data for manual testing:<br>(i) Gross weight.<br>(ii) Helicopter configuration.<br>(iii) Approach airspeed.<br>If non-homogenous fog is used to obscure visibility, the vertical variation in horizontal visibility must be described and be included in the slant range visibility calculation used in the computations. | | | | |
| 5. ..... | Sound system | | | | | | | |
| | The sponsor will not be required to repeat the helicopter tests (i.e., tests 5.a.1. through 5.a.8. (or 5.b.1. through 5.b.9.) and 5.c., as appropriate) during continuing qualification evaluations if frequency response and background noise test results are within tolerance when compared to the initial qualification evaluation results, and the sponsor shows that no software changes have occurred that will affect the helicopter test results. If the frequency response test method is chosen and fails, the sponsor may elect to fix the frequency response problem and repeat the test or the sponsor may elect to repeat the helicopter tests. If the helicopter tests are repeated during continuing qualification evaluations, the results may be compared against initial qualification evaluation results or helicopter master data. All tests in this section must be presented using an unweighted 1/3-octave band format from band 17 to 42 (50 Hz to 16 kHz). A minimum 20 second average must be taken at the location corresponding to the helicopter data set. The helicopter and flight simulator results must be produced using comparable data analysis techniques. | | | | | | | |
| 5.a. ..... | Basic requirements | | | | | | | |

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerance(s) | Flight condition | Test details | Simulator level | | | Notes |
| Entry No. | Title | | | | B | C | D | |
| 5.a.1. ..... | Ready for engine start. | ±5 dB per 1/3 octave band. | Ground ..... | Normal condition prior to engine start. The APU must be on if appropriate. | | | X | |
| 5.a.2. ..... | All engines at idle; rotor not turning (if applicable) and rotor turning. | ±5 dB per 1/3 octave band. | Ground ..... | Normal condition prior to lift-off. | | | X | |
| 5.a.3. ..... | Hover ..... | ±5 dB per 1/3 octave band. | Hover ..... | | | | X | |
| 5.a.4. ..... | Climb ..... | ±5 dB per 1/3 octave band. | En-route climb ..... | Medium altitude ..... | | | X | |
| 5.a.5. ..... | Cruise ..... | ±5 dB per 1/3 octave band. | Cruise ..... | Normal cruise configuration. | | | X | |
| 5.a.6. ..... | Final approach ..... | ±5 dB per 1/3 octave band. | Landing ..... | Constant airspeed, gear down. | | | X | |
| 5.b. ..... | Special cases | | | | | | | |
| | | ±5 dB per 1/3 octave band. | As appropriate ..... | | | | X | These special cases are identified as particularly significant during critical phases of flight and ground operations for a specific helicopter type or model. |
| 5.c. ..... | Background noise | | | | | | | |
| | | ±3 dB per 1/3 octave band. | As appropriate ..... | Results of the background noise at initial qualification must be included in the MQTG. Measurements must be made with the simulation running, the sound muted, and a "dead" flight deck. | | | X | The simulated sound will be evaluated to ensure that the background noise does not interfere with training, testing, or checking. |
| 5.d. ..... | Frequency response | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | X | Measurements are compared to those taken during initial qualification evaluation. |
| | | | | | | |
| ±5 dB on three (3) consecutive bands when compared to initial evaluation; and ±2 dB when comparing the average of the absolute differences between initial and continuing qualification evaluation. | | | Applicable only to Continuing Qualification Evaluations. If frequency response plots are provided for each channel at the initial evaluation, these plots may be repeated at the continuing qualification evaluation with the following tolerances applied:<br>(a) The continuing qualification 1/3 octave band amplitudes must not exceed ±5 dB for three consecutive bands when compared to initial results.<br>(b) The average of the sum of the absolute differences between initial and continuing qualification results must not exceed 2 dB (refer to table C2C in Appendix C). | | | |

BEGIN INFORMATION

3. GENERAL

a. If relevant winds are present in the objective data, the wind vector should be clearly noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for test near the ground.

b. The reader is encouraged to review the Airplane Flight Simulator Evaluation Handbook, Volumes I and II, published by the Royal Aeronautical Society, London, UK, and FAA AC 25–7, as amended, Flight Test Guide for Certification of Transport Category Airplanes, and AC 23–8, as amended, Flight Test Guide for Certification of Part 23 Airplanes, for references and examples regarding flight testing requirements and techniques.

4. CONTROL DYNAMICS

a. General. The characteristics of a helicopter flight control system have a major effect on the handling qualities. A significant consideration in pilot acceptability of a helicopter is the ''feel'' provided through the flight controls. Considerable effort is expended on helicopter feel system design so that pilots will be comfortable and will consider the helicopter desirable to fly. In order for an FFS to be representative, it should ''feel'' like the helicopter being simulated. Compliance with this requirement is determined by comparing a recording of the control feel dynamics of the FFS to actual helicopter measurements in the hover and cruise configurations.

(1) Recordings such as free response to an impulse or step function are classically used to estimate the dynamic properties of electromechanical systems. In any case, it is only possible to estimate the dynamic properties as a result of only being able to estimate true inputs and responses. Therefore, it is imperative that the best possible data be collected since close matching of the FFS control loading system to the helicopter system is essential. The required dynamic control tests are described in Table C2A of this attachment.

(2) For initial and upgrade evaluations, the QPS requires that control dynamics characteristics be measured and recorded directly from the flight controls (Handling Qualities—Table C2A). This procedure is usually accomplished by measuring the free response of the controls using a step or impulse input to excite the system. The procedure should be accomplished in the hover and cruise flight conditions and configurations.

(3) For helicopters with irreversible control systems, measurements may be obtained on the ground if proper pitot-static inputs are provided to represent airspeeds typical of those encountered in flight. Likewise, it may be shown that for some helicopters, hover, climb, cruise, and autorotation have like effects. Thus, one may suffice for another. If either or both considerations apply, engineering validation or helicopter manufacturer rationale should be submitted as justification for ground tests or for eliminating a configuration. For FFSs requiring static and dynamic tests at the controls, special test fixtures will not be required during initial and upgrade evaluations if the QTG shows both test fixture results and the results of an alternate approach (e.g., computer plots that were produced concurrently and show satisfactory agreement). Repeat of the alternate method during the initial evaluation satisfies this test requirement.

b. Control Dynamics Evaluations. The dynamic properties of control systems are often stated in terms of frequency, damping, and a number of other classical measurements. In order to establish a consistent means of validating test results for FFS control loading, criteria are needed that will clearly define the measurement interpretation and the applied tolerances. Criteria are needed for underdamped, critically damped and overdamped systems. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or overdamped systems, the frequency and damping are not readily measured from a response time history. Therefore, the following suggested measurements may be used:

(1) For Levels C and D simulators. Tests to verify that control feel dynamics represent the helicopter should show that the dynamic damping cycles (free response of the controls) match those of the helicopter within specified tolerances. The NSPM recognizes that several different testing methods may be used to verify the control feel dynamic response. The NSPM will consider the merits of testing methods based on reliability and consistency. One acceptable method of evaluating the response and the tolerance to be applied is described below for the underdamped and critically damped cases. A sponsor using this method to comply with the QPS requirements should perform the tests as follows:

(a) Underdamped Response. Two measurements are required for the period, the time to first zero crossing (in case a rate limit is present) and the subsequent frequency of oscillation. It is necessary to measure cycles on an individual basis in case there are nonuniform periods in the response. Each period will be independently compared to the respective period of the helicopter control system and, consequently, will enjoy the full tolerance specified for that period. The damping tolerance will be applied to overshoots on an individual basis. Care should be

taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 percent of the total initial displacement should be considered significant. The residual band, labeled $T(A_d)$ on Figure C2A is ±5 percent of the initial displacement amplitude $A_d$ from the steady state value of the oscillation. Only oscillations outside the residual band are considered significant. When comparing FFS data to helicopter data, the process should begin by overlaying or aligning the FFS and helicopter steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual periods of oscillation. The FFS should show the same number of significant overshoots to within one when compared against the helicopter data. The procedure for evaluating the response is illustrated in Figure C2A.

(b) Critically damped and Overdamped Response. Due to the nature of critically damped and overdamped responses (no overshoots), the time to reach 90 percent of the steady state (neutral point) value should be the same as the helicopter within ±10 percent. The simulator response must be critically damped also. Figure C2B illustrates the procedure.

(c) Special considerations. Control systems that exhibit characteristics other than classical overdamped or underdamped responses should meet specified tolerances. In addition, special consideration should be given to ensure that significant trends are maintained.

(2) Tolerances.

(a) The following summarizes the tolerances, ''T'' for underdamped systems, and ''n'' is the sequential period of a full cycle of oscillation. See Figure C2A of this attachment for an illustration of the referenced measurements.

| | |
|---|---|
| $T(P_0)$ ..... | ±10% of $P_0$ |
| $T(P_1)$ ..... | ±20% of $P_1$ |
| $T(P_2)$ ..... | ±30% of $P_2$ |
| $T(P_n)$ ..... | ±10(n + 1)% of $P_n$ |
| $T(A_n)$ ..... | ±10% of $A_1$, ±20% of Subsequent Peaks |
| $T(A_d)$ ..... | ±5% of $A_d$ = residual band |

Significant overshoots. First overshoot and ±1 subsequent overshoots

(b) The following tolerance applies to critically damped and overdamped systems only. See Figure C2B for an illustration of the reference measurements:

$T(P_0)$ ..... ±10% of $P_0$

END INFORMATION

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BEGIN QPS REQUIREMENT

c. Alternative method for control dynamics evaluation.

(1) An alternative means for validating control dynamics for aircraft with hydraulically powered flight controls and artificial feel systems is by the measurement of control force and rate of movement. For each axis of pitch, roll, and yaw, the control must be forced to its maximum extreme position for the following distinct rates. These tests are conducted under normal flight and ground conditions.

(a) Static test—Slowly move the control so that a full sweep is achieved within 95–105 seconds. A full sweep is defined as movement of the controller from neutral to the stop, usually aft or right stop, then to the opposite stop, then to the neutral position.

(b) Slow dynamic test—Achieve a full sweep within 8–12 seconds.

(c) Fast dynamic test—Achieve a full sweep in within 3–5 seconds.

NOTE: Dynamic sweeps may be limited to forces not exceeding 100 lbs. (44.5 daN).

(d) Tolerances

(i) Static test—see Table C2A, FFS Objective Tests, Entries 2.a.1., 2.a.2., and 2.a.3.

(ii) Dynamic test—±2 lbs (0.9 daN) or ±10% on dynamic increment above static test.

END QPS REQUIREMENT

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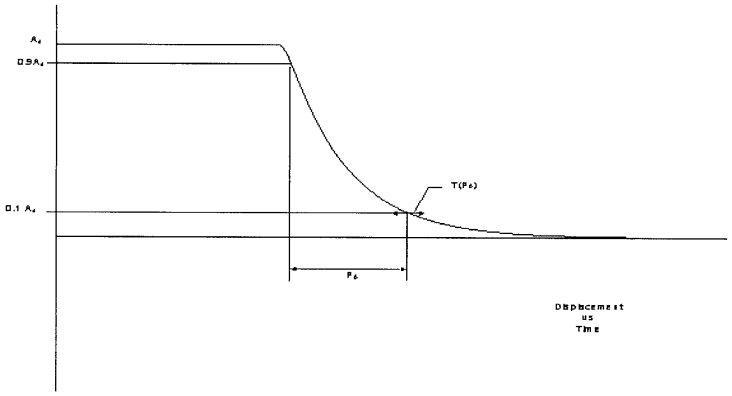
BEGIN INFORMATION

d. The FAA is open to alternative means that are justified and appropriate to the application. For example, the method described here may not apply to all manufacturers systems and certainly not to aircraft with reversible control systems. Each case is considered on its own merit on an ad hoc basis. If the FAA finds that alternative methods do not result in satisfactory performance, more conventionally accepted methods will have to be used.

**Attachment 2 to Appendix C to Part 60—**
**Figure C2A. Under-Damped Step Response**

**Attachment 2 to Appendix C to Part 60—**
**Figure C2B. Critically-Damped Step Response**




END INFORMATION

5. [RESERVED]

BEGIN INFORMATION

6. MOTION SYSTEM.

a. General.

(1) Pilots use continuous information signals to regulate the state of the helicopter. In concert with the instruments and outside-world visual information, whole-body motion feedback is essential in assisting the pilot to

control the helicopter dynamics, particularly in the presence of external disturbances. The motion system should meet basic objective performance criteria, and be subjectively tuned at the pilot's seat position to represent the linear and angular accelerations of the helicopter during a prescribed minimum set of maneuvers and conditions. The response of the motion cueing system should be repeatable.

(2) The Motion System tests in Section 3 of Table C2A are intended to qualify the FFS motion cueing system from a mechanical performance standpoint. Additionally, the list of motion effects provides a representative sample of dynamic conditions that should be present in the flight simulator. An additional list of representative, training-critical maneuvers, selected from Section 1, (Performance tests) and Section 2, (Handling Qualities tests) in Table C2A, that should be recorded during initial qualification (but without tolerance) to indicate the flight simulator motion cueing performance signature have been identified (reference Section 3.e). These tests are intended to help improve the overall standard of FFS motion cueing.

b. Motion System Checks. The intent of test 3a, Frequency Response, test 3b, Leg Balance, and test 3c, Turn-Around Check, as described in the Table of Objective Tests, is to demonstrate the performance of the motion system hardware, and to check the integrity of the motion set-up with regard to calibration and wear. These tests are independent of the motion cueing software and should be considered robotic tests.

c. Motion System Repeatability. The intent of this test is to ensure that the motion system software and motion system hardware have not degraded or changed over time. This diagnostic test should be completed during continuing qualification checks in lieu of the robotic tests. This will allow an improved ability to determine changes in the software or determine degradation in the hardware. The following information delineates the methodology that should be used for this test.

(1) Input: The inputs should be such that rotational accelerations, rotational rates, and linear accelerations are inserted before the transfer from helicopter center of gravity to pilot reference point with a minimum amplitude of 5 deg/sec/sec, 10 deg/sec and 0.3 g, respectively, to provide adequate analysis of the output.

(2) Recommended output:

(a) Actual platform linear accelerations; the output will comprise accelerations due to both the linear and rotational motion acceleration;

(b) Motion actuators position.

d. Motion Cueing Performance Signature.

(1) Background. The intent of this test is to provide quantitative time history records of motion system response to a selected set of automated QTG maneuvers during initial qualification. It is not intended to be a comparison of the motion platform accelerations against the flight test recorded accelerations (i.e., not to be compared against helicopter cueing). If there is a modification to the initially qualified motion software or motion hardware (e.g., motion washout filter, simulator payload change greater than 10%) then a new baseline may need to be established.

(2) Test Selection. The conditions identified in Section 3.e. in Table C2A are those maneuvers where motion cueing is the most discernible. They are general tests applicable to all types of helicopters and should be completed for motion cueing performance signature at any time acceptable to the NSPM prior to or during the initial qualification evaluation, and the results included in the MQTG.

(3) Priority. Motion system should be designed with the intent of placing greater importance on those maneuvers that directly influence pilot perception and control of the helicopter motions. For the maneuvers identified in section 3.e. in Table C2A, the flight simulator motion cueing system should have a high tilt co-ordination gain, high rotational gain, and high correlation with respect to the helicopter simulation model.

(4) Data Recording. The minimum list of parameters provided should allow for the determination of the flight simulator's motion cueing performance signature for the initial qualification evaluation. The following parameters are recommended as being acceptable to perform such a function:

(a) Flight model acceleration and rotational rate commands at the pilot reference point;

(b) Motion actuators position;

(c) Actual platform position;

(d) Actual platform acceleration at pilot reference point.

e. Motion Vibrations.

(1) Presentation of results. The characteristic motion vibrations may be used to verify that the flight simulator can reproduce the frequency content of the helicopter when flown in specific conditions. The test results should be presented as a Power Spectral Density (PSD) plot with frequencies on the horizontal axis and amplitude on the vertical axis. The helicopter data and flight simulator data should be presented in the same format with the same scaling. The algorithms used for generating the flight simulator data should be the same as those used for the helicopter data. If they are not the same then the algorithms used for the flight simulator data should be proven to be sufficiently comparable. As a minimum the results along the dominant axes should be presented and a rationale for not presenting the other axes should be provided.

(2) Interpretation of results. The overall trend of the PSD plot should be considered

while focusing on the dominant frequencies. Less emphasis should be placed on the differences at the high frequency and low amplitude portions of the PSD plot. During the analysis, certain structural components of the flight simulator have resonant frequencies that are filtered and may not appear in the PSD plot. If filtering is required, the notch filter bandwidth should be limited to 1 Hz to ensure that the buffet feel is not adversely affected. In addition, a rationale should be provided to explain that the characteristic motion vibration is not being adversely affected by the filtering. The amplitude should match helicopter data as described below. However, if the PSD plot was altered for subjective reasons, a rationale should be provided to justify the change. If the plot is on a logarithmic scale it may be difficult to interpret the amplitude of the buffet in terms of acceleration. For example, a $1 \times 10^{-3}$ g-rms$^2$/Hz would describe a heavy buffet and may be seen in the deep stall regime. Alternatively, a $1 \times 10^{-6}$ g-rms$^2$/Hz buffet is almost imperceptable, but may represent a flap buffet at low speed. The previous two examples differ in magnitude by 1000. On a PSD plot this represents three decades (one decade is a change in order of magnitude of 10, and two decades is a change in order of magnitude of 100).

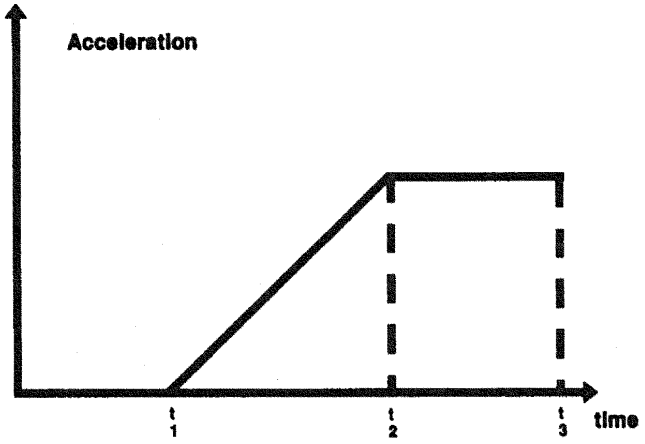
NOTE: In the example, ''g-rms$^2$'' is the mathematical expression for ''g's root mean squared.''

f. Table C2B, Motion System Recommendations for Level C and Level D Helicopter Simulators, contains a description of the parameters that should be present in simulator motion systems to provide adequate onset motion cues to helicopter pilots. The information provided covers the six axes of motion (pitch, roll, yaw, vertical, lateral, and longitudinal) and addresses displacement, velocity, and acceleration. Also included is information about the parameters for initial rotational and linear acceleration. The parameters listed in this table apply only to Level C and Level D simulators, and are presented here as recommended targets for motion system capability. They are not requirements.

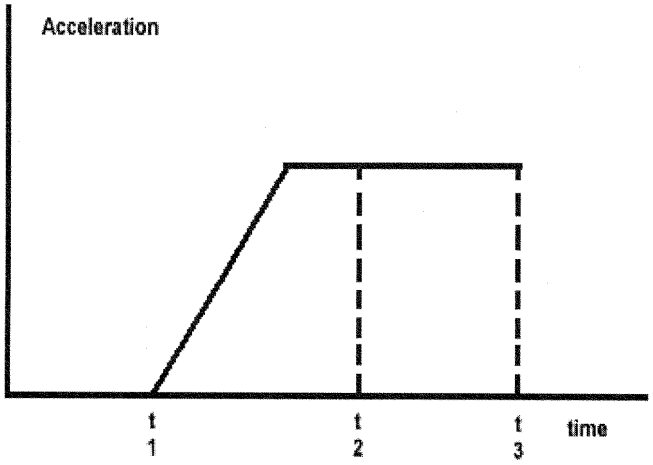
TABLE C2B—MOTION SYSTEM RECOMMENDATIONS FOR LEVEL C AND LEVEL D HELICOPTER SIMULATORS

| | | |
|---|---|---|
| a. ..... | Motion System Envelope | |
| a.1. ..... | Pitch | |
| a.1.a. ..... | Displacement ..... | ±25° |
| a.1.b. ..... | Velocity ..... | ±20°/sec |
| a.1.c. ..... | Acceleration ..... | ±100°/sec$^2$ |
| a.2. ..... | Roll | |
| a.2.a. ..... | Displacement ..... | ±25° |
| a.2.b. ..... | Velocity ..... | ±20°/sec |
| a.2.c. ..... | Acceleration ..... | ±100°/sec$^2$ |
| a.3. ..... | Yaw | |
| a.3.a. ..... | Displacement ..... | ±25° |
| a.3.b. ..... | Velocity— ..... | ±20°/sec |
| a.3.c. ..... | Acceleration ..... | ±100°/sec$^2$ |
| a.4. ..... | Vertical | |
| a.4.a. ..... | Displacement ..... | ±34 in. |
| a.4.b. ..... | Velocity ..... | ±24 in. |
| a.4.c. ..... | Acceleration ..... | ±0.8 g. |
| a.5. ..... | Lateral | |
| a.5.a. ..... | Displacement ..... | ±45 in. |
| a.5.b. ..... | Velocity ..... | ±28 in/sec. |
| a.5.c. ..... | Acceleration ..... | ±0.6 g. |
| a.6. ..... | Longitudinal | |
| a.6.a. ..... | Displacement ..... | ±34 in. |
| a.6.b. ..... | Velocity ..... | ±28 in/sec. |
| a.6.c. ..... | Acceleration ..... | ±0.6 g. |
| a.7. ..... | Initial Rotational Acceleration Ratio. | |
| | | All axes 300°/ sec$^2$/sec |
| a.8. ..... | Initial Linear Acceleration Ratio. | |
| a.8.a. ..... | Vertical ..... | ±6g/sec |
| a.8.b. ..... | Lateral ..... | ±3g/sec |
| a.8.c. ..... | Longitudinal ..... | ±3g/sec |

**Attachment 2 to Appendix C to Part 60—**
**Figure C2C. Acceleration Test Signals**




**Attachment 2 to Appendix C to Part 60—**
**Figure C2D. Test Signal Characteristics**




NOTE: Motion system baseline performance repeatability tests should be repeated if the simulator weight changes for any reason (i.e., visual change or structural change). The new results should be used for future comparison.

7. SOUND SYSTEM

a. General. The total sound environment in the helicopter is very complex, and changes with atmospheric conditions, helicopter configuration, airspeed, altitude, and power settings. Flight deck sounds are an important component of the flight deck operational environment and provide valuable information

to the flight crew. These aural cues can either assist the crew (as an indication of an abnormal situation), or hinder the crew (as a distraction or nuisance). For effective training, the flight simulator should provide flight deck sounds that are perceptible to the pilot during normal and abnormal operations, and that are comparable to those of the helicopter. The flight simulator operator should carefully evaluate background noises in the location where the device will be installed. To demonstrate compliance with the sound requirements, the objective or validation tests in this attachment were selected to provide a representative sample of normal static conditions typically experienced by a pilot.

b. Alternate propulsion. For FFS with multiple propulsion configurations, any condition listed in Table C2A in this attachment should be presented for evaluation as part of the QTG if identified by the helicopter manufacturer or other data supplier as significantly different due to a change in propulsion system (engine or propeller).

c. Data and Data Collection System.

(1) Information provided to the flight simulator manufacturer should comply be presented in the format suggested by the ''International Air Transport Association (IATA) Flight Simulator Design and Performance Data Requirements,'' as amended. This information should contain calibration and frequency response data.

(2) The system used to perform the tests listed in Table C2A should comply with the following standards:

(a) The specifications for octave, half octave, and third octave band filter sets may be found in American National Standards Institute (ANSI) S1.11–1986.

(b) Measurement microphones should be type WS2 or better, as described in International Electrotechnical Commission (IEC) 1094–4–1995.

(3) Headsets. If headsets are used during normal operation of the helicopter they should also be used during the flight simulator evaluation.

(4) Playback equipment. Playback equipment and recordings of the QTG conditions should be provided during initial evaluations.

(5) Background noise.

(a) Background noise is the noise in the flight simulator that is not associated with the helicopter, but is caused by the flight simulator's cooling and hydraulic systems and extraneous noise from other locations in the building. Background noise can seriously impact the correct simulation of helicopter sounds, and should be kept below the helicopter sounds. In some cases, the sound level of the simulation can be increased to compensate for the background noise. However, this approach is limited by the specified tolerances and by the subjective acceptability of the sound environment to the evaluation pilot.

(b) The acceptability of the background noise levels is dependent upon the normal sound levels in the helicopter being represented. Background noise levels that fall below the lines defined by the following points, may be acceptable:

(i) 70 dB @ 50 Hz;

(ii) 55 dB @ 1000 Hz;

(iii) 30 dB @ 16 kHz.

(NOTE: These limits are for unweighted ⅓ octave band sound levels. Meeting these limits for background noise does not ensure an acceptable flight simulator. Helicopter sounds that fall below this limit require careful review and may require lower limits on background noise.)

(6) Validation testing. Deficiencies in helicopter recordings should be considered when applying the specified tolerances to ensure that the simulation is representative of the helicopter. Examples of typical deficiencies are:

(a) Variation of data between tail numbers.

(b) Frequency response of microphones.

(c) Repeatability of the measurements.

TABLE C2C—EXAMPLE OF CONTINUING QUALIFICATION FREQUENCY RESPONSE TEST TOLERANCE

| Band center frequency | Initial results (dBSPL) | Continuing qualification results (dBSPL) | Absolute difference |
|---|---|---|---|
| 50 | 75.0 | 73.8 | 1.2 |
| 63 | 75.9 | 75.6 | 0.3 |
| 80 | 77.1 | 76.5 | 0.6 |
| 100 | 78.0 | 78.3 | 0.3 |
| 125 | 81.9 | 81.3 | 0.6 |
| 160 | 79.8 | 80.1 | 0.3 |
| 200 | 83.1 | 84.9 | 1.8 |
| 250 | 78.6 | 78.9 | 0.3 |
| 315 | 79.5 | 78.3 | 1.2 |
| 400 | 80.1 | 79.5 | 0.9 |
| 500 | 80.7 | 79.8 | 0.9 |
| 630 | 81.9 | 80.4 | 1.5 |
| 800 | 73.2 | 74.1 | 0.9 |
| 1000 | 79.2 | 80.1 | 0.9 |
| 1250 | 80.7 | 82.8 | 2.1 |
| 1600 | 81.6 | 78.6 | 3.0 |
| 2000 | 76.2 | 74.4 | 1.8 |
| 2500 | 79.5 | 80.7 | 1.2 |
| 3150 | 80.1 | 77.1 | 3.0 |
| 4000 | 78.9 | 78.6 | 0.3 |
| 5000 | 80.1 | 77.1 | 3.0 |
| 6300 | 80.7 | 80.4 | 0.3 |
| 8000 | 84.3 | 85.5 | 1.2 |
| 10000 | 81.3 | 79.8 | 1.5 |
| 12500 | 80.7 | 80.1 | 0.6 |
| 16000 | 71.1 | 71.1 | 0.0 |
| | Average | | 1.1 |

8. ADDITIONAL INFORMATION ABOUT FLIGHT SIMULATOR QUALIFICATION FOR NEW OR DERIVATIVE HELICOPTERS

a. Typically, a helicopter manufacturer's approved final data for performance, handling qualities, systems or avionics is not available until well after a new or derivative helicopter has entered service. However, flight crew training and certification often begins several months prior to the entry of the first helicopter into service. Consequently, it may be necessary to use preliminary data provided by the helicopter manufacturer for interim qualification of flight simulators.

b. In these cases, the NSPM may accept certain partially validated preliminary helicopter and systems data, and early release (''red label'') avionics data in order to permit the necessary program schedule for training, certification, and service introduction.

c. Simulator sponsors seeking qualification based on preliminary data should consult the NSPM to make special arrangements for using preliminary data for flight simulator qualification. The sponsor should also consult the helicopter and flight simulator manufacturers to develop a data plan and flight simulator qualification plan.

d. The procedure to be followed to gain NSPM acceptance of preliminary data will vary from case to case and between helicopter manufacturers. Each helicopter manufacturer's new helicopter development and test program is designed to suit the needs of the particular project and may not contain the same events or sequence of events as another manufacturer's program or even the same manufacturer's program for a different helicopter. Therefore, there cannot be a prescribed invariable procedure for acceptance of preliminary data; instead there should be a statement describing the final sequence of events, data sources, and validation procedures agreed by the simulator sponsor, the helicopter manufacturer, the flight simulator manufacturer, and the NSPM.

NOTE: A description of helicopter manufacturer-provided data needed for flight simulator modeling and validation is to be found in the ''Royal Aeronautical Society Data Package Requirements for Design and Performance Evaluation of Rotary Wing Synthetic Training Devices.''

e. The preliminary data should be the manufacturer's best representation of the helicopter, with assurance that the final data will not deviate significantly from the preliminary estimates. Data derived from these predictive or preliminary techniques should be validated by available sources including, at least, the following:

(1) Manufacturer's engineering report. The report should explain the predictive method used and illustrate past success of the method on similar projects. For example, the manufacturer could show the application of the method to an earlier helicopter model or predict the characteristics of an earlier model and compare the results to final data for that model.

(2) Early flight test results. This data is often derived from helicopter certification tests and should be used to maximum advantage for early flight simulator validation. Certain critical tests that would normally be done early in the helicopter certification program should be included to validate essential pilot training and certification maneuvers. These tests include cases where a pilot is expected to cope with a helicopter failure mode or an engine failure. The early data available will depend on the helicopter manufacturer's flight test program design and may not be the same in each case. The flight test program of the helicopter manufacturer should include provisions for generation of very early flight tests results for flight simulator validation.

f. The use of preliminary data is not indefinite. The helicopter manufacturer's final data should be available within 12 months after the helicopter first entry into service or as agreed by the NSPM, the simulator sponsor, and the helicopter manufacturer. When applying for interim qualification using preliminary data, the simulator sponsor and the NSPM should agree on the update program. This includes specifying that the final data update will be installed in the flight simulator within a period of 12 months following the final data release, unless special conditions exist and a different schedule is acceptable. The flight simulator performance and handling validation would then be based on data derived from flight tests. Initial helicopter systems data should be updated after engineering tests. Final helicopter systems data should also be used for flight simulator programming and validation.

g. Flight simulator avionics should stay essentially in step with helicopter avionics (hardware and software) updates. The permitted time lapse between helicopter and flight simulator updates should be minimal. It may depend on the magnitude of the update and whether the QTG and pilot training and certification are affected. Differences in helicopter and flight simulator avionics versions and the resulting effects on flight simulator qualification should be agreed between the simulator sponsor and the NSPM. Consultation with the flight simulator manufacturer is desirable throughout the qualification process.

h. The following describes an example of the design data and sources that might be used in the development of an interim qualification plan.

(1) The plan should consist of the development of a QTG based upon a mix of flight test and engineering simulation data. For

data collected from specific helicopter flight tests or other flights the required design model or data changes necessary to support an acceptable Proof of Match (POM) should be generated by the helicopter manufacturer.

(2) For proper validation of the two sets of data, the helicopter manufacturer should compare their simulation model responses against the flight test data, when driven by the same control inputs and subjected to the same atmospheric conditions as recorded in the flight test. The model responses should result from a simulation where the following systems are run in an integrated fashion and are consistent with the design data released to the flight simulator manufacturer:

(a) Propulsion.

(b) Aerodynamics.

(c) Mass properties.

(d) Flight controls.

(e) Stability augmentation.

(f) Brakes/landing gear.

i. A qualified test pilot should be used to assess handling qualities and performance evaluations for the qualification of flight simulators of new helicopter types.

END INFORMATION

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BEGIN QPS REQUIREMENT

9. ENGINEERING SIMULATOR—VALIDATION DATA

a. When a fully validated simulation (i.e., validated with flight test results) is modified due to changes to the simulated helicopter configuration, the helicopter manufacturer or other acceptable data supplier must coordinate with the NSPM to supply validation data from an ''audited'' engineering simulator/simulation to selectively supplement flight test data. The NSPM must be provided an opportunity to audit the use of the engineering simulation or the engineering simulator during the acquisition of the data that will be used as validation data. Audited data may be used for changes that are incremental in nature. Manufacturers or other data suppliers must be able to demonstrate that the predicted changes in helicopter performance are based on acceptable aeronautical principles with proven success history and valid outcomes. This must include comparisons of predicted and flight test validated data.

b. Helicopter manufacturers or other acceptable data suppliers seeking to use an engineering simulator for simulation validation data as an alternative to flight-test derived validation data, must contact the NSPM and provide the following:

(1) A description of the proposed aircraft changes, a description of the proposed simulation model changes, and the use of an integral configuration management process, including an audit of the actual simulation model modifications that includes a step-by-step description leading from the original model(s) to the current model(s).

(2) A schedule for review by the NSPM of the proposed plan and the subsequent validation data to establish acceptability of the proposal.

(3) Validation data from an audited engineering simulator/simulation to supplement specific segments of the flight test data.

c. To be qualified to supply engineering simulator validation data, for aerodynamic, engine, flight control, or ground handling models, a helicopter manufacturer or other acceptable data supplier must:

(1) Be able to verify their ability to:

(a) Develop and implement high fidelity simulation models; and

(b) Predict the handling and performance characteristics of a helicopter with sufficient accuracy to avoid additional flight test activities for those handling and performance characteristics.

(2) Have an engineering simulator that:

(a) Is a physical entity, complete with a flight deck representative of the simulated class of helicopter;

(b) Has controls sufficient for manual flight;

(c) Has models that run in an integrated manner;

(d) Had fully flight-test validated simulation models as the original or baseline simulation models;

(e) Has an out-of-the-flight deck visual system;

(f) Has actual avionics boxes interchangeable with the equivalent software simulations to support validation of released software;

(g) Uses the same models as released to the training community (which are also used to produce stand-alone proof-of-match and checkout documents);

(h) Is used to support helicopter development and certification; and

(i) Has been found to be a high fidelity representation of the helicopter by the manufacturer's pilots (or other acceptable data supplier), certificate holders, and the NSPM.

(3) Use the engineering simulator to produce a representative set of integrated proof-of-match cases.

(4) Use a configuration control system covering hardware and software for the operating components of the engineering simulator.

(5) Demonstrate that the predicted effects of the change(s) are within the provisions of sub-paragraph ''a'' of this section, and confirm that additional flight test data are not required.

d. Additional Requirements for Validation Data

(1) When used to provide validation data, an engineering simulator must meet the simulator standards currently applicable to

training simulators except for the data package.

(2) The data package used must be:

(a) Comprised of the engineering predictions derived from the helicopter design, development, or certification process;

(b) Based on acceptable aeronautical principles with proven success history and valid outcomes for aerodynamics, engine operations, avionics operations, flight control applications, or ground handling;

(c) Verified with existing flight-test data; and

(d) Applicable to the configuration of a production helicopter, as opposed to a flight-test helicopter.

(3) Where engineering simulator data are used as part of a QTG, an essential match must exist between the training simulator and the validation data.

(4) Training flight simulator(s) using these baseline and modified simulation models must be qualified to at least internationally recognized standards, such as contained in the ICAO Document 9625, the ''Manual of Criteria for the Qualification of Flight Simulators.''

END QPS REQUIREMENT

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10. [RESERVED]

11. VALIDATION TEST TOLERANCES

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BEGIN INFORMATION

a. Non-Flight-Test Tolerances. If engineering simulator data or other non-flight-test data are used as an allowable form of reference validation data for the objective tests listed in Table C2A of this attachment, the data provider must supply a well-documented mathematical model and testing procedure that enables a replication of the engineering simulation results within 20% of the corresponding flight test tolerances.

b. Background

(1) The tolerances listed in Table C2A of this attachment are designed to measure the quality of the match using flight-test data as a reference.

(2) Good engineering judgment should be applied to all tolerances in any test. A test is failed when the results fall outside of the prescribed tolerance(s).

(3) Engineering simulator data are acceptable because the same simulation models used to produce the reference data are also used to test the flight training simulator (i.e., the two sets of results should be ''essentially'' similar).

(4) The results from the two sources may differ for the following reasons:

(a) Hardware (avionics units and flight controls);

(b) Iteration rates;

(c) Execution order;

(d) Integration methods;

(e) Processor architecture;

(f) Digital drift, including:

(i) Interpolation methods;

(ii) Data handling differences;

(iii) Auto-test trim tolerances.

(5) The tolerance limit between the reference data and the flight simulator results is generally 20% of the corresponding ''flight-test'' tolerances. However, there may be cases where the simulator models used are of higher fidelity, or the manner in which they are cascaded in the integrated testing loop have the effect of a higher fidelity, than those supplied by the data provider. Under these circumstances, it is possible that an error greater than 20% may be generated. An error greater than 20% may be acceptable if the simulator sponsor can provide an adequate explanation.

(6) Guidelines are needed for the application of tolerances to engineering-simulator-generated validation data because:

(a) Flight-test data are often not available due to sound technical reasons;

(b) Alternative technical solutions are being advanced; and

(c) The costs are high.

12. VALIDATION DATA ROADMAP

a. Helicopter manufacturers or other data suppliers should supply a validation data roadmap (VDR) document as part of the data package. A VDR document contains guidance material from the helicopter validation data supplier recommending the best possible sources of data to be used as validation data in the QTG. A VDR is of special value when requesting interim qualification, qualification of simulators for helicopters certificated prior to 1992, and qualification of alternate engine or avionics fits. A sponsor seeking to have a device qualified in accordance with the standards contained in this QPS appendix should submit a VDR to the NSPM as early as possible in the planning stages. The NSPM is the final authority to approve the data to be used as validation material for the QTG. The NSPM and the Joint Aviation Authorities' Synthetic Training Devices Advisory Board have committed to maintain a list of agreed VDRs.

b. The VDR should identify (in matrix format) sources of data for all required tests. It should also provide guidance regarding the validity of these data for a specific engine type, thrust rating configuration, and the revision levels of all avionics affecting helicopter handling qualities and performance. The VDR should include rationale or explanation in cases where data or parameters are missing, engineering simulation data are to be used, flight test methods require explanation, or where there is any deviation from

data requirements. Additionally, the document should refer to other appropriate sources of validation data (e.g., sound and vibration data documents).

c. The Sample Validation Data Roadmap (VDR) for helicopters, shown in Table C2D, depicts a generic roadmap matrix identifying sources of validation data for an abbreviated list of tests. This sample document uses fixed wing parameters instead of helicopter values. It is merely a sample and does not provide actual data. A complete matrix should address all test conditions for helicopter application and provide actual data and data sources.

d. Two examples of rationale pages are presented in Appendix F of IATA Flight Simulator Design and Performance Data Requirements document. These illustrate the type of helicopter and avionics configuration information and descriptive engineering rationale used to describe data anomalies or provide an acceptable basis for using alternative data for QTG validation requirements.

END INFORMATION

| ICAO or IATA # | Test Description | CCA Mode | Validation Source | | Validation Document | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aircraft Flight Test Data | Engineering Simulator Data (DEF-73 Engines) | Aerodynamics POM Doc.#xxx123, Rev. A | Flight Controls POM Doc.#xxx456, NEW | Ground Handling POM Doc. #xxx789, Rev. B | Propulsion POM Doc. #321, Rev. C | Integrated POM Doc. #xxx654, Rev. A | Appendix to this VDR Doc. #xxx987, NEW | *Legend:*<br>D71 = Engine Type (Thrust Rating of 71.5K)<br>D73 = Engine Type (Thrust Rating of 73K)<br><br>Bold upper case = primary validation source.<br><br>Lower case, within parentheses = alternative validation source.<br><br>R = Rationale included in the data package Appendix. |
| *Notes:*<br>1. Only one page is shown; and some test conditions were deleted for brevity.<br>2. Relevant regulatory material should be consulted and all applicable tests addressed.<br>3. Validation source, document and comments provided herein are for reference only and do not constitute approval for use.<br>4. CCA mode must be described for each test condition.<br>5. If more than one aircraft type (e.g., derivative and baseline) are used as validation data more columns may be necessary. | | | | | | | | | | | |
| 1.a.1. | Minimum Radius Turn. | | X | | | D71 | | | | | |
| 1.a.2. | Rate of Turn vs. Nosewheel Angle (2 speeds). | | X | | | D71 | | | | | |
| 1.b.1. | Ground Acceleration Time and Distance. | | X | | | (d73) | | D73 | | | Primary data contained in IPOM. |
| 1.b.2. | Minimum Control Speed, Ground (Vmcg). | | (x) | X | (d71) | | | | | D73 | See engineering rationale for test data in VDR. |
| 1.b.3. | Minimum Unstick Speed (Vmu). | | X | | D71 | | | | | | |
| 1.b.4. | Normal Takeoff. | | X | | (d73) | | | | D73 | | Primary data contained in IPOM. |
| 1.b.5. | Critical Engine Failure on Takeoff. | | X | | (d71) | | | | | D73 | Alternative engine thrust rating flight test data in VDR. |
| 1.b.6. | Crosswind Takeoff. | | X | | (d71) | | | | | D73 | Alternative engine thrust rating flight test data in VDR. |
| 1.b.7. | Rejected Takeoff. | | X | | D71 | | | | | R | Test procedure anomaly; see rationale. |
| 1.b.8. | Dynamic Engine Failure After Takeoff. | | | X | | | | | | D73 | No flight test data available; see rationale. |
| 1.c.1. | Normal Climb – All Engines. | | X | | (d71) | | | | D71 | | Primary data contained in IPOM. |
| 1.c.2. | Climb – Engine-out, Second Segment. | | X | | (d71) | | | | | D73 | Alternative engine thrust rating flight test data in VDR. |
| 1.c.3. | Climb – Engine-out, Enroute. | | X | | (d71) | | | | | D73 | AFM data available (73K). |
| 1.c.4. | Engine-out, Approach Climb. | | X | | D71 | | | | | | |
| 1.c.5.a. | Level Flight Acceleration. | | (x) | X | (d73) | | | | | D73 | Eng sim data w/ modified EEC accel rate in VDR. |
| 1.c.5.b. | Level Flight Deceleration. | | (x) | X | (d73) | | | | | D73 | Eng sim data w/ modified EEC accel rate in VDR. |
| 1.d.1. | Cruise Performance. | | X | | D71 | | | | | | |
| 1.e.1.a. | Stopping Time & Distance (Wheel brakes / Light weight). | | | X | D71 | | | | | (d73) | No flight test data available; see rationale. |
| 1.e.1.b. | Stopping Time & Distance (Wheel brakes/ Med. weight). | | X | (x) | D71 | | | | | (d73) | |
| 1.e.1.c. | Stopping Time & Distance (Wheel brakes / Heavy weight). | | X | (x) | D71 | | | | | (d73) | |
| 1.e.2.a. | Stopping Time & Distance (Reverse thrust / Light weight). | | X | (x) | D71 | | | | | (d73) | |
| 1.e.2.b. | Stopping Time & Distance (Reverse thrust / Med. Weight). | | | X | (d71) | | | | | D73 | No flight test data available; see rationale. |

BEGIN INFORMATION

13. [RESERVED]

14. ACCEPTANCE GUIDELINES FOR ALTERNATIVE AVIONICS (FLIGHT-RELATED COMPUTERS AND CONTROLLERS)

a. Background

(1) For a new helicopter type, the majority of flight validation data are collected on the first helicopter configuration with a ''baseline'' flight-related avionics ship-set; (see subparagraph b.(2) of this section). These data are then used to validate all flight simulators representing that helicopter type.

(2) Additional validation data may be needed for flight simulators representing a helicopter with avionics of a different hardware design than the baseline, or a different software revision than that of previously validated configurations.

(3) When a flight simulator with additional or alternate avionics configurations is to be qualified, the QTG should contain tests against validation data for selected cases where avionics differences are expected to be significant.

b. Approval Guidelines For Validating Alternate Avionics

(1) The following guidelines apply to flight simulators representing helicopters with a revised avionics configuration, or more than one avionics configuration.

(2) The baseline validation data should be based on flight test data, except where other data are specifically allowed (e.g., engineering flight simulator data).

(3) The helicopter avionics can be segmented into two groups, systems or components whose functional behavior contributes to the aircraft response presented in the QTG results, and systems that do not. The following avionics are examples of contributory systems for which hardware design changes or software revisions may lead to significant differences in the aircraft response relative to the baseline avionics configuration: Flight control computers and controllers for engines, autopilot, braking system, and nosewheel steering system, if applicable. Related avionics such as augmentation systems should also be considered.

(4) The acceptability of validation data used in the QTG for an alternative avionics fit should be determined as follows:

(a) For changes to an avionics system or component that do not affect QTG validation test response, the QTG test can be based on validation data from the previously validated avionics configuration.

(b) For an avionics change to a contributory system, where a specific test is not affected by the change (e.g., the avionics change is a Built In Test Equipment (BITE) update or a modification in a different flight phase), the QTG test can be based on validation data from the previously-validated avionics configuration. The QTG should include authoritative justification (e.g., from the helicopter manufacturer or system supplier) that this avionics change does not affect the test.

(c) For an avionics change to a contributory system, the QTG may be based on validation data from the previously-validated avionics configuration if no new functionality is added and the impact of the avionics change on the helicopter response is based on acceptable aeronautical principles with proven success history and valid outcomes. This should be supplemented with avionics-specific validation data from the helicopter manufacturer's engineering simulation, generated with the revised avionics configuration. The QTG should include an explanation of the nature of the change and its effect on the helicopter response.

(d) For an avionics change to a contributory system that significantly affects some tests in the QTG, or where new functionality is added, the QTG should be based on validation data from the previously validated avionics configuration and supplemental avionics-specific flight test data sufficient to validate the alternate avionics revision. Additional flight test validation data may not be needed if the avionics changes were certified without the need for testing with a comprehensive flight instrumentation package. The helicopter manufacturer should coordinate flight simulator data requirements in advance with the NSPM.

(5) A matrix or ''roadmap'' should be provided with the QTG indicating the appropriate validation data source for each test. The roadmap should include identification of the revision state of those contributory avionics systems that could affect specific test responses.

15. TRANSPORT DELAY TESTING

a. This paragraph describes how to determine the introduced transport delay through the flight simulator system so that it does not exceed a specific time delay. The transport delay should be measured from control inputs through the interface, through each of the host computer modules and back through the interface to motion, flight instrument, and visual systems. The transport delay should not exceed the maximum allowable interval.

b. Four specific examples of transport delay are:

(1) Simulation of classic non-computer controlled aircraft;

(2) Simulation of Computer Controlled Aircraft using real helicopter black boxes;

(3) Simulation of Computer Controlled Aircraft using software emulation of helicopter boxes;

(4) Simulation using software avionics or rehosted instruments.

c. Figure C2C illustrates the total transport delay for a non-computer-controlled helicopter or the classic transport delay test. Since there are no helicopter-induced delays for this case, the total transport delay is equivalent to the introduced delay.

d. Figure C2D illustrates the transport delay testing method using the real helicopter controller system.

e. To obtain the induced transport delay for the motion, instrument and visual signal, the delay induced by the helicopter controller should be subtracted from the total transport delay. This difference represents the introduced delay and should not exceed the standards prescribed in Table C1A.

f. Introduced transport delay is measured from the flight deck control input to the reaction of the instruments and motion and visual systems (See Figure C2C).

g. The control input may also be introduced after the helicopter controller system input and the introduced transport delay may be measured directly from the control input to the reaction of the instruments, and simulator motion and visual systems (See Figure C2D).

h. Figure C2E illustrates the transport delay testing method used on a flight simulator that uses a software emulated helicopter controller system.

i. It is not possible to measure the introduced transport delay using the simulated helicopter controller system architecture for the pitch, roll and yaw axes. Therefore, the signal should be measured directly from the pilot controller. The flight simulator manufacturer should measure the total transport delay and subtract the inherent delay of the actual helicopter components because the real helicopter controller system has an inherent delay provided by the helicopter manufacturer. The flight simulator manufacturer should ensure that the introduced delay does not exceed the standards prescribed in Table C1A.

j. Special measurements for instrument signals for flight simulators using a real helicopter instrument display system instead of a simulated or re-hosted display. For flight instrument systems, the total transport delay should be measured and the inherent delay of the actual helicopter components subtracted to ensure that the introduced delay does not exceed the standards prescribed in Table C1A.

(1) Figure C2FA illustrates the transport delay procedure without helicopter display simulation. The introduced delay consists of the delay between the control movement and the instrument change on the data bus.

(2) Figure C2FB illustrates the modified testing method required to measure introduced delay due to software avionics or rehosted instruments. The total simulated instrument transport delay is measured and the helicopter delay should be subtracted from this total. This difference represents the introduced delay and should not exceed the standards prescribed in Table C1A. The inherent delay of the helicopter between the data bus and the displays is indicated in figure C2FA. The display manufacturer should provide this delay time.

k. Recorded signals. The signals recorded to conduct the transport delay calculations should be explained on a schematic block diagram. The flight simulator manufacturer should also provide an explanation of why each signal was selected and how they relate to the above descriptions.

l. Interpretation of results. Flight simulator results vary over time from test to test due to ''sampling uncertainty.'' All flight simulators run at a specific rate where all modules are executed sequentially in the host computer. The flight controls input can occur at any time in the iteration, but these data will not be processed before the start of the new iteration. For example, a flight simulator running at 60 Hz may have a difference of as much as 16.67 msec between results. This does not mean that the test has failed. Instead, the difference is attributed to variation in input processing. In some conditions, the host simulator and the visual system do not run at the same iteration rate, so the output of the host computer to the visual system will not always be synchronized.

m. The transport delay test should account for both daylight and night modes of operation of the visual system. In both cases, the tolerances prescribed in Table C1A should be met and the motion response should occur before the end of the first video scan containing new information.

**Figure C2E**
**Transport Delay for simulation of classic non-Computer Controlled Aircraft.**

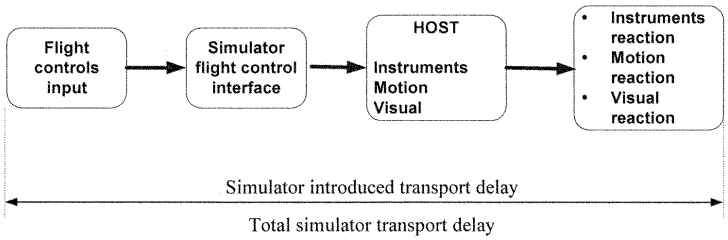



**Figure C2F**
**Transport Delay for simulation of Computer Controlled Aircraft using real helicopter black boxes**

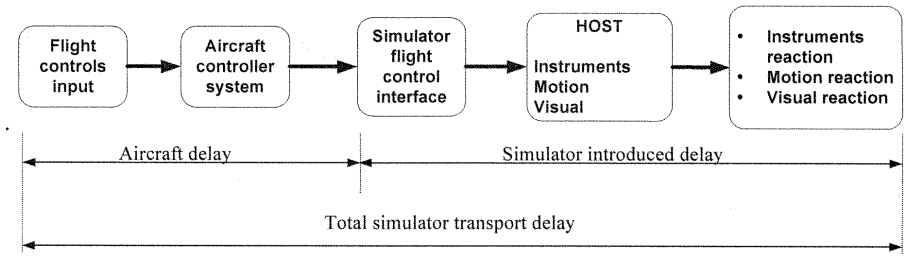


**Figure C2G**
**Transport Delay for simulation of Computer Controlled Aircraft using software emulation of helicopter boxes**

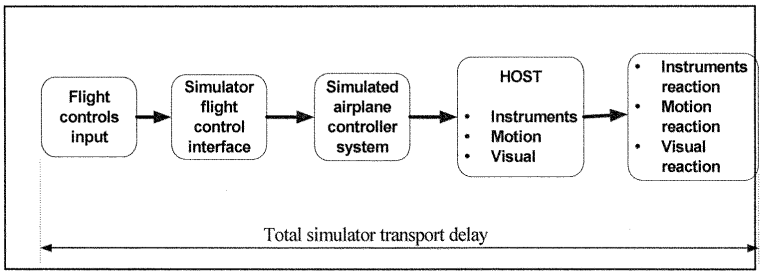
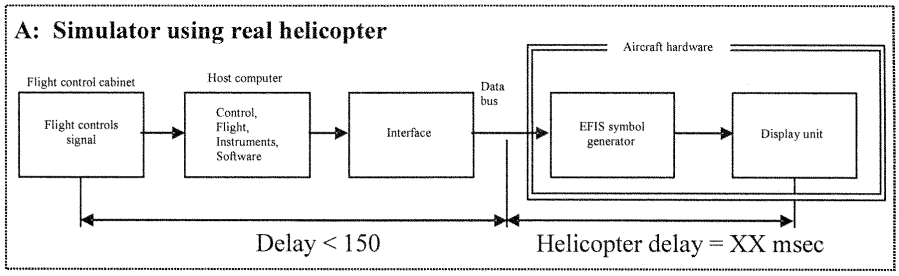
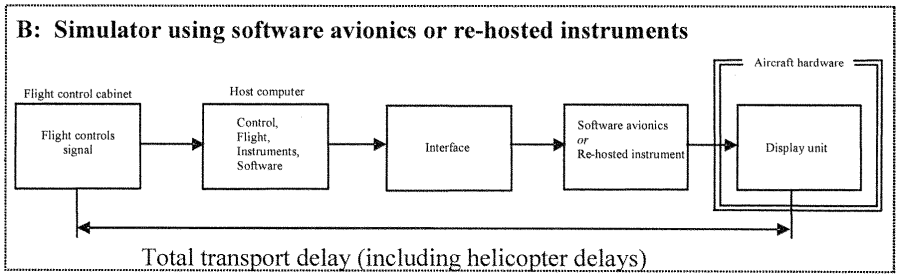



**Figure C2HA and C2HB**
**Transport delay for simulation of helicopters using real or re-hosted instrument drivers**




16. CONTINUING QUALIFICATION EVALUATIONS—VALIDATION TEST DATA PRESENTATION

a. Background

(1) The MQTG is created during the initial evaluation of a flight simulator. This is the master document, as amended, to which flight simulator continuing qualification evaluation test results are compared.

(2) The currently accepted method of presenting continuing qualification evaluation test results is to provide flight simulator results over-plotted with reference data. Test results are carefully reviewed to determine if the test is within the specified tolerances. This can be a time consuming process, particularly when reference data exhibits rapid variations or an apparent anomaly requiring engineering judgment in the application of

the tolerances. In these cases, the solution is to compare the results to the MQTG. The continuing qualification results are compared to the results in the MQTG for acceptance. The flight simulator operator and the NSPM should look for any change in the flight simulator performance since initial qualification.

b. Continuing Qualification Evaluation Test Results Presentation

(1) Flight simulator operators are encouraged to over-plot continuing qualification validation test results with MQTG flight simulator results recorded during the initial evaluation and as amended. Any change in a validation test will be readily apparent. In addition to plotting continuing qualification validation test and MQTG results, operators may elect to plot reference data.

(2) There are no suggested tolerances between flight simulator continuing qualification and MQTG validation test results. Investigation of any discrepancy between the MQTG and continuing qualification flight simulator performance is left to the discretion of the flight simulator operator and the NSPM.

(3) Differences between the two sets of results, other than variations attributable to repeatability issues that cannot be explained should be investigated.

(4) The flight simulator should retain the ability to over-plot both automatic and manual validation test results with reference data.

END INFORMATION

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BEGIN QPS REQUIREMENTS

17. ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION: LEVEL B SIMULATORS ONLY

a. Sponsors are not required to use the alternative data sources, procedures, and instrumentation. However, any sponsor choosing to use alternative sources must comply with the requirements in Table C2E.

END QPS REQUIREMENTS

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BEGIN INFORMATION

b. It has become standard practice for experienced simulator manufacturers to use such techniques as a means of establishing data bases for new simulator configurations while awaiting the availability of actual flight test data. The data generated from the aerodynamic modeling techniques is then compared to the flight test data when it becomes available. The results of such comparisons have become increasingly consistent, indicating that these techniques, applied with appropriate experience, are dependable and accurate for the development of aerodynamic models for use in Level B simulators.

c. Based on this history of successful comparisons, the NSPM has concluded that those who are experienced in the development of aerodynamic models for simulator application can successfully use these modeling techniques to alter the method for acquiring flight test data for Level B simulators.

d. The information in Table C2E (Alternative Data Sources, Procedures, and Information) is presented to describe an acceptable alternative to data sources for simulator modeling and validation and an acceptable alternative to the procedures and instrumentation traditionally used to gather such modeling and validation data.

(1) Alternative data sources that may be used for part or all of a data requirement are the Helicopter Maintenance Manual, the Rotorcraft Flight Manual (RFM), Helicopter Design Data, the Type Inspection Report (TIR), Certification Data or acceptable supplemental flight test data.

(2) The sponsor should coordinate with the NSPM prior to using alternative data sources in a flight test or data gathering effort.

e. The NSPM position on the use of these alternative data sources, procedures, and instrumentation is based on the use of a rigorously defined and fully mature simulation controls system model that includes accurate gearing and cable stretch characteristics (where applicable), determined from actual aircraft measurements. The model does not require control surface position measurements in the flight test objective data in these limited applications.

f. Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated helicopter instruments, including the inclinometer; the force/position measurements of flight deck controls; and a clear visual directional reference for a known magnetic bearing (e.g., a runway centerline). Ground track and wind corrected heading may be used for sideslip angle.

g. The sponsor is urged to contact the NSPM for clarification of any issue regarding helicopters with reversible control systems. This table is not applicable to Computer Controlled Aircraft flight simulators.

h. Use of these alternate data sources, procedures, and instrumentation does not relieve the sponsor from compliance with the balance of the information contained in this document relative to Level B FFSs.

i. The term ''inertial measurement system'' is used in table C2E includes the use of a functional global positioning system (GPS).

j. Synchronized video for the use of alternative data sources, procedures, and instrumentation should have:

(1) sufficient resolution to allow magnification of the display to make appropriate measurement and comparisons; and

(2) sufficient size and incremental marking to allow similar measurement and comparison. The detail provided by the video should provide sufficient clarity and accuracy to measure the necessary parameter(s) to at least ½ of the tolerance authorized for the specific test being conducted and allow an integration of the parameter(s) in question to obtain a rate of change.

END INFORMATION

TABLE C2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION

[The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix C are not used]

| QPS requirements | | | Information |
|---|---|---|---|
| Table of objective tests<br>Test entry number and title | Level By only | Alternative data sources, procedures, and instrumentation | Notes |
| 1.a.1.a. Performance. Engine Start and Accelerations. | X | Data may be acquired using a synchronized video recording of all engine instruments, start buttons, means for fuel introduction and means for moving from ''idle'' to ''flight.'' A stopwatch is necessary. | |
| 1.a.1.b. Performance. Steady State Idle and Operating RPM Conditions. | X | Data may be acquired using a synchronized video recording of all engine instruments, and include the status of the means for moving from ''idle'' to ''flight.''. | |
| 1.a.2. Performance. Power Turbine Speed Trim. | X | Data may be acquired using a synchronized video recording of all engine instruments. Speed trim actuator position may be hand recorded. | |
| 1.a.3. Performance. Engine and Rotor Speed Governing. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.b.1. Performance. On Surface Taxi. Minimum Radius Turn. | X | TIR, AFM, or Design data may be used. | |
| 1.b.2. Performance. On Surface Taxi Rate of Turn vs. Nosewheel Steering Angle. | X | Data may be acquired by using a constant tiller position (measured with a protractor), or full pedal application for steady state turn, and synchronized video of heading indicator. If less than full pedal is used, pedal position must be recorded. | A single procedure may not be adequate for all rotorcraft steering systems. Appropriate measurement procedures must be devised and proposed for NSPM concurrence. |
| 1.b.3. Performance. Taxi ... | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.b.4. Performance. Brake | X | Data may be acquired using a stopwatch and a means for measuring distance such as runway distance markers conforming with runway distance marker standards. | |
| 1.c.1. Performance. Running Takeoff. | X | Preliminary certification data may be used. Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. Collective, cyclic, and pedal position time history must be recorded from the start of collective movement through to normal climb. Indicated torque settings may be hand recorded at the moment of lift-off and in a steady normal climb. | |
| 1.c.2. Performance. One Engine Inoperative (OEI), continued takeoff. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. Collective, cyclic, and pedal position time history must be recorded from the start of collective movement through to normal OEI climb. Indicated torque settings may be hand recorded at the moment of lift-off and in a steady normal OEI climb. | |
| 1.f. Performance. Level Flight. Trimmed Flight Control Positions. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.g. Performance. Normal Climb. Trimmed Flight Control Positions. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.h.1. Descent Performance and Trimmed Flight Control Positions. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |

TABLE C2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

[The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix C are not used]

| QPS requirements | | | Information |
|---|---|---|---|
| Table of objective tests<br>Test entry number and title | Level By only | Alternative data sources, procedures, and instrumentation | Notes |
| 1.h.2. Autorotation Performance and Trimmed Flight Control Positions. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.j.1. Performance. Running Landing All Engines. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.j.2. Performance. Running Landing One Engine Inoperative. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 1.j.3. Performance. Balked Landing. | X | Data may be acquired by using a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. The synchronized video must record the time of the "balk landing" decision. | |
| 2.a.1. Handling Qualities. Static Control Checks. Cyclic Controller Position vs. Force. | X | Control positions can be obtained using continuous control position recordings. Force data may be acquired by using a hand held force gauge so that the forces can be cross-plotted against control position in each of the control axes. | |
| 2.a.2. Handling Qualities. Static Control Checks. Collective/Pedals vs. Force. | X | Control positions can be obtained using continuous control position recordings. Force data may be acquired by using a hand held force gauge so that the forces can be cross-plotted against control position in each of the control axes. | |
| 2.a.3. Handling Qualities. Brake Pedal Force vs. Position. | X | Brake pedal positions can be obtained using continuous position recordings. Force data may be acquired by using a hand held force gauge so that the forces can be cross-plotted against brake pedal position. | |
| 2.a.4. Handling Qualities. Trim System Rate (all applicable systems). | X | Control positions can be obtained using continuous control position recordings plotted against time to provide rate in each applicable system. | |
| 2.a.6. Handling Qualities. Control System Freeplay. | X | Data may be acquired by direct measurement. | |
| 2.c.1. Longitudinal Handling Qualities. Control Response. | X | Data may be acquired by using an inertial measurement system, a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 2.c.2. Longitudinal Handling Qualities. Static Stability. | X | Data may be acquired by using an inertial measurement system, a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 2.c.3.a. Longitudinal Handling Qualities. Dynamic Stability, Long Term Response. | X | Data may be acquired by using an inertial measurement system, a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 2.c.3.b. Longitudinal Handling Qualities. Dynamic Stability, Short Term Response. | X | Data may be acquired by using an inertial measurement system, a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 2.c.4. Longitudinal Handling Qualities. Maneuvering stability. | X | Data may be acquired by using an inertial measurement system, a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 2.d.1.a. Lateral Handling Qualities. Control Response. | X | Data may be acquired by using an inertial measurement system, a synchronized video of the calibrated helicopter instruments and the force/position measurements of flight deck controls. | |
| 2.d.1.b Directional Handling Qualities. Control Response.. | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated helicopter instruments and force/position measurements of flight deck directional controls. | |
| 2.d.2. Handling Qualities. Directional Static Stability. | X | Data may be acquired by using an inertial measurement system and a synchronized video of calibrated helicopter instruments and force/position measurements of flight deck directional controls. | |
| 2.d.3.a. Handling Qualities. Dynamic Lateral and Directional Stability Lateral-Directional Oscillations. | X | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated helicopter instruments, the force/position measurements of flight deck controls, and a stop watch. | |
| 2.d.3.b. Handling Qualities. Dynamic Lateral and Directional Stability Spiral Stability. | X | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated helicopter instruments, the force/position measurements of flight deck controls, and a stop watch. | |

TABLE C2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION—Continued

[The standards in this table are required if the data gathering methods described in paragraph 9 of Appendix C are not used]

| QPS requirements | | | Information |
|---|---|---|---|
| Table of objective tests<br>Test entry number and title | Level By only | Alternative data sources, procedures, and instrumentation | Notes |
| 2.d.3.c. Handling Qualities. Dynamic Lateral and Directional Stability. Adverse/Proverse Yaw. | X | Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated helicopter instruments, the force/position measurements of flight deck controls. | |

BEGIN INFORMATION

18. VISUAL DISPLAY SYSTEMS.

a. Basic principles of a FFS collimated display:

(1) The essential feature of a collimated display is that light rays coming from a given point in a picture are parallel. There are two main implications of the parallel rays:

(a) The viewer's eyes focus at infinity and have zero convergence, providing a cue that the object is distant; and

(b) The angle to any given point in the picture does not change when viewed from a different position so the object behaves geometrically as though it were located at a significant distance from the viewer. These cues are self-consistent, and are appropriate for any object that has been modeled as being at a significant distance from the viewer.

(2) In an ideal situation the rays are perfectly parallel, but most implementations provide only an approximation to the ideal. Typically, an FFS display provides an image located not closer than about 20–33 ft (6–10 m) from the viewer, with the distance varying over the field-of-view. A schematic representation of a collimated display is provided in Figure C2A.

(3) Collimated displays are well suited to many simulation applications as the area of interest is relatively distant from the observer so the angles to objects should remain independent of viewing position. Consider the view of the runway seen by the flight crew lined up on an approach. In the real world, the runway is distant and the light rays from the runway to the eyes are parallel. The runway appears to be straight ahead to both crew members. This situation is well simulated by a collimated display and is presented in Figure C2B. Note that the distance to the runway has been shortened for clarity. If drawn to scale, the runway would be farther away and the rays from the two seats would be closer to being parallel.

(4) While the horizontal field-of-view of a collimated display can be extended to approximately 210°–220°, the vertical field-of-view has been limited to about 40°–45°. These limitations result from tradeoffs in optical quality and interference between the display components and flight deck structures, but were sufficient to meet FFS regulatory approval for Helicopter FFSs. However, recent designs have been introduced with vertical fields of view of up to 60° for helicopter applications.

b. Basic principles of a FFS dome (or non-collimated) display:

(1) The situation in a dome display is shown in Figure C2C. As the angles can be correct for only one eye point at a time, the visual system in the figure has been aligned for the right seat eye point position. The runway appears to be straight ahead of the aircraft for this viewer. For the left seat viewer, however, the runway appears to be somewhat to the right of the aircraft. As the aircraft is still moving towards the runway, the perceived velocity vector will be directed towards the runway and this will be interpreted as the aircraft having some yaw offset.

(2) The situation is substantially different for near field objects encountered in helicopter operations close to the ground. In those cases, objects that should be interpreted as being close to the viewer will be misinterpreted as being distant in a collimated display. The errors can actually be reduced in a dome display.

(3) The field-of-view possible with a dome display can be larger than that of a collimated display. Depending on the configuration, a field-of-view of 240° by 90° is possible and can be exceeded.

c. Additional display considerations

(1) While the situations described above are for discrete viewing positions, the same arguments can be extended to moving eye points produced by the viewer's head movement. In the real world, the parallax effects resulting from head movement provide distance cues. The effect is particularly strong for relative movement of flight deck structure in the near field and modeled objects in the distance. Collimated displays will provide accurate parallax cues for distant objects, but increasingly inaccurate cues for

near field objects. The situation is reversed for dome displays.

(2) Stereopsis cues resulting from the different images presented to each eye for objects relatively close to the viewer also provide depth cues. Again, the collimated and dome displays provide more or less accurate cues depending on the modeled distance of the objects being viewed.

d. Training implications

(1) In view of the basic principles described above, it is clear that neither display approach provides a completely accurate image for all possible object distances. The sponsor should consider the training role of the FFS when configuring the display system to make the optimum choice. Factors that should be considered include relative importance of training tasks at low altitudes, the role of the two crew members in the flying tasks, and the field-of-view required for specific training tasks.

**Plan Views of Collimated and Dome (or Non-collimated) Visual Display Systems**

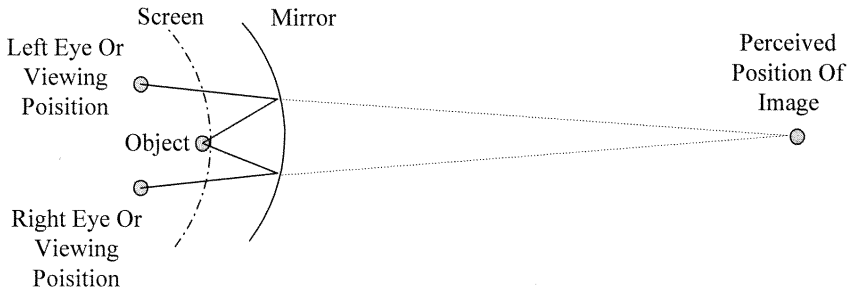


**Figure C2I - Collimated display**

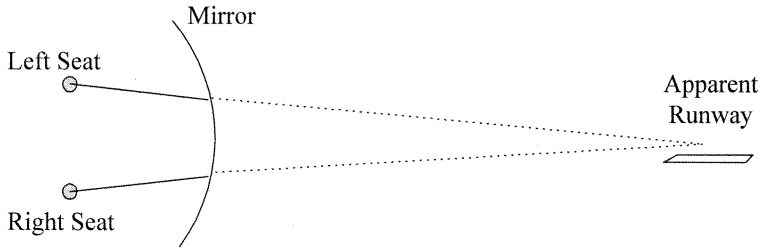


**Figure C2J - Runway view in a collimated display**

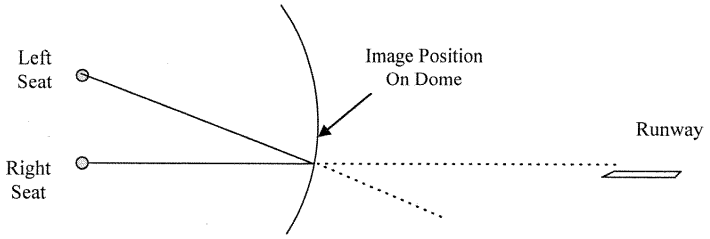


**Figure C2K - Runway view in a dome display**

**End Information**

ATTACHMENT 3 TO APPENDIX C TO PART 60—SIMULATOR SUBJECTIVE EVALUATION

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Except for special use airport models, all airport models required by this part must be representations of real-world, operational airports or representations of fictional airports and must meet the requirements set out in Tables C3B or C3C of this attachment, as appropriate.

b. If fictional airports are used, the sponsor must ensure that navigational aids and all appropriate maps, charts, and other navigational reference material for the fictional

airports (and surrounding areas as necessary) are compatible, complete, and accurate with respect to the visual presentation and airport model of this fictional airport. An SOC must be submitted that addresses navigation aid installation and performance and other criteria (including obstruction clearance protection) for all instrument approaches to the fictional airports that are available in the simulator. The SOC must reference and account for information in the terminal instrument procedures manual and the construction and availability of the required maps, charts, and other navigational material. This material must be clearly marked ''for training purposes only.''

c. When the simulator is being used by an instructor or evaluator for purposes of training, checking, or testing under this chapter, only airport models classified as Class I, Class II, or Class III may be used by the instructor or evaluator. Detailed descriptions/definitions of these classifications are found in Appendix F of this part.

d. When a person sponsors an FFS maintained by a person other than a U.S. certificate holder, the sponsor is accountable for that FFS originally meeting, and continuing to meet, the criteria under which it was originally qualified and the appropriate Part 60 criteria, including the visual scenes and airport models that may be used by instructors or evaluators for purposes of training, checking, or testing under this chapter.

e. Neither Class II nor Class III airport visual models are required to appear on the SOQ, and the method used for keeping instructors and evaluators apprised of the airport models that meet Class II or Class III requirements on any given simulator is at the option of the sponsor, but the method used must be available for review by the TPAA.

f. When an airport model represents a real world airport and a permanent change is made to that real world airport (e.g., a new runway, an extended taxiway, a new lighting system, a runway closure) without a written extension grant from the NSPM (described in paragraph 1.g., of this section), an update to that airport model must be made in accordance with the following time limits:

(1) For a new airport runway, a runway extension, a new airport taxiway, a taxiway extension, or a runway/taxiway closure—within 90 days of the opening for use of the new airport runway, runway extension, new airport taxiway, or taxiway extension; or within 90 days of the closure of the runway or taxiway.

(2) For a new or modified approach light system—within 45 days of the activation of the new or modified approach light system.

(3) For other facility or structural changes on the airport (e.g., new terminal, relocation of Air Traffic Control Tower)—within 180 days of the opening of the new or changed facility or structure.

g. If a sponsor desires an extension to the time limit for an update to a visual scene or airport model or has an objection to what must be updated in the specific airport model requirement, the sponsor must provide a written extension request to the NSPM stating the reason for the update delay and a proposed completion date or provide an explanation for the objection, explaining why the identified airport change will not have an impact on flight training, testing, or checking. A copy of this request or objection must also be sent to the POI/TCPM. The NSPM will send the official response to the sponsor and a copy to the POI/TCPM; however, if there is an objection, after consultation with the appropriate POI/TCPM regarding the training, testing, or checking impact, the NSPM will send the official response to the sponsor and a copy to the POI/TCPM.

END QPS REQUIREMENTS

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BEGIN INFORMATION

2. DISCUSSION

a. The subjective tests provide a basis for evaluating the capability of the simulator to perform over a typical utilization period; determining that the simulator competently simulates each required maneuver, procedure, or task; and verifying correct operation of the simulator controls, instruments, and systems. The items listed in the following Tables are for simulator evaluation purposes only. They may not be used to limit or exceed the authorizations for use of a given level of simulator as described on the SOQ or as approved by the TPAA. All items in the following paragraphs are subject to an examination.

b. The tests in Table C3A, Operations Tasks, in this attachment address pilot functions, including maneuvers and procedures (called flight tasks), and are divided by flight phases. The performance of these tasks by the NSPM includes an operational examination of the visual system and special effects. There are flight tasks included to address some features of advanced technology helicopters and innovative training programs.

c. The tests in Table C3A, Operations Tasks, and Table C3G, Instructor Operating Station, in this attachment address the overall function and control of the simulator including the various simulated environmental conditions; simulated helicopter system operation (normal, abnormal, and emergency); visual system displays; and special effects necessary to meet flight crew training, evaluation, or flight experience requirements.

d. All simulated helicopter systems functions will be assessed for normal and, where appropriate, alternate operations. Normal, abnormal, and emergency operations associated with a flight phase will be assessed during the evaluation of flight tasks or events within that flight phase. Simulated helicopter systems are listed separately under ''Any Flight Phase'' to ensure appropriate attention to systems checks. Operational navigation systems (including inertial navigation systems, global positioning systems, or other long-range systems) and the associated electronic display systems will be evaluated if installed. The NSP pilot will include in his report to the TPAA, the effect of the system operation and any system limitation.

e. Simulators demonstrating a satisfactory circling approach will be qualified for the circling approach maneuver and may be approved for such use by the TPAA in the sponsor's FAA-approved flight training program. To be considered satisfactory, the circling approach will be flown at maximum gross weight for landing, with minimum visibility for the helicopter approach category, and must allow proper alignment with a landing runway at least 90° different from the instrument approach course while allowing the pilot to keep an identifiable portion of the airport in sight throughout the maneuver (reference—14 CFR 91.175(e)).

f. At the request of the TPAA, the NSP Pilot may assess the simulator for a special aspect of a sponsor's training program during the functions and subjective portion of an evaluation. Such an assessment may include a portion of a Line Oriented Flight Training (LOFT) scenario or special emphasis items in the sponsor's training program. Unless directly related to a requirement for the qualification level, the results of such an evaluation would not affect the qualification of the simulator.

g. This appendix addresses helicopter simulators at Levels B, C, and D because there are no Level A Helicopter simulators.

h. The FAA intends to allow the use of Class III airport models on a limited basis when the sponsor provides the TPAA (or other regulatory authority) an appropriate analysis of the skills, knowledge, and abilities (SKAs) necessary for competent performance of the tasks in which this particular media element is used. The analysis should describe the ability of the FFS/visual media to provide an adequate environment in which the required SKAs are satisfactorily performed and learned. The analysis should also include the specific media element, such as the visual scene or airport model. Additional sources of information on the conduct of task and capability analysis may be found on the FAA's Advanced Qualification Program (AQP) Web site at: *http://www.faa.gov/education_research/training/aqp/.*

h. The TPAA may accept Class III airport models without individual observation provided the sponsor provides the TPAA with an acceptable description of the process for determining the acceptability of a specific airport model, outlines the conditions under which such an airport model may be used, and adequately describes what restrictions will be applied to each resulting airport or landing area model. Examples of situations that may warrant Class III model designation by the TPAA include the following:

(a) Training, testing, or checking on very low visibility operations, including SMGCS operations.

(b) Instrument operations training (including instrument takeoff, departure, arrival, approach, and missed approach training, testing, or checking) using—

(i) A specific model that has been geographically ''moved'' to a different location and aligned with an instrument procedure for another airport.

(ii) A model that does not match changes made at the real-world airport (or landing area for helicopters) being modeled.

(iii) A model generated with an ''off-board'' or an ''on-board'' model development tool (by providing proper latitude/longitude reference; correct runway or landing area orientation, length, width, marking, and lighting information; and appropriate adjacent taxiway location) to generate a facsimile of a real world airport or landing area.

i. Previously qualified simulators with certain early generation Computer Generated Image (CGI) visual systems, are limited by the capability of the Image Generator or the display system used. These systems are:

(1) Early CGI visual systems that are exempt from the necessity of including runway numbers as a part of the specific runway marking requirements are:

(a) Link NVS and DNVS.

(b) Novoview 2500 and 6000.

(c) FlightSafety VITAL series up to, and including, VITAL III, but not beyond.

(d) Redifusion SP1, SP1T, and SP2.

(2) Early CGI visual systems are excepted from the necessity of including runway numbers unless the runway is used for LOFT training sessions. These LOFT airport models require runway numbers, but only for the specific runway end (one direction) used in the LOFT session. The systems required to display runway numbers only for LOFT scenes are:

(a) FlightSafety VITAL IV.

(b) Redifusion SP3 and SP3T.

(c) Link-Miles Image II.

(3) The following list of previously qualified CGI and display systems are incapable of generating blue lights. These systems are not required to have accurate taxi-way edge lighting are:

(a) Redifusion SP1 and SP1T.

(b) FlightSafety Vital IV.

(c) Link-Miles Image II and Image IIT
(d) XKD displays (even though the XKD image generator is capable of generating blue colored lights, the display cannot accommodate that color).

END INFORMATION

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List or the level of simulator qualification involved. Items not installed or not functional on the simulator and, therefore, not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ. | | | | |
| **1. Preparation for Flight** | | | | |
| 1.a. | Flight deck check: Switches, indicators, systems, and equipment | X | X | X |
| **2. APU/Engine start and run-up** | | | | |
| 2.a. | Normal start procedures | X | X | X |
| 2.b. | Alternate start procedures | X | X | X |
| 2.c. | Abnormal starts and shutdowns (e.g., hot start, hung start) | X | X | X |
| 2.d. | Rotor engagement | X | X | X |
| 2.e. | System checks | X | X | X |
| **3. Taxiing—Ground** | | | | |
| 3.a | Power required to taxi | X | X | X |
| 3.b. | Brake effectiveness | X | X | X |
| 3.c. | Ground handling | X | X | X |
| 3.d. | Water handling (if applicable) | | X | X |
| 3.e. | Abnormal/emergency procedures: | | | |
| 3.e.1. | Brake system failure | X | X | X |
| 3.e.2. | Ground resonance | | X | X |
| 3.e.3. | Dynamic rollover | | X | X |
| 3.e.4. | Deployment of emergency floats/water landing | | X | X |
| 3.e.5. | Others listed on the SOQ | A | X | X |
| **4. Taxiing—Hover** | | | | |
| 4.a. | Takeoff to a hover | X | X | X |
| 4.b. | Instrument response: | | | |
| 4.b.1. | Engine instruments | X | X | X |
| 4.b.2. | Flight instruments | X | X | X |
| 4.b.3. | Hovering turns | X | X | X |
| 4.c. | Hover power checks: | | | |
| 4.c.1. | In ground effect (IGE) | X | X | X |
| 4.c.2. | Out of ground effect (OGE) | X | X | X |
| 4.d. | Crosswind/tailwind hover | X | X | X |

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| 4.e. | Translating tendency | X | X | X |
| 4.f. | External load operations: | | | |
| 4.f.1. | Hookup | | X | X |
| 4.f.2. | Release | | X | X |
| 4.f.3. | Winch operations | | X | X |
| 4.g. | Abnormal/emergency procedures: | | | |
| 4.g.1. | Engine failure | X | X | X |
| 4.g.2. | Fuel governing system failure | X | X | X |
| 4.g.3. | Settling with power (OGE) | X | X | X |
| 4.g.4. | Hovering autorotation | | X | X |
| 4.g.5. | Stability augmentation system failure | X | X | X |
| 4.g.6. | Directional control malfunction | X | X | X |
| 4.g.7. | Loss of tail rotor effectiveness (LTE) | | X | X |
| 4.g.8. | Others listed on the SOQ | A | X | X |
| 4.h. | Pre-takeoff checks | X | X | X |
| **5. Takeoff/Translational Flight** | | | | |
| 5.a. | Forward (up to effective translational lift) | | X | X |
| 5.b. | Sideward (up to limiting airspeed) | | X | X |
| 5.c. | Rearward (up to limiting airspeed) | | X | X |
| **6. Takeoff and Departure Phase** | | | | |
| 6.a. | Normal | X | X | X |
| 6.a.1. | From ground | X | X | X |
| 6.a.2. | From hover | X | X | X |
| 6.a.2.a. | Cat A | X | X | X |
| 6.a.2.b. | Cat B | X | X | X |
| 6.a.3. | Running | X | X | X |
| 6.a.4. | Crosswind/tailwind | X | X | X |
| 6.a.5. | Maximum performance | X | X | X |
| 6.a.6. | Instrument | X | X | X |
| 6.a.7. | Takeoff from a confined area | X | X | X |
| 6.a.8. | Takeoff from a pinnacle/platform | X | X | X |
| 6.a.9. | Takeoff from a slope | X | X | X |
| 6.a.10. | External load operations | | X | X |
| 6.b. | Abnormal/emergency procedures: | X | X | X |
| 6.b.1. | Takeoff with engine failure after critical decision point (CDP) | X | X | X |

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| 6.b.1.a. | Cat A | | X | X |
| 6.b.1.b. | Cat B | | X | X |
| 6.c. | Rejected takeoff | | | |
| 6.c.1. | Land | X | X | X |
| 6.c.2. | Water (if appropriate) | X | X | X |
| 6.d. | Instrument departure | X | X | X |
| 6.e. | Others as listed on the SOQ | A | X | X |
| **7. Climb** | | | | |
| 7.a. | Normal | X | X | X |
| 7.b. | Obstacle clearance | X | X | X |
| 7.c. | Vertical | | X | X |
| 7.d. | One engine inoperative | X | X | X |
| 7.e. | Others as listed on the SOQ | A | X | X |
| **8. Cruise** | | | | |
| 8.a | Performance | X | X | X |
| 8.b. | Flying qualities | X | X | X |
| 8.c. | Turns | X | X | X |
| 8.c.1. | Timed | X | X | X |
| 8.c.2. | Normal | X | X | X |
| 8.c.3. | Steep | X | X | X |
| 8.d. | Accelerations and decelerations | X | X | X |
| 8.e. | High speed vibrations | X | X | X |
| 8.f. | External Load Operations (see entry 4.f. of this table) | | X | X |
| 8.g. | Abnormal/emergency procedures | X | X | X |
| 8.g.1. | Engine fire | X | X | X |
| 8.g.2 | Engine failure | X | X | X |
| 8.g.3. | Inflight engine shutdown and restart | X | X | X |
| 8.g.4. | Fuel governing system failures | X | X | X |
| 8.g.5. | Directional control malfunction | X | X | X |
| 8.g.6. | Hydraulic failure | X | X | X |
| 8.g.7. | Stability system failure | X | X | X |
| 8.g.8. | Rotor vibrations | X | X | X |
| 8.g.9. | Recovery from unusual attitudes | X | X | X |
| **9. Descent** | | | | |
| 9.a. | Normal | X | X | X |

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| 9.b. | Maximum rate | X | X | X |
| 9.c. | Autorotative | | | |
| 9.c.1. | Straight-in | X | X | X |
| 9.c.2. | With turn | X | X | X |
| 9.d. | External Load | | X | X |
| **10. Approach** | | | | |
| 10.a. | Non-precision | X | X | X |
| 10.a.1. | All engines operating | X | X | X |
| 10.a.2. | One or more engines inoperative | X | X | X |
| 10.a.3. | Approach procedures: | X | X | X |
| 10.a.3.a. | NDB | X | X | X |
| 10.a.3.b. | VOR, RNAV, TACAN | X | X | X |
| 10.a.3.c. | ASR | X | X | X |
| 10.a.3.d. | Circling | X | X | X |
| 10.a.3.e. | Helicopter only | X | X | X |
| 10.a.4. | Missed approach | X | X | X |
| 10.a.4.a. | All engines operating | X | X | X |
| 10.a.4.b. | One or more engines inoperative | X | X | X |
| 10.b. | Precision | X | X | X |
| 10.b.1. | All engines operating | X | X | X |
| 10.b.2. | Manually controlled—one or more engines inoperative | X | X | X |
| 10.b.3. | Approach procedures: | X | X | X |
| 10.b.3.a. | PAR | X | X | X |
| 10.b.3.b. | MLS | X | X | X |
| 10.b.3.c. | ILS | X | X | X |
| 10.b.3.c. | (1) Manual (raw data) | X | X | X |
| 10.b.3.c. | (2) Flight director only | X | X | X |
| 10.b.3.c. | (3) Autopilot* only | X | X | X |
| 10.b.3.c. | (4) Cat I | X | X | X |
| 10.b.3.c. | (5) Cat II | X | X | X |
| 10.b.4. | Missed approach: | | | |
| 10.b.4.a. | All engines operating | X | X | X |
| 10.b.4.b. | One or more engines inoperative | X | X | X |
| 10.b.4.c. | Stability system failure | X | X | X |
| 10.c. | Others as listed on the SOQ | A | X | X |

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| **11. Landings and Approaches to Landings** | | | | |
| 11.a. | Visual Approaches: | | | |
| 11.a.1. | Normal | X | X | X |
| 11.a.2. | Steep | X | X | X |
| 11.a.3. | Shallow | X | X | X |
| 11.a.4. | Crosswind | X | X | X |
| 11.a.5. | Category A profile | | X | X |
| 11.a.6. | Category B profile | | X | X |
| 11.a.7. | External Load | | X | X |
| 11.b. | Abnormal/emergency procedures: | | | |
| 11.b.1. | Directional control failure | X | X | X |
| 11.b.2. | Hydraulics failure | X | X | X |
| 11.b.3. | Fuel governing failure | X | X | X |
| 11.b.4. | Autorotation | X | X | X |
| 11.b.5. | Stability system failure | X | X | X |
| 11.b.6. | Others listed on the SOQ | A | X | X |
| 11c. | Landings: | | | |
| 11.c.1. | Normal: | | | |
| 11.c.1.a. | Running | X | X | X |
| 11.c.1.b. | From Hover | X | X | X |
| 11.c.2. | Pinnacle/platform | X | X | X |
| 11.c.3. | Confined area | X | X | X |
| 11.c.4. | Slope | | X | X |
| 11.c.5. | Crosswind | X | X | X |
| 11.c.6. | Tailwind | X | X | X |
| 11.c.7. | Rejected Landing | X | X | X |
| 11.c.8. | Abnormal/emergency procedures: | | | |
| 11.c.8.a. | From autorotation | | X | X |
| 11.c.8.b. | One or more engines inoperative | X | X | X |
| 11.c.8.c. | Directional control failure | X | X | X |
| 11.c.8.d. | Hydraulics failure | X | X | X |
| 11.c.8.e. | Stability augmentation system failure | X | X | X |
| 11.c.9. | Other (listed on the SOQ) | A | X | X |
| **12. Any Flight Phase** | | | | |
| 12.a.1. | Air conditioning | X | X | X |

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| 12.a.2. | Anti-icing/deicing | X | X | X |
| 12.a.3. | Auxiliary power-plant | X | X | X |
| 12.a.4. | Communications | X | X | X |
| 12.a.5. | Electrical | X | X | X |
| 12.a.6. | Fire detection and suppression | X | X | X |
| 12.a.7. | Stabilizer | X | X | X |
| 12.a.8. | Flight controls | X | X | X |
| 12.a.9. | Fuel and oil | X | X | X |
| 12.a.10. | Hydraulic | X | X | X |
| 12.a.11. | Landing gear | X | X | X |
| 12.a.12. | Oxygen | X | X | X |
| 12.a.13. | Pneumatic | X | X | X |
| 12.a.14. | Powerplant | X | X | X |
| 12.a.15. | Flight control computers | X | X | X |
| 12.a.16. | Stability and control augmentation | X | X | X |
| 12.b. | Flight management and guidance system: | | | |
| 12.b.1. | Airborne radar | X | X | X |
| 12.b.2. | Automatic landing aids | X | X | X |
| 12.b.3. | Autopilot | X | X | X |
| 12.b.4. | Collision avoidance system | X | X | X |
| 12.b.5. | Flight data displays | X | X | X |
| 12.b.6. | Flight management computers | X | X | X |
| 12.b.7. | Heads-up displays | X | X | X |
| 12.b.8. | Navigation systems | X | X | X |
| 12.c. | Airborne procedures: | | | |
| 12.c.1. | Holding | X | X | X |
| 12.c.2. | Air hazard avoidance | X | X | X |
| 12.c.3. | Retreating blade stall recovery | X | X | X |
| 12.c.4. | Mast bumping | X | X | X |
| 12.c.5 | Loss of directional control | X | X | X |
| 12.c.6. | Loss of tail rotor effectiveness | | X | X |
| 12.c.7. | Other (listed on the SOQ) | A | X | X |
| **13. Engine Shutdown and Parking** | | | | |
| 13.a. | Engine and systems operation | X | X | X |
| 13.b. | Parking brake operation | X | X | X |

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Operations tasks | Simulator level | | |
| | | B | C | D |
| 13.c. | Rotor brake operation | X | X | X |
| 13.d. | Abnormal/emergency procedures | X | X | X |

*''Autopilot'' means attitude retention mode of operation.

Note: An ''A'' in the table indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FFS and is working properly.

TABLE C3B—FUNCTIONS AND SUBJECTIVE TESTS

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual requirements for qualification at the stated level class I airport or landing area models | Simulator level | | |
| | | B | C | D |
| This table specifies the minimum airport visual model content and functionality to qualify a simulator at the indicated level. This table applies only to the airport scenes required for simulator qualification; i.e., two helicopter landing area models for Level B simulators; four helicopter landing area models for Level C and Level D simulators. | | | | |
| **1.** | **Functional test content requirements**<br>The following is the minimum airport/landing area model content requirement to satisfy visual capability tests, and provides suitable visual cues to allow completion of all functions and subjective tests described in this attachment for simulators at Level B. | | | |
| 1.a. | A minimum of one (1) representative airport and one (1) representative helicopter landing area model. The airport and the helicopter landing area may be contained within the same model. If but if this option is selected, the approach path to the airport runway(s) and the approach path to the helicopter landing area must be different. The model(s) used to meet the following requirements may be demonstrated at either a fictional or a real-world airport or helicopter landing area, but each must be acceptable to the sponsor's TPAA, selectable from the IOS, and listed on the SOQ. | X | | |
| 1.b. | The fidelity of the visual scene must be sufficient for the aircrew to visually identify the airport and/or helicopter landing area; determine the position of the simulated helicopter within the visual scene; successfully accomplish take-offs, approaches, and landings; and maneuver around the airport on the ground, or hover taxi, as necessary. | X | | |
| 1.c. | Runways: | | | |
| 1.c.1. | Visible runway number | X | | |
| 1.c.2. | Runway threshold elevations and locations must be modeled to provide sufficient correlation with helicopter systems (e.g., altimeter). | X | | |
| 1.c.3. | Runway surface and markings | X | | |
| 1.c.4. | Lighting for the runway in use including runway edge and centerline | X | | |
| 1.c.5. | Lighting, visual approach aid (VASI or PAPI) and approach lighting of appropriate colors | X | | |
| 1.c.6. | Representative taxiway lights | X | | |
| 1.d. | Other helicopter landing area: | | | |
| 1.d.1. | Standard heliport designation (''H'') marking, properly sized and oriented | X | | |
| 1.d.2. | Perimeter markings for the Touchdown and Lift-Off Area (TLOF) or the Final Approach and Takeoff Area (FATO), as appropriate. | X | | |
| 1.d.3. | Perimeter lighting for the TLOF or the FATO areas, as appropriate | X | | |
| 1.d.4. | Appropriate markings and lighting to allow movement from the runway or helicopter landing area to another part of the landing facility. | X | | |
| **2.** | **Functional test content requirements for Level C and Level D simulators** | | | |

TABLE C3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual requirements for qualification at the stated level class I airport or landing area models | Simulator level | | |
| | | B | C | D |
| | The following is the minimum airport/landing area model content requirement to satisfy visual capability tests, and provide suitable visual cues to allow completion of all functions and subjective tests described in this attachment for simulators at Level C and Level D. Not all of the elements described in this section must be found in a single airport/landing area scene. However, all of the elements described in this section must be found throughout a combination of the four (4) airport/landing area models described in entry 2.a. The representations of the hazards (as described in 2.d.) must be ''hard objects'' that interact as such if contacted by the simulated helicopter. Additionally, surfaces on which the helicopter lands must be ''hard surfaces.'' The model(s) used to meet the following requirements must be demonstrated at either a fictional or a real-world airport or helicopter landing area, and each must be acceptable to the sponsor's TPAA, selectable from the IOS, and listed on the SOQ. | | | |
| 2.a. ..... | There must be at least the following airport/helicopter landing areas. | | | |
| 2.a.1. ..... | At least one (1) representative airport ..... | | X | X |
| 2.a.2. ..... | At least three representative non-airport landing areas, as follows: | | | |
| 2.a.2.a ..... | At least one (1) representative helicopter landing area situated on a substantially elevated surface with respect to the surrounding structures or terrain (e.g., building top, offshore oil rig). | | X | X |
| 2.a.2.b. ..... | At least one (1) helicopter landing area that meets the definition of a ''confined landing area'' ..... | | X | X |
| 2.a.2.c. ..... | At least one (1) helicopter landing area on a sloped surface where the slope is at least 2½° ..... | | X | X |
| 2.b. ..... | For each of the airport/helicopter landing areas described in 2.a., the simulator must be able to provide at least the following: | | X | X |
| 2.b.1. ..... | A night and twilight (dusk) environment. ..... | | X | X |
| 2.b.2. ..... | A daylight environment ..... | | | X |
| 2.c. ..... | Non-airport helicopter landing areas must have the following: | | | |
| 2.c.1. ..... | Representative buildings, structures, and lighting within appropriate distances ..... | | X | X |
| 2.c.2. ..... | Representative moving and static clutter (e.g., other aircraft, power carts, tugs, fuel trucks) ..... | | X | X |
| 2.c.3. ..... | Representative depiction of terrain and obstacles as well as significant and identifiable natural and cultural features, within 25 NM of the reference landing area. | | X | X |
| 2.c.4. ..... | Standard heliport designation (''H'') marking, properly sized and oriented ..... | | X | X |
| 2.c.5. ..... | Perimeter markings for the Touchdown and Lift-Off Area (TLOF) or the Final Approach and Takeoff Area (FATO), as appropriate. | | X | X |
| 2.c.6. ..... | Perimeter lighting for the TLOF or the FATO areas, as appropriate ..... | | X | X |
| 2.c.7. ..... | Appropriate markings and lighting to allow movement from the area to another part of the landing facility, if appropriate. | | X | X |
| 2.c.8. ..... | Representative markings, lighting, and signage, including a windsock that gives appropriate wind cues. | | X | X |
| 2.c.9. ..... | Appropriate markings, lighting, and signage necessary for position identification, and to allow movement from the landing area to another part of the landing facility. | | X | X |
| 2.c.10. ..... | Representative moving and static ground traffic (e.g., vehicular and aircraft), including the ability to present surface hazards (e.g., conflicting traffic, vehicular or aircraft, on or approaching the landing area). | | X | X |
| 2.c.11. ..... | Portrayal of landing surface contaminants, including lighting reflections when wet and partially obscured lights when snow is present, or suitable alternative effects. | | X | X |
| 2.d. ..... | All of the following three (3) hazards must be presented in a combination of the three (3) non-airport landing areas (described in entry 2.a.2. of this table) and each of these non-airport landing areas must have at least one of the following hazards: | | | |
| 2.d.1. ..... | Other airborne traffic ..... | | X | X |

TABLE C3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual requirements for qualification at the stated level class I airport or landing area models | Simulator level | | |
| | | B | C | D |
| 2.d.2. ..... | Buildings, trees, or other vertical obstructions in the immediate landing area ..... | | X | X |
| 2.d.3. ..... | Suspended wires in the immediate landing area ..... | | X | X |
| 2.e. ..... | Airport applications. Each airport must have the following: | | | |
| 2.e.1. ..... | At least one runway designated as ''in-use'', appropriately marked and capable of being lighted fully | | X | X |
| 2.e.2. ..... | Runway threshold elevations and locations must be modeled to provide sufficient correlation with helicopter systems (e.g., HGS, GPS, altimeter). Slopes in runways, taxiways, and ramp areas, if depicted in the visual scene, may not cause distracting or unrealistic effects, including pilot eye-point height variation. | X | X | X |
| 2.e.3. ..... | Appropriate approach lighting systems and airfield lighting for a VFR circuit and landing, non-precision approaches and landings, and precision approaches and landings, as appropriate.. | | X | X |
| 2.e.4. ..... | Representative taxiway lights ..... | | | X |
| **3.** ..... | **Airport or landing area model management**<br>The following is the minimum visual scene management requirements | | | |
| 3.a. ..... | Runway and helicopter landing area approach lighting must fade into view in accordance with the environmental conditions set in the simulator. | X | X | X |
| 3.b. ..... | The direction of strobe lights, approach lights, runway edge lights, visual landing aids, runway centerline lights, threshold lights, touchdown zone lights, and TLOF or FATO lights must be replicated. | X | X | X |
| **4.** ..... | **Visual feature recognition.**<br>The following are the minimum distances at which runway features must be visible. Distances are measured from runway threshold or a helicopter landing area to a helicopter aligned with the runway or helicopter landing area on an extended 3° glide-slope in simulated meteorological conditions. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing | | | |
| 4.a. ..... | For runways: Runway definition, strobe lights, approach lights, and runway edge lights from 5 sm (8 km) of the runway threshold. | X | X | X |
| 4.b. ..... | For runways: Centerline lights and taxiway definition from 3 sm (5 km) ..... | X | X | X |
| 4.c. ..... | For runways: Visual Approach Aid lights (VASI or PAPI) from 3 sm (5 km) of the threshold ..... | X | | |
| 4.d. ..... | For runways: Visual Approach Aid lights (VASI or PAPI) from 5 sm (8 km) of the threshold ..... | | X | X |
| 4.e. ..... | For runways: Runway threshold lights and touchdown zone lights from 2 sm (3 km) ..... | X | X | X |
| 4.f. ..... | For runways and helicopter landing areas: Markings within range of landing lights for night/twilight scenes and the surface resolution test on daylight scenes, as required. | X | X | X |
| 4.g. ..... | For circling approaches, the runway of intended landing and associated lighting must fade into view in a non-distracting manner. | X | X | X |
| 4.h. ..... | For helicopter landing areas: Landing direction lights and raised FATO lights from 1 sm (1.5 km) ..... | X | X | X |
| 4.i. ..... | For helicopter landing areas: Flush mounted FATO lights, TOFL lights, and the lighted windsock from 0.5 sm (750 m). | | | X |
| 4.j. ..... | Hover taxiway lighting (yellow/blue/yellow cylinders) from TOFL area ..... | | | X |
| **5.** ..... | **Airport or helicopter landing area model content** | | | |

TABLE C3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual requirements for qualification at the stated level class I airport or landing area models | Simulator level | | |
| | | B | C | D |
| | The following prescribes the minimum requirements for an airport/helicopter landing area model and identifies other aspects of the environment that must correspond with that model for simulators at Level B, Level C, and Level D. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. If all runways or landing areas in a visual model used to meet the requirements of this attachment are not designated as ''in use,'' then the ''in use'' runways/landing areas must be listed on the SOQ (e.g., KORD, Rwys 9R, 14L, 22R). Models of airports or helicopter landing areas with more than one runway or landing area must have all significant runways or landing areas not ''in-use'' visually depicted for airport runway/landing area recognition purposes. The use of white or off-white light strings that identify the runway or landing area for twilight and night scenes are acceptable for this requirement; and rectangular surface depictions are acceptable for daylight scenes. A visual system's capabilities must be balanced between providing visual models with an accurate representation of the airport and a realistic representation of the surrounding environment. Each runway or helicopter landing area designated as an ''in-use'' runway or area must include the following detail that is developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material; however, this does not require that such models contain details that are beyond the design capability of the currently qualified visual system. Only one ''primary'' taxi route from parking to the runway end or helicopter takeoff/landing area will be required for each ''in-use'' runway or helicopter takeoff/landing area. | | | |
| 5.a. ..... | The surface and markings for each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 5.a.1. ..... | For airports: Runway threshold markings, runway numbers, touchdown zone markings, fixed distance markings, runway edge markings, and runway centerline stripes. | X | X | X |
| 5.a.2. ..... | For helicopter landing areas: Markings for standard heliport identification (''H'') and TOFL, FATO, and safety areas. | X | X | X |
| 5.b. ..... | The lighting for each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 5.b.1. ..... | For airports: Runway approach, threshold, edge, end, centerline (if applicable), touchdown zone (if applicable), leadoff, and visual landing aid lights or light systems for that runway. | X | X | X |
| 5.b.2. ..... | For helicopter landing areas: landing direction, raised and flush FATO, TOFL, windsock lighting ..... | X | X | X |
| 5.c. ..... | The taxiway surface and markings associated with each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 5.c.1. ..... | For airports: Taxiway edge, centerline (if appropriate), runway hold lines, and ILS critical area(s) ..... | X | X | X |
| 5.c.2. ..... | For helicopter landing areas: taxiways, taxi routes, and aprons ..... | X | X | X |
| 5.d. ..... | The taxiway lighting associated with each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 5.d.1. ..... | For airports: Runway edge, centerline (if appropriate), runway hold lines, ILS critical areas ..... | X | X | X |
| 5.d.2. ..... | For helicopter landing areas: taxiways, taxi routes, and aprons ..... | X | X | X |
| 5.d.3. ..... | For airports: taxiway lighting of correct color ..... | | | X |
| 5.e. ..... | Airport signage associated with each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 5.e.1. ..... | For airports: Signs for runway distance remaining, intersecting runway with taxiway, and intersecting taxiway with taxiway. | X | X | X |
| 5.e.2. ..... | For helicopter landing areas: as appropriate for the model used ..... | X | X | X |
| 5.f. ..... | Required visual model correlation with other aspects of the airport or helicopter landing environment simulation: | | | |
| 5.f.1. ..... | The airport or helicopter landing area model must be properly aligned with the navigational aids that are associated with operations at the ''in-use'' runway or helicopter landing area. | X | X | X |
| 5.f.2. ..... | The simulation of runway or helicopter landing area contaminants must be correlated with the displayed runway surface and lighting where applicable. | | X | X |
| **6.** ..... | **Correlation with helicopter and associated equipment**<br>The following are the minimum correlation comparisons that must be made for simulators at Level B, Level C, and Level D | | | |
| 6.a. ..... | Visual system compatibility with aerodynamic programming ..... | X | X | X |

TABLE C3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual requirements for qualification at the stated level class I airport or landing area models | Simulator level | | |
| | | B | C | D |
| 6.b. | Visual cues to assess sink rate and depth perception during landings | X | X | X |
| 6.c. | Accurate portrayal of environment relating to flight simulator attitudes | X | X | X |
| 6.d. | The visual scene must correlate with integrated helicopter systems (e.g., terrain, traffic and weather avoidance systems and Head-up Guidance System (HGS)). | | X | X |
| 6.e. | Representative visual effects for each visible, own-ship, helicopter external light(s)—taxi and landing light lobes (including independent operation, if appropriate). | X | X | X |
| 6.f. | The effect of rain removal devices | | X | X |
| **7.** | **Scene quality**<br>The following are the minimum scene quality tests that must be conducted for simulators at Level B, Level C, and Level D. | | | |
| 7.a. | Surfaces and textural cues must be free from apparent and distracting quantization (aliasing) | | X | X |
| 7.b. | System capable of portraying full color realistic textural cues | | X | X |
| 7.c. | The system light points must be free from distracting jitter, smearing or streaking | X | X | X |
| 7.d. | Demonstration of occulting through each channel of the system in an operational scene | X | X | X |
| 7.e. | Demonstration of a minimum of ten levels of occulting through each channel of the system in an operational scene. | | X | X |
| 7.f. | System capable of providing focus effects that simulate rain. | | X | X |
| 7.g. | System capable of providing focus effects that simulate light point perspective growth | | X | X |
| 7.h. | Runway light controls capable of six discrete light steps (0–5) | X | X | X |
| **8.** | **Environmental effects.**<br>The following are the minimum environmental effects that must be available in simulators at Level B, Level C, and Level D. | | | |
| 8.a. | The displayed scene corresponding to the appropriate surface contaminants and include appropriate lighting reflections for wet, partially obscured lights for snow, or alternative effects. | | | X |
| 8.b. | Special weather representations which include: | | | |
| 8.b.1. | The sound, motion and visual effects of light, medium and heavy precipitation near a thunderstorm on take-off, approach, and landings at and below an altitude of 2,000 ft (600 m) above the surface and within a radius of 10 sm (16 km) from the airport or helicopter landing area. | | | X |
| 8.b.2. | One airport or helicopter landing area with a snow scene to include terrain snow and snow-covered surfaces. | | | X |
| 8.c. | In-cloud effects such as variable cloud density, speed cues and ambient changes | | X | X |
| 8.d. | The effect of multiple cloud layers representing few, scattered, broken and overcast conditions giving partial or complete obstruction of the ground scene. | | X | X |
| 8.e. | Visibility and RVR measured in terms of distance. Visibility/RVR checked at 2,000 ft (600 m) above the airport or helicopter landing area and at two heights below 2,000 ft with at least 500 ft of separation between the measurements. The measurements must be taken within a radius of 10 sm (16 km) from the airport or helicopter landing area. | X | X | X |
| 8.f. | Patchy fog giving the effect of variable RVR | | | X |
| 8.g. | Effects of fog on airport lighting such as halos and defocus | | X | X |
| 8.h. | Effect of own-ship lighting in reduced visibility, such as reflected glare, including landing lights, strobes, and beacons. | | X | X |
| 8.i. | Wind cues to provide the effect of blowing snow or sand across a dry runway or taxiway selectable from the instructor station. | | | X |

TABLE C3B—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual requirements for qualification at the stated level class I airport or landing area models | Simulator level | | |
| | | B | C | D |
| 8.j. ..... | ''White-out'' or ''Brown-out'' effects due to rotor downwash beginning at a distance above the ground equal to the rotor diameter. | | | X |
| **9.** ..... | **Instructor control of the following:** The following are the minimum instructor controls that must be available in Level B, Level C, and Level D simulators, as indicated. | | | |
| 9.a. ..... | Environmental effects, e.g. cloud base, cloud effects, cloud density, visibility in statute miles/ kilometers and RVR in feet/meters. | X | X | X |
| 9.b. ..... | Airport or helicopter landing area selection ..... | X | X | X |
| 9.c. ..... | Airport or helicopter landing area lighting, including variable intensity ..... | X | X | X |
| 9.d. ..... | Dynamic effects including ground and flight traffic ..... | | X | X |
| **End QPS Requirement** | | | | |
| **Begin Information** | | | | |
| **10.** ..... | An example of being able to ''combine two airport models to achieve two ''in-use'' runways: One runway designated as the ''in-use'' runway in the first model of the airport, and the second runway designated as the ''in-use'' runway in the second model of the same airport. For example, the clearance is for the ILS approach to Runway 27, Circle to Land on Runway 18 right. Two airport visual models might be used: the first with Runway 27 designated as the ''in use'' runway for the approach to runway 27, and the second with Runway 18 Right designated as the ''in use'' runway. When the pilot breaks off the ILS approach to runway 27, the instructor may change to the second airport visual model in which runway 18 Right is designated as the ''in use'' runway, and the pilot would make a visual approach and landing. This process is acceptable to the FAA as long as the temporary interruption due to the visual model change is not distracting to the pilot. | | | |
| **11.** ..... | Sponsors are not required to provide every detail of a runway, but the detail that is provided should be correct within reasonable limits. | | | |
| **End Information** | | | | |

TABLE C3C—FUNCTIONS AND SUBJECTIVE TESTS

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual scene content additional airport or landing area models beyond minimum required for qualification Class II airport or landing area models | Simulator level | | |
| | | B | C | D |
| This table specifies the minimum airport or helicopter landing area visual model content and functionality necessary to add visual models to a simulator's visual model library (i.e., beyond those necessary for qualification at the stated level) without the necessity of further involvement of the NSPM or TPAA. | | | | |
| **1.** ..... | **Airport or landing area model management** The following is the minimum visual scene management requirements for simulators at Levels B, C, and D. | | | |
| 1.a. ..... | The installation and direction of the following lights must be replicated for the ''in-use'' surface: | | | |
| 1.a.1. ..... | For ''in-use'' runways: Strobe lights, approach lights, runway edge lights, visual landing aids, runway centerline lights, threshold lights, and touchdown zone lights. | X | X | X |
| 1.a.2. ..... | For ''in-use'' helicopter landing areas: ground level TLOF perimeter lights, elevated TLOF perimeter lights (if applicable), Optional TLOF lights (if applicable), ground FATO perimeter lights, elevated TLOF lights (if applicable), landing direction lights. | X | X | X |
| **2.** ..... | **Visual feature recognition** The following are the minimum distances at which runway or landing area features must be visible for simulators at Levels B, C, and D. Distances are measured from runway threshold or a helicopter landing area to an aircraft aligned with the runway or helicopter landing area on a 3° glide-slope from the aircraft to the touchdown point, in simulated meteorological conditions. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. | | | |

TABLE C3C—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual scene content additional airport or landing area models beyond minimum required for qualification<br>Class II airport or landing area models | Simulator level | | |
| | | B | C | D |
| 2.a. ..... | For Runways: | | | |
| 2.a.1. ..... | Strobe lights, approach lights, and edge lights from 5 sm (8 km) of the threshold ..... | X | X | X |
| 2.a.2. ..... | Centerline lights and taxiway definition from 3 sm (5 km) ..... | X | X | X |
| 2.a.3. ..... | Visual Approach Aid lights (VASI or PAPI) from 3 sm (5 km) of the threshold ..... | X | | |
| 2.a.4. ..... | Visual Approach Aid lights (VASI or PAPI) from 5 sm (8 km) of the threshold ..... | | X | X |
| 2.a.5. ..... | Threshold lights and touchdown zone lights from 2 sm (3 km) ..... | X | X | X |
| 2.a.6. ..... | Markings within range of landing lights for night/twilight (dusk) scenes and as required by the surface resolution test on daylight scenes. | X | X | X |
| 2.a.7. ..... | For circling approaches, the runway of intended landing and associated lighting must fade into view in a non-distracting manner. | X | X | X |
| 2.b. ..... | For Helicopter landing areas: | | | |
| 2.b.1. ..... | Landing direction lights and raised FATO lights from 1 sm (1.5 km) ..... | X | X | X |
| 2.b.2. ..... | Flush mounted FATO lights, TOFL lights, and the lighted windsock from 0.5 sm (750 m) ..... | | X | X |
| 2.b.3. ..... | Hover taxiway lighting (yellow/blue/yellow cylinders) from TOFL area ..... | | X | X |
| 2.b.4. ..... | Markings within range of landing lights for night/twilight (dusk) scenes and as required by the surface resolution test on daylight scenes. | X | X | X |
| **3.** ..... | **Airport or Helicopter landing area model content**<br>The following prescribes the minimum requirements for what must be provided in an airport visual model and identifies other aspects of the airport environment that must correspond with that model for simulators at Level B, C, and D. The detail must be developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material; however, this does not require that airport or helicopter landing area models contain details that are beyond the designed capability of the currently qualified visual system. For circling approaches, all requirements of this section apply to the runway used for the initial approach and to the runway of intended landing. Only one ''primary'' taxi route from parking to the runway end or helicopter takeoff/landing area will be required for each ''in-use'' runway or helicopter takeoff/landing area. | | | |
| 3.a. ..... | The surface and markings for each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 3.a.1. ..... | For airports: Runway threshold markings, runway numbers, touchdown zone markings, fixed distance markings, runway edge markings, and runway centerline stripes. | X | X | X |
| 3.a.2. ..... | For helicopter landing areas: Standard heliport marking (''H''), TOFL, FATO, and safety areas ..... | X | X | X |
| 3.b. ..... | The lighting for each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 3.b.1. ..... | For airports: Runway approach, threshold, edge, end, centerline (if applicable), touchdown zone (if applicable), leadoff, and visual landing aid lights or light systems for that runway. | X | X | X |
| 3.b.2. ..... | For helicopter landing areas: Landing direction, raised and flush FATO, TOFL, windsock lighting ..... | X | X | X |
| 3.c. ..... | The taxiway surface and markings associated with each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 3.c.1. ..... | For airports: Taxiway edge, centerline (if appropriate), runway hold lines, and ILS critical area(s) ..... | X | X | X |
| 3.c.2. ..... | For helicopter landing areas: Taxiways, taxi routes, and aprons ..... | X | X | X |
| 3.d. ..... | The taxiway lighting associated with each ''in-use'' runway or helicopter landing area must include the following: | | | |
| 3.d.1. ..... | For airports: Runway edge, centerline (if appropriate), runway hold lines, ILS critical areas ..... | X | X | X |
| 3.d.2. ..... | For helicopter landing areas: Taxiways, taxi routes, and aprons ..... | X | X | X |
| 3.d.3. ..... | For airports: Taxiway lighting of correct color ..... | | | X |
| **4.** ..... | **Required visual model correlation with other aspects of the airport environment simulation** | | | |

TABLE C3C—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | |
|---|---|---|---|---|
| Entry No. | Visual scene content additional airport or landing area models beyond minimum required for qualification<br>Class II airport or landing area models | Simulator level | | |
| | | B | C | D |
| | The following are the minimum visual model correlation tests that must be conducted for Level B, Level C, and Level D simulators, as indicated. | | | |
| 4.a. ..... | The airport model must be properly aligned with the navigational aids that are associated with operations at the ''in-use'' runway. | X | X | X |
| 4.b. ..... | Slopes in runways, taxiways, and ramp areas, if depicted in the visual scene, must not cause distracting or unrealistic effects. | X | X | X |
| **5.** ..... | **Correlation with helicopter and associated equipment**<br>The following are the minimum correlation comparisons that must be made for simulators at Level B, C, and D. | | | |
| 5.a. ..... | Visual system compatibility with aerodynamic programming ..... | X | X | X |
| 5.b. ..... | Accurate portrayal of environment relating to flight simulator attitudes ..... | X | X | X |
| 5.c. ..... | Visual cues to assess sink rate and depth perception during landings ..... | X | X | X |
| **6.** ..... | **Scene quality**<br>The following are the minimum scene quality tests that must be conducted for simulators at Level B, C, and D. | | | |
| 6.a. ..... | Light points free from distracting jitter, smearing or streaking ..... | X | X | X |
| 6.b. ..... | Surfaces and textural cues free from apparent and distracting quantization (aliasing) ..... | | X | X |
| 6.c. ..... | Correct color and realistic textural cues ..... | | | X |
| **7.** ..... | **Instructor controls of the following:**<br>The following are the minimum instructor controls that must be available in Level B, Level C, and Level D simulators, as indicated. | | | |
| 7.a. ..... | Environmental effects, e.g., cloud base (if used), cloud effects, cloud density, visibility in statute miles/kilometers and RVR in feet/meters. | X | X | X |
| 7.b. ..... | Airport/Heliport selection ..... | X | X | X |
| 7.c. ..... | Airport lighting including variable intensity ..... | X | X | X |
| 7.d. ..... | Dynamic effects including ground and flight traffic ..... | | X | X |
| | **End QPS Requirements** | | | |
| | **Begin Information** | | | |
| **8.** ..... | Sponsors are not required to provide every detail of a runway or helicopter landing area, but the detail that is provided must be correct within the capabilities of the system. | X | X | X |
| | **End Information** | | | |

TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Motion system (and special aerodynamic model) effects | Simulator level | | | Notes |
| | | B | C | D | |
| This table specifies motion effects that are required to indicate the threshold at which a flight crewmember must be able to recognize an event or situation. Where applicable, flight simulator pitch, side loading and directional control characteristics must be representative of the helicopter. | | | | | |

TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Motion system (and special aerodynamic model) effects | Simulator level | | | Notes |
| | | B | C | D | |
| 1 ..... | **Runway rumble, oleo deflection, ground speed, uneven runway, runway and taxiway centerline light characteristics:** Procedure: After the helicopter has been preset to the takeoff position and then released, taxi at various speeds with a smooth runway and note the general characteristics of the simulated runway rumble effects of oleo deflections. Repeat the maneuver with a runway roughness of 50%, then with maximum roughness. Note the associated motion vibrations affected by ground speed and runway roughness | X | X | X | If time permits, different gross weights can also be selected as this may also affect the associated vibrations depending on helicopter type. The associated motion effects for the above tests should also include an assessment of the effects of rolling over centerline lights, surface discontinuities of uneven runways, and various taxiway characteristics. |
| 2 ..... | **Friction Drag from Skid-type Landing Gear:** Procedure: Perform a running takeoff or a running landing and note an increase in a fuselage vibration (as opposed to rotor vibration) due to the friction of dragging the skid along the surface. This vibration will lessen as the ground speed decreases | | X | X | |
| 3. ..... | **Rotor Out-of-Track and/or Out-of-Balance condition:** Procedure: Select the malfunction or condition from the IOS. Start the engine(s) normally and check for an abnormal vibration for an Out-of-Track condition and check for an abnormal vibration for an Out-of-Balance condition | X | X | X | Does not require becoming airborne. The abnormal vibration for Out-of-Track and Out-of-Balance conditions should be recognized in the frequency range of the inverse of the period for each; i.e., 1/P for vertical vibration, and 1/P for lateral vibration. |
| 4. ..... | **Bumps associated with the landing gear:** Procedure: Perform a normal take-off paying special attention to the bumps that could be perceptible due to maximum oleo extension after lift-off | X | X | X | When the landing gear is extended or retracted, motion bumps can be felt when the gear locks into position. |
| 5. ..... | **Buffet during extension and retraction of landing gear:** Procedure: Operate the landing gear. Check that the motion cues of the buffet experienced represent the actual helicopter | X | X | X | |
| 6. ..... | **Failure of Dynamic Vibration Absorber or similar system as appropriate for the helicopter (e.g., droop stop or static stop):** Procedure: May be accomplished any time the rotor is engaged. Select the appropriate failure at the IOS, note an appropriate increase in vibration and check that the vibration intensity and frequency increases with an increase in RPM and an increase in collective application | X | X | X | |
| 7. ..... | **Tail Rotor Drive Failure:** Procedure: With the engine(s) running and the rotor engaged—select the malfunction and note the immediate increase of medium frequency vibration | X | X | X | The tail rotor operates in the medium frequency range, normally estimated by multiplying the tail rotor gear box ratio by the main rotor RPM. The failure can be recognized by an increase in the vibrations in this frequency range. |
| 8. ..... | **Touchdown cues for main and nose gear:** Procedure: Conduct several normal approaches with various rates of descent. Check that the motion cues for the touchdown bumps for each descent rate are representative of the actual helicopter | X | X | X | |

TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Motion system (and special aerodynamic model) effects | Simulator level | | | Notes |
| | | B | C | D | |
| 9. ..... | **Tire failure dynamics:** Procedure: Simulate a single tire failure and a multiple tire failure | | X | X | The pilot may notice some yawing with a multiple tire failure selected on the same side. This should require the use of the pedal to maintain control of the helicopter. Dependent on helicopter type, a single tire failure may not be noticed by the pilot and may not cause any special motion effect. Sound or vibration may be associated with the actual tire losing pressure. |
| 10. ..... | **Engine malfunction and engine damage:** Procedure: The characteristics of an engine malfunction as prescribed in the malfunction definition document for the particular flight simulator must describe the special motion effects felt by the pilot. Note the associated engine instruments varying according to the nature of the malfunction and note the replication of the effects of the airframe vibration | X | X | X | |
| 11. ..... | **Tail boom strikes:** Procedure: Tail-strikes can be checked by over-rotation of the helicopter at a quick stop or autorotation to the ground | X | X | X | The motion effect should be felt as a noticeable nose down pitching moment. |
| 12. ..... | **Vortex Ring State (Settling with Power):** Procedure: Specific procedures may differ between helicopters and may be prescribed by the Helicopter Manufacturer or other subject matter expert. However, the following information is provided for illustrative purposes * * * To enter the maneuver, reduce power below hover power. Hold altitude with aft cyclic until the airspeed approaches 20 knots. Then allow the sink rate to increase to 300 feet per minute or more as the attitude is adjusted to obtain an airspeed of less than 10 knots | | X | X | When the aircraft begins to shudder, the application of additional up collective increases the vibration and sink rate. One recovery method is to decrease collective to enter vertical autorotation and/or use cyclic inputs to gain horizontal airspeed and exit from vortex ring state. |
| 13. ..... | **Retreating Blade Stall:** Procedure: Specific procedures may differ between helicopters and may be prescribed by the Helicopter Manufacturer or other subject matter expert. However, the following information is provided for illustrative purposes: To enter the maneuver, increase forward airspeed; the effect will be recognized through the development of a low frequency vibration, pitching up of the nose, and a roll in the direction of the retreating blade. High weight, low rotor RPM, high density altitude, turbulence or steep, abrupt turns are all conducive to retreating blade stall at high forward airspeeds | | X | X | Correct recovery from retreating blade stall requires the collective to be lowered first, which reduces blade angles and the angle of attack. Aft cyclic can then be used to slow the helicopter. |

TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

| QPS requirements | | | | | Information |
|---|---|---|---|---|---|
| Entry No. | Motion system (and special aerodynamic model) effects | Simulator level | | | Notes |
| | | B | C | D | |
| 14. ..... | **Translational Lift Effects:**<br>Procedure: From a stabilized in-ground-effect (IGE) Hover begin a forward acceleration. When passing through the effective translational lift range, the noticeable effect will be a possible nose pitch-up in some helicopters, an increase in the rate of climb, and a temporary increase in vibration level (in some cases this vibration may be pronounced). This effect is experienced again upon deceleration through the appropriate speed range. During deceleration, the pitch and rate of climb will have the reverse effect, but there will be a similar, temporary increase in vibration level | X | X | X | |

TABLE C3E—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | |
|---|---|---|---|---|
| Entry number | Sound system | Simulator level | | |
| | | B | C | D |
| **The following checks are performed during a normal flight profile, motion system ON.** | | | | |
| 1. ..... | Precipitation. ..... | | X | X |
| 2. ..... | Rain removal equipment. ..... | | X | X |
| 3. ..... | Helicopter noises used by the pilot for normal helicopter operation. ..... | | X | X |
| 4. ..... | Abnormal operations for which there are associated sound cues, including engine malfunctions, landing gear or tire malfunctions, tail boom. | | X | X |
| 5. ..... | Sound of a crash when the flight simulator is landed in excess of limitations ..... | | X | X |

TABLE C3F—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | |
|---|---|---|---|---|
| Entry number | Special effects | Simulator level | | |
| | | B | C | D |
| This table specifies the minimum special effects necessary for the specified simulator level. | | | | |
| **1.** ..... | **Braking Dynamics:** .....<br>Representations of the dynamics of brake failure (flight simulator pitch, side-loading, and directional control characteristics representative of the helicopter), including antiskid and decreased brake efficiency due to high brake temperatures (based on helicopter related data), sufficient to enable pilot identification of the problem and implementation of appropriate procedures. | | X | X |
| **2.** ..... | **Effects of Airframe and Engine Icing: Required only for those helicopters authorized for operations in known icing conditions**.<br>Procedure: With the simulator airborne, in a clean configuration, nominal altitude and cruise airspeed, autopilot on and auto-throttles off, engine and airfoil anti-ice/de-ice systems deactivated; activate icing conditions at a rate that allows monitoring of simulator and systems response.<br>Icing recognition will include an increase in gross weight, airspeed decay, change in simulator pitch attitude, change in engine performance indications (other than due to airspeed changes), and change in data from pitot/static system, or rotor out-of-track/balance. Activate heating, anti-ice, or de-ice systems independently. Recognition will include proper effects of these systems, eventually returning the simulated helicopter to normal flight. | | X | X |

TABLE C3G—FUNCTIONS AND SUBJECTIVE TESTS

| QPS Requirements | | | | |
|---|---|---|---|---|
| Entry number | Instructor Operating Station (IOS) | Simulator level | | |
| | | B | C | D |
| Functions in this table are subject to evaluation only if appropriate for the helicopter or the system is installed on the specific simulator. | | | | |
| **1.** | **Simulator Power Switch(es)** | X | X | X |
| **2.** | **Helicopter conditions.** | | | |
| 2.a. | Gross weight, center of gravity, fuel loading and allocation | X | X | X |
| 2.b. | Helicopter systems status | X | X | X |
| 2.c. | Ground crew functions | X | X | X |
| **3.** | **Airports/Heliports.** | | | |
| 3.a. | Number and selection | X | X | X |
| 3.b. | Runway or landing area selection | X | X | X |
| 3.c. | Landing surface conditions (rough, smooth, icy, wet, dry, snow) | X | X | X |
| 3.d. | Preset positions | X | X | X |
| 3.e. | Lighting controls | X | X | X |
| **4.** | **Environmental controls.** | | | |
| 4.a | Visibility (statute miles/kilometers) | X | X | X |
| 4.b. | Runway visual range (in feet/meters) | X | X | X |
| 4.c. | Temperature | X | X | X |
| 4.d. | Climate conditions | X | X | X |
| 4.e. | Wind speed and direction | X | X | X |
| **5.** | **Helicopter system malfunctions** (Insertion/deletion). | X | X | X |
| **6.** | **Locks, Freezes, and Repositioning.** | | | |
| 6.a. | Problem (all) freeze/release | X | X | X |
| 6.b. | Position (geographic) freeze/release | X | X | X |
| 6.c. | Repositioning (locations, freezes, and releases) | X | X | X |
| 6.d. | Ground speed control | X | X | X |
| **7.** | **Remote IOS.** | X | X | X |
| **8.** | **Sound Controls.** On/off/adjustment | X | X | X |
| **9.** | **Motion/Control Loading System.** | | | |
| 9.a. | On/off/emergency stop | X | X | X |
| **10.** | **Observer Seats/Stations.** Position/Adjustment/Positive restraint system | X | X | X |

ATTACHMENT 4 TO APPENDIX C TO PART 60—SAMPLE DOCUMENTS

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**Attachment 4 to Appendix C to Part 60—**
**Figure C4A – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**INFORMATION**

Date _____

Charles A. Spillner
Manager, National Simulator Program
Federal Aviation Administration
100 Hartsfield Centre Parkway, Suite 400
Atlanta, GA 30354

Dear Mr. Spillner:

**RE: Request for Initial/Upgrade Evaluation Date**

This is to advise you of our intent to request an (initial or upgrade) evaluation of our (FFS Manufacturer), (Aircraft Type/Level) Full Flight Simulator (FFS), (FAA ID Number, if previously qualified), located in (City, State) at the (Facility) on (Proposed Evaluation Date). (The proposed evaluation date shall not be more than 180 days following the date of this letter.) The FFS will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FFS will be sponsored as follows; (Select One)

☐ The FFS will be used within the sponsor's FAA approved training program and placed on the sponsor's Training/Operations Specifications.

☐ The FFS will be used for dry lease only.

We agree to provide the formal request for the evaluation to your staff as follows: (check one)

☐ For QTG tests run at the factory, not later, than 45 days prior to the proposed evaluation date with the additional "l/3 on-site" tests provided not later than 14 days prior to the proposed evaluation date.

☐ For QTG tests run on-site, not later than 30 days prior to the proposed evaluation date.

We understand that the formal request will contain the following documents:

7. Sponsor's Letter of Request (*Company Compliance Letter*).
8. Principal Operations Inspector (POI) or Training Center Program Manager's (TCPM) endorsement.
9. Complete QTG.

If we are unable to meet the above requirements, we understand this may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation.

(The sponsor should add additional comments as necessary).

Please contact (Name Telephone and Fax Number of Sponsor's Contact) to confirm the date for this initial evaluation. We understand a member of your National Simulator Program staff will respond to this request within 14 days.

A copy of this letter of intent has been provided to (Name), the Principal Operations Inspector (POI) and/or Training Center Program Manager (TCPM).

Sincerely,

Attachment: FFS Information Form
cc: POI/TCPM

**Attachment 4 to Appendix C to Part 60—**
**Figure C4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FFS Information Form**

## INFORMATION

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ | **Physical Address:** | ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| | | | |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | ____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:**____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** | | |
| | ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| | | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐ **Yes:** | **Date of Manufacture:** | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** ____ | |
| **Engine model(s) and data revision:** ____ | | **Source of aerodynamic model:** ____ | |
| **FMS identification and revision level:** ____ | | **Source of aerodynamic coefficient data:** ____ | |
| **Visual system manufacturer/model:** ____ | | **Aerodynamic data revision number:** ____ | |
| **Flight control data revision:** ____ | | **Visual system display:** ____ | |
| **Mot ion system manufacturer/type:** ____ | | **FSTD computer(s) identification:** ____ | |
| | | | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | |
| **NAA FSTD ID No:** | ____ | **Last NAA Evaluation Date:** | ____ |
| **NAA Qualification Level:** | ____ | | |
| **NAA Qualification Basis:** | ____ | | |

| | | | | |
|---|---|---|---|---|
| **Visual System Manufacturer and Type:** | ____ | **FSTD Seats Available:** ____ | **Motion System Manufacturer and Type:** | ____: |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FFS Information Form**

**INFORMATION**

| Aircraft Equipment: | Engine Type(s): | Flight Instrumentation: | Engine Instrumentation: |
|---|---|---|---|
| | _____<br>_____ | ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS<br>☐ TCAS ☐ GPWS ☐ Plain View<br>☐ GPS ☐ FMS Type: __<br>☐ WX Radar ☐ Other: __ | ☐ EICAS ☐ FADEC<br>☐ Other: __ |

| | | | |
|---|---|---|---|
| **Airport Models:** | 3.6.1 _____<br>Airport Designator | 3.6.2_____<br>Airport Designator | 3.6.3 _____<br>Airport Designator |
| **Circle to Land:** | 3. 7.1 _____<br>Airport Designator | 3. 7.2_____<br>Approach | 3. 7.3 _____<br>Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____<br>Airport Designator | 3.8 .2_____<br>Approach | 3. 8.3 _____<br>Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| | | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| | | | |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |
| **Proficiency Checks** (135/121/142) | ☐ | _____ |
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FFS Information Form**

**INFORMATION**

| | | |
|---|---|---|
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III** * (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4C – Sample Letter of Compliance**
**INFORMATION**

(Date)

Mr. (Name of Training Program Approval Authority):
(Name of FAA FSDO)
(Address)
(City/State/Zip)

Dear Mr. (Name of TPAA):

**RE: Letter of Compliance**

(Operator Sponsor Name) requests evaluation of our (Aircraft Type) FFS for Level (__) qualification. The (FFS Manufacturer Name) FFS with (Visual System Manufacturer Name/Model) system is fully defined on the FFS Information page of the accompanying Qualification Test Guide (QTG). We have completed the tests of the FFS and certify that it meets all applicable requirements of FAR parts 121, 125, or 135), and the guidance of (AC 120-40B or 14 CFR Part 60). Appropriate hardware and software configuration control procedures have been established. Our Pilot(s), (Name(s)), who are qualified on (Aircraft Type) aircraft have assessed the FFS and have found that it conforms to the (Operator/Sponsor) (Aircraft Type) flight deck configuration and that the simulated systems and subsystems function equivalently to those in the aircraft. The above named pilot(s) have also assessed the performance and the flying qualities of the FFS and find that it represents the respective aircraft.

(Added Comments may be placed here)

Sincerely,
(Sponsor Representative)

cc:
FAA, National Simulator Program

**Attachment 4 to Appendix C to Part 60—**
**Figure C4D – Sample Qualification Test Guide Cover Page**
**INFORMATION**

SPONSOR NAME

SPONSOR ADDRESS

FAA QUALIFICATION TEST GUIDE

(SPECIFIC Helicopter MODEL)
*for example*
Farnsworth Z-100

(Type of Simulator)

(Simulator Identification Including Manufacturer, Serial Number, Visual System Used)

(Simulator Level)

(Qualification Performance Standard Used)

(Simulator Location)

FAA Initial Evaluation

Date: _____

_____ Date: _____
(Sponsor)

_____ Date: _____
Manager, National
Simulator Program, FAA

**Attachment 4 to Appendix C to Part 60—**
**Figure C4E – Sample Statement of Qualification - Certificate**
**INFORMATION**

Federal Aviation Administration
National Simulator Program

# *Certificate of Qualification*

**This is to certify that representatives of the National Simulator Program**
**Completed an evaluation of the**

## Go-Fast Airlines
## Farnsworth Z-100 Full Flight Simulator

FAA Identification Number 0999

And pursuant to 14 CFR Part 60 found it to meet its original qualification basis, AC 120-63 (MM/DD/YY)

**The Master Qualification Test Guide and the attached**
**Configuration List and List of Qualified Tasks**
**Provide the Qualification Basis for this device to operate at**
Level D

**Until April 30, 2010**

**Unless sooner rescinded or extended by the National Simulator Program Manager**

March 15, 2009 (date)

*C. Nordlie* (for the NSPM)

**Attachment 4 to Appendix C to Part 60—**
**Figure C4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

# STATEMENT of QUALIFICATION
# CONFIGURATION LIST

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ ____ | **Physical Address:** | ____ ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| **Type of Evaluation Requested:** | ☐ Initial ☐ Upgrade ☐ Continuing Qualification ☐ Special ☐ Reinstatement | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | ____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:** ____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐ **Yes:** | **Date of Manufacture:** | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** ____ | |
| **Engine model(s) and data revision:** ____ | | **Source of aerodynamic model:** ____ | |
| **FMS identification and revision level:** ____ | | **Source of aerodynamic coefficient data:** ____ | |
| **Visual system manufacturer/model:** ____ | | **Aerodynamic data revision number:** ____ | |
| **Flight control data revision:** ____ | | **Visual system display:** ____ | |
| **Mot ion system manufacturer/type:** ____ | | **FSTD computer(s) identification:** ____ | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | |
| **NAA FSTD ID No:** | ____ | **Last NAA Evaluation Date:** | ____ |
| **NAA Qualification Level:** | ____ | | |
| **NAA Qualification Basis:** | ____ | | |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

| | | | | | |
|---|---|---|---|---|---|
| **Visual System Manufacturer and Type:** | _____ | **FSTD Seats Available:** _____ | **Motion System Manufacturer and Type:** | _____: | |
| **Aircraft Equipment:** | **Engine Type(s):** _____ _____ | **Flight Instrumentation:** ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS ☐ TCAS ☐ GPWS ☐ Plain View ☐ GPS ☐ FMS Type: ___ ☐ WX Radar ☐ Other: ___ | | **Engine Instrumentation:** ☐ EICAS ☐ FADEC ☐ Other: ___ | |

| | | | |
|---|---|---|---|
| **Airport Models:** | 3.6.1 _____ Airport Designator | 3.6.2_____ Airport Designator | 3.6.3 _____ Airport Designator |
| **Circle to Land:** | 3. 7.1 _____ Airport Designator | 3. 7.2_____ Approach | 3. 7.3 _____ Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____ Airport Designator | 3.8 .2_____ Approach | 3. 8.3 _____ Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4F – Sample Statement of Qualification; Configuration List**
**INFORMATION**

| | | |
|---|---|---|
| **Proficiency Checks** (135/121/142) | ☐ | _____ |
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III** * (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4G – Sample Statement of Qualification – List of Qualified Tasks**
**INFORMATION**

**STATEMENT of QUALIFICATION**
**List of Qualified Tasks**

Go Fast Airline Training -- Farnsworth Z-100 -- Level D -- FAA ID# 0999

| **The FFS is qualified to perform all of the Maneuvers, Procedures, Tasks, and Functions Listed in Appendix A, Attachment 1, Table A1B, Minimum FFS Requirements In Effect on [mm/dd/yyyy] except for the following listed Tasks or Functions.** |
|---|

| Qualified for all tasks in Table C1B for which the sponsor has requested qualification, except for the following:<br><br>6.e. Environmental system.<br>6.f. Fire detection and extinguisher system.<br>7.b. In-flight fire and smoke removal.<br>7.d. Ditching. |
|---|
| Additional tasks for which this FFS is qualified (i.e., in addition to the list in Table C1B)<br><br>Enhanced Visual System |

**Attachment 4 to Appendix C to Part 60—**
**Figure C4H – Sample Continuing Qualification Evaluation Requirements Page**
**INFORMATION**

| **Continuing qualification Evaluation Requirements**<br>***Completed at conclusion of Initial Evaluation*** | |
|---|---|
| Continuing qualification Evaluations to be conducted each<br><br>_(fill in)__ months<br><br>Allotting _____ hours of FTD time.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

| **Revision:** | |
|---|---|
| Based on (enter reasoning): | |
| | |
| | |
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

| **Revision:** | |
|---|---|
| Based on (enter reasoning): | |
| | |
| | |
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed: _____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

(Repeat as Necessary)

**Attachment 4 to Appendix C to Part 60—**
**Figure C4I – Sample MQTG Index of Effective FFS Directives**
**INFORMATION**

| Index of Effective FSTD Directives Filed in this Section | | | |
|---|---|---|---|
| **Number** | **Effective Date** | **Date of Notification** | **Details** |
| | | | |
| | | | |
| | | | |
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Continue as Necessary....

ATTACHMENT 5 TO APPENDIX C TO PART 60—FSTD DIRECTIVES APPLICABLE TO HELICOPTER FFSs

FLIGHT SIMULATION TRAINING DEVICE (FSTD) DIRECTIVE

FSTD Directive 1. Applicable to all FFSs, regardless of the original qualification basis and qualification date (original or upgrade), having Class II or Class III airport models available.

*Agency:* Federal Aviation Administration (FAA), DOT

*Action:* This is a retroactive requirement to have all Class II or Class III airport models meet current requirements.

*Summary:* Notwithstanding the authorization listed in paragraph 13b in Appendices A and C of this part, this FSTD Directive requires each certificate holder to ensure that by May 30, 2009, except for the airport model(s) used to qualify the simulator at the designated level, each airport model used by the certificate holder's instructors or evaluators for training, checking, or testing under this chapter in an FFS, meets the definition of a Class II or Class III airport model as defined in 14CFR part 60. The completion of this requirement will not require a report, and the method used for keeping instructors and evaluators apprised of the airport models that meet Class II or Class III requirements on any given simulator is at the option of the certificate holder whose employees are using the FFS, but the method used must be available for review by the TPAA for that certificate holder.

*Dates:* FSTD Directive 1 becomes effective on May 30, 2008.

*For Further Information Contact:* Ed Cook, Senior Advisor to the Division Manager, Air Transportation Division, AFS–200, 800 Independence Ave, SW, Washington, DC, 20591: telephone: (404) 832–4701; fax: (404) 761–8906.

SPECIFIC REQUIREMENTS:

1. Part 60 requires that each FSTD be:

a. Sponsored by a person holding or applying for an FAA operating certificate under Part 119, Part 141, or Part 142, or holding or applying for an FAA-approved training program under Part 63, Appendix C, for flight engineers, and

b. Evaluated and issued an SOQ for a specific FSTD level.

2. FFSs also require the installation of a visual system that is capable of providing an out-of-the-flight-deck view of airport models. However, historically these airport models were not routinely evaluated or required to meet any standardized criteria. This has led to qualified simulators containing airport models being used to meet FAA-approved training, testing, or checking requirements with potentially incorrect or inappropriate visual references.

3. To prevent this from occurring in the future, by May 30, 2009, except for the airport model(s) used to qualify the simulator at the designated level, each certificate holder must assure that each airport model used for training, testing, or checking under this chapter in a qualified FFS meets the definition of a Class II or Class III airport model as defined in Appendix F of this part.

4. These references describe the requirements for visual scene management and the minimum distances from which runway or landing area features must be visible for all levels of simulator. The visual scene or airport model must provide, for each ''in-use runway'' or ''in-use landing area,'' runway or landing area surface and markings, runway or landing area lighting, taxiway surface and markings, and taxiway lighting. Additional requirements include correlation of the visual scenes or airport models with other aspects of the airport environment, correlation of the aircraft and associated equipment, scene quality assessment features, and the extent to which the instructor is able to exercise control of these scenes or models.

5. For circling approaches, all requirements of this section apply to the runway used for the initial approach and to the runway of intended landing.

6. The details in these scenes or models must be developed using airport pictures, construction drawings and maps, or other similar data, or be developed in accordance with published regulatory material. However, FSTD Directive 1 does not require that airport models contain details that are beyond the initially designed capability of the visual system, as currently qualified. The recognized limitations to visual systems are as follows:

a. Visual systems not required to have runway numbers as a part of the specific runway marking requirements are:

(1) Link NVS and DNVS.

(2) Novoview 2500 and 6000.

(3) FlightSafety VITAL series up to, and including, VITAL III, but not beyond.

(4) Redifusion SP1, SP1T, and SP2.

b. Visual systems required to display runway numbers only for LOFT scenes are:

(1) FlightSafety VITAL IV.

(2) Redifusion SP3 and SP3T.

(3) Link-Miles Image II.

c. Visual systems not required to have accurate taxiway edge lighting are:

(1) Redifusion SP1.

(2) FlightSafety Vital IV.

(3) Link-Miles Image II and Image IIT

(4) XKD displays (even though the XKD image generator is capable of generating blue colored lights, the display cannot accommodate that color).

7. A copy of this Directive must be filed in the MQTG in the designated FSTD Directive Section, and its inclusion must be annotated on the Index of Effective FSTD Directives chart. See Attachment 4, Appendices A through D of this part for a sample MQTG Index of Effective FSTD Directives chart.

[Doc. No. FAA–2002–12461, 73 FR 26490, May 9, 2008]

## APPENDIX D TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FLIGHT TRAINING DEVICES

BEGIN INFORMATION

This appendix establishes the standards for Helicopter Flight Training Device (FTD) evaluation and qualification at Level 4, Level 5, Level 6, or Level 7. The NSPM is responsible for the development, application, and implementation of the standards contained within this appendix. The procedures and criteria specified in this appendix will be used by the NSPM, or a person or persons assigned by the NSPM when conducting helicopter FTD evaluations.

TABLE OF CONTENTS

1. Introduction.
2. Applicability (§§ 60.1, 60.2).
3. Definitions (§ 60.3).
4. Qualification Performance Standards (§ 60.4).
5. Quality Management System (§ 60.5).
6. Sponsor Qualification Requirements (§ 60.7).
7. Additional Responsibilities of the Sponsor (§ 60.9).
8. FTD Use (§ 60.11).
9. FTD Objective Data Requirements (§ 60.13).
10. Special Equipment and Personnel Requirements for Qualification of the FTD (§ 60.14).
11. Initial (and Upgrade) Qualification Requirements (§ 60.15).
12. Additional Qualifications for Currently Qualified FTDs (§ 60.16).
13. Previously Qualified FTDs (§ 60.17).
14. Inspection, Continuing Qualification Evaluation, and Maintenance Requirements (§ 60.19).
15. Logging FTD Discrepancies (§ 60.20).
16. Interim Qualification of FTDs for New Helicopter Types or Models (§ 60.21).
17. Modifications to FTDs (§ 60.23).
18. Operations with Missing, Malfunctioning, or Inoperative Components (§ 60.25).
19. Automatic Loss of Qualification and Procedures for Restoration of Qualification (§ 60.27).
20. Other Losses of Qualification and Procedures for Restoration of Qualification (§ 60.29).
21. Recordkeeping and Reporting (§ 60.31).
22. Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements (§ 60.33).

23. [Reserved]
24. Levels of FTD.
25. FTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA) (§60.37).

Attachment 1 to Appendix D to Part 60—General FTD Requirements.

Attachment 2 to Appendix D to Part 60—Flight Training Device (FTD) Objective Tests.

Attachment 3 to Appendix D to Part 60—Flight Training Device (FTD) Subjective Evaluation.

Attachment 4 to Appendix D to Part 60—Sample Documents.

END INFORMATION

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## 1. INTRODUCTION

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BEGIN INFORMATION

a. This appendix contains background information as well as regulatory and informative material as described later in this section. To assist the reader in determining what areas are required and what areas are permissive, the text in this appendix is divided into two sections: ''QPS Requirements'' and ''Information.'' The QPS Requirements sections contain details regarding compliance with the part 60 rule language. These details are regulatory, but are found only in this appendix. The Information sections contain material that is advisory in nature, and designed to give the user general information about the regulation.

b. Questions regarding the contents of this publication should be sent to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Service, National Simulator Program Staff, AFS–205, 100 Hartsfield Centre Parkway, Suite 400, Atlanta, Georgia 30354. Telephone contact numbers for the NSP are: Phone, 404–832–4700; fax, 404–761–8906. The general e-mail address for the NSP office is: *9-aso-avr-sim-team@faa.gov*. The NSP Internet Web Site address is: *http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/nsp/*. On this Web Site you will find an NSP personnel list with telephone and e-mail contact information for each NSP staff member, a list of qualified flight simulation devices, ACs, a description of the qualification process, NSP policy, and an NSP ''In-Works'' section. Also linked from this site are additional information sources, handbook bulletins, frequently asked questions, a listing and text of the Federal Aviation Regulations, Flight Standards Inspector's handbooks, and other FAA links.

c. The NSPM encourages the use of electronic media for all communication, including any record, report, request, test, or statement required by this appendix. The electronic media used must have adequate security provisions and be acceptable to the NSPM. The NSPM recommends inquiries on system compatibility, and minimum system requirements are also included on the NSP Web site.

d. Related Reading References.

(1) 14 CFR part 60.
(2) 14 CFR part 61.
(3) 14 CFR part 63.
(4) 14 CFR part 119.
(5) 14 CFR part 121.
(6) 14 CFR part 125.
(7) 14 CFR part 135.
(8) 14 CFR part 141.
(9) 14 CFR part 142.

(10) AC 120–28, as amended, Criteria for Approval of Category III Landing Weather Minima.

(11) AC 120–29, as amended, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.

(12) AC 120–35, as amended, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.

(13) AC 120–41, as amended, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.

(14) AC 120–57, as amended, Surface Movement Guidance and Control System (SMGCS).

(15) AC 120–63, as amended, Helicopter Simulator Qualification.

(16) AC 150/5300–13, as amended, Airport Design.

(17) AC 150/5340–1, as amended, Standards for Airport Markings.

(18) AC 150/5340–4, as amended, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.

(19) AC 150/5390–2, as amended, Heliport Design.

(20) AC 150/5340–19, as amended, Taxiway Centerline Lighting System.

(21) AC 150/5340–24, as amended, Runway and Taxiway Edge Lighting System.

(22) AC 150/5345–28, as amended, Precision Approach Path Indicator (PAPI) Systems.

(23) International Air Transport Association document, ''Flight Simulator Design and Performance Data Requirements,'' as amended.

(24) AC 29–2, as amended, Flight Test Guide for Certification of Transport Category Rotorcraft.

(25) AC 27–1, as amended, Flight Test Guide for Certification of Normal Category Rotorcraft.

(26) International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, as amended.

(27) Airplane Flight Simulator Evaluation Handbook, Volume I, as amended and Volume II, as amended, The Royal Aeronautical Society, London, UK.

(28) FAA Publication FAA–S–8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).

(29) The FAA Aeronautical Information Manual (AIM). An electronic version of the AIM is on the Internet at *http://www.faa.gov/atpubs*.

(30) Aeronautical Radio, Inc. (ARINC) document number 436, *Guidelines For Electronic Qualification Test Guide* (as amended).

(31) Aeronautical Radio, Inc. (ARINC) document 610, *Guidance for Design and Integration of Aircraft Avionics Equipment in Simulators* (as amended).

END INFORMATION

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2. APPLICABILITY (§60.1 AND 60.2)

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BEGIN INFORMATION

No additional regulatory or informational material applies to §60.1, Applicability, or to §60.2, Applicability of sponsor rules to person who are not sponsors and who are engaged in certain unauthorized activities.

END INFORMATION

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3. DEFINITIONS (§60.3)

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BEGIN INFORMATION

See Appendix F of this part for a list of definitions and abbreviations from part 1, part 60, and the QPS appendices of part 60.

END INFORMATION

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4. QUALIFICATION PERFORMANCE STANDARDS (§60.4)

BEGIN INFORMATION

No additional regulatory or informational material applies to §60.4, Qualification Performance Standards.

END INFORMATION

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5. QUALITY MANAGEMENT SYSTEM (§60.5)

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BEGIN INFORMATION

Additional regulatory material and informational material regarding Quality Management Systems for FTDs may be found in Appendix E of this part.

END INFORMATION

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6. SPONSOR QUALIFICATION REQUIREMENTS (§60.7)

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BEGIN INFORMATION

a. The intent of the language in §60.7(b) is to have a specific FTD, identified by the sponsor, used at least once in an FAA-approved flight training program for the helicopter simulated during the 12-month period described. The identification of the specific FTD may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FTD at least once during the prescribed period. There is no minimum number of hours or minimum FTD periods required.

b. The following examples describe acceptable operational practices:

(1) Example One.

(a) A sponsor is sponsoring a single, specific FTD for its own use, in its own facility or elsewhere—this single FTD forms the basis for the sponsorship. The sponsor uses that FTD at least once in each 12-month period in that sponsor's FAA-approved flight training program for the helicopter simulated. This 12-month period is established according to the following schedule:

(i) If the FTD was qualified prior to May 30, 2008, the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with §60.19 after May 30, 2008, and continues for each subsequent 12-month period;

(ii) A device qualified on or after May 30, 2008, will be required to undergo an initial or upgrade evaluation in accordance with §60.15. Once the initial or upgrade evaluation is complete, the first continuing qualification evaluation will be conducted within 6 months. The 12 month continuing qualification evaluation cycle begins on that date and continues for each subsequent 12-month period.

(b) There is no minimum number of hours of FTD use required.

(c) The identification of the specific FTD may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FTD at least once during the prescribed period.

(2) Example Two.

(a) A sponsor sponsors an additional number of FTDs, in its facility or elsewhere. Each additionally sponsored FTD must be—

(i) Used by the sponsor in the sponsor's FAA-approved flight training program for the helicopter simulated (as described in §60.7(d)(1)); or

(ii) Used by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the helicopter simulated (as described in §60.7(d)(1)). This 12-month period is established in the same manner as in example one; or

(iii) Provided a statement each year from a qualified pilot, (after having flown the helicopter not the subject FTD or another FTD, during the preceding 12-month period) stating that the subject FTD's performance and handling qualities represent the helicopter (as described in §60.7(d)(2)). This statement is provided at least once in each 12-month period established in the same manner as in example one.

(b) There is no minimum number of hours of FTD use required.

(3) Example Three.

(a) A sponsor in New York (in this example, a Part 142 certificate holder) establishes ''satellite'' training centers in Chicago and Moscow.

(b) The satellite function means that the Chicago and Moscow centers must operate under the New York center's certificate (in accordance with all of the New York center's practices, procedures, and policies; e.g., instructor and/or technician training/checking requirements, record keeping, QMS program).

(c) All of the FTDs in the Chicago and Moscow centers could be dry-leased (i.e., the certificate holder does not have and use FAA-approved flight training programs for the FTDs in the Chicago and Moscow centers) because—

(i) Each FTD in the Chicago center and each FTD in the Moscow center is used at least once each 12-month period by another FAA certificate holder in that other certificate holder's FAA-approved flight training program for the helicopter (as described in §60.7(d)(1)); or

(ii) A statement is obtained from a qualified pilot (having flown the helicopter, not the subject FTD or another FTD during the preceding 12-month period) stating that the performance and handling qualities of each FTD in the Chicago and Moscow centers represents the helicopter (as described in §60.7(d)(2)).

END INFORMATION

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7. ADDITIONAL RESPONSIBILITIES OF THE SPONSOR (§60.9)

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BEGIN INFORMATION

The phrase ''as soon as practicable'' in §60.9(a) means without unnecessarily disrupting or delaying beyond a reasonable time the training, evaluation, or experience being conducted in the FTD.

END INFORMATION

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8. FTD USE (§60.11).

---

BEGIN INFORMATION

No additional regulatory or informational material applies to §60.11, FTD Use.

END INFORMATION

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9. FTD OBJECTIVE DATA REQUIREMENTS (§60.13)

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BEGIN QPS REQUIREMENTS

a. Flight test data used to validate FTD performance and handling qualities must have been gathered in accordance with a flight test program containing the following:

(1) A flight test plan consisting of:

(a) The maneuvers and procedures required for aircraft certification and simulation programming and validation.

(b) For each maneuver or procedure—

(i) The procedures and control input the flight test pilot and/or engineer used.

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

(iv) The helicopter configuration, including weight and center of gravity.

(v) The data to be gathered.

(vi) All other information necessary to recreate the flight test conditions in the FTD.

(2) Appropriately qualified flight test personnel.

(3) Appropriate and sufficient data acquisition equipment or system(s), including appropriate data reduction and analysis methods and techniques, acceptable to the FAA's Aircraft Certification Service.

b. The data, regardless of source, must be presented:

(1) In a format that supports the FTD validation process;

(2) In a manner that is clearly readable and annotated correctly and completely;

(3) With resolution sufficient to determine compliance with the tolerances set forth in Attachment 2, Table D2A Appendix D;

(4) With any necessary guidance information provided; and

(5) Without alteration, adjustments, or bias. Data may be corrected to address known data calibration errors provided that an explanation of the methods used to correct the errors appears in the QTG. The corrected data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation

c. After completion of any additional flight test, a flight test report must be submitted in support of the validation data. The report must contain sufficient data and rationale to support qualification of the FTD at the level requested.

d. As required by §60.13(f), the sponsor must notify the NSPM when it becomes aware that an addition to or a revision of the flight related data or helicopter systems related data is available if this data is used to program and operate a qualified FTD. The data referred to in this sub-section is data used to validate the performance, handling qualities, or other characteristics of the aircraft, including data related to any relevant changes occurring after the type certification is issued. The sponsor must—

(1) Within 10 calendar days, notify the NSPM of the existence of this data; and

(a) Within 45 calendar days, notify the NSPM of—

(b) The schedule to incorporate this data into the FTD; or

(c) The reason for not incorporating this data into the FTD.

e. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot tests'' results in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

END QPS REQUIREMENTS

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BEGIN INFORMATION

f. The FTD sponsor is encouraged to maintain a liaison with the manufacturer of the aircraft being simulated (or with the holder of the aircraft type certificate for the aircraft being simulated if the manufacturer is no longer in business), and if appropriate, with the person having supplied the aircraft data package for the FTD in order to facilitate the notification described in this paragraph.

g. It is the intent of the NSPM that for new aircraft entering service, at a point well in advance of preparation of the QTG, the sponsor should submit to the NSPM for approval, a descriptive document (see Appendix C of this part, Table C2D, Sample Validation Data Roadmap for Helicopters) containing the plan for acquiring the validation data, including data sources. This document should clearly identify sources of data for all required tests, a description of the validity of these data for a specific engine type and thrust rating configuration, and the revision levels of all avionics affecting the performance or flying qualities of the aircraft. Additionally, this document should provide other information such as the rationale or explanation for cases where data or data parameters are missing, instances where engineering simulation data are used, or where flight test methods require further explanations. It should also provide a brief narrative describing the cause and effect of any deviation from data requirements. The aircraft manufacturer may provide this document.

h. There is no requirement for any flight test data supplier to submit a flight test plan or program prior to gathering flight test data. However, the NSPM notes that inexperienced data gatherers often provide data that is irrelevant, improperly marked, or lacking adequate justification for selection. Other problems include inadequate information regarding initial conditions or test maneuvers. The NSPM has been forced to refuse these data submissions as validation data for an FTD evaluation. For this reason the NSPM recommends that any data supplier not previously experienced in this area review the data necessary for programming and for validating the performance of the FTD and discuss the flight test plan anticipated for acquiring such data with the NSPM well in advance of commencing the flight tests.

i. The NSPM will consider, on a case-by-case basis, whether to approve supplemental validation data derived from flight data recording systems such as a Quick Access Recorder or Flight Data Recorder.

END INFORMATION

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10. SPECIAL EQUIPMENT AND PERSONNEL REQUIREMENTS FOR QUALIFICATION OF THE FTD (§60.14).

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BEGIN INFORMATION

a. In the event that the NSPM determines that special equipment or specifically qualified persons will be required to conduct an evaluation, the NSPM will make every attempt to notify the sponsor at least one (1) week, but in no case less than 72 hours, in advance of the evaluation. Examples of special equipment include flight control measurement devices, accelerometers, or oscilloscopes. Examples of specially qualified personnel include individuals specifically qualified to install or use any special equipment when its use is required.

b. Examples of a special evaluation include an evaluation conducted after an FTD is moved; at the request of the TPAA; or as a result of comments received from users of the FTD that raise questions about the continued qualification or use of the FTD.

END INFORMATION

11. INITIAL (AND UPGRADE) QUALIFICATION REQUIREMENTS (§60.15).

BEGIN QPS REQUIREMENT

a. In order to be qualified at a particular qualification level, the FTD must:

(1) Meet the general requirements listed in Attachment 1 of this appendix.

(2) Meet the objective testing requirements listed in Attachment 2 of this appendix (Level 4 FTDs do not require objective tests).

(3) Satisfactorily accomplish the subjective tests listed in Attachment 3 of this appendix.

b. The request described in §60.15(a) must include all of the following:

(1) A statement that the FTD meets all of the applicable provisions of this part and all applicable provisions of the QPS.

(2) A confirmation that the sponsor will forward to the NSPM the statement described in §60.15(b) in such time as to be received no later than 5 business days prior to the scheduled evaluation and may be forwarded to the NSPM via traditional or electronic means.

(3) Except for a Level 4 FTD, a QTG, acceptable to the NSPM, that includes all of the following:

(a) Objective data obtained from aircraft testing or another approved source.

(b) Correlating objective test results obtained from the performance of the FTD as prescribed in the appropriate QPS.

(c) The result of FTD subjective tests prescribed in the appropriate QPS.

(d) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

c. The QTG described in paragraph a(3) of this section must provide the documented proof of compliance with the FTD objective tests in Attachment 2, Table D2A of this appendix.

d. The QTG is prepared and submitted by the sponsor, or the sponsor's agent on behalf of the sponsor, to the NSPM for review and approval, and must include, for each objective test:

(1) Parameters, tolerances, and flight conditions.

(2) Pertinent and complete instructions for conducting automatic and manual tests.

(3) A means of comparing the FTD test results to the objective data.

(4) Any other information as necessary to assist in the evaluation of the test results.

(5) Other information appropriate to the qualification level of the FTD.

e. The QTG described in paragraphs (a)(3) and (b) of this section, must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 4, Figure D4C, of this appendix, for a sample QTG cover page).

(2) A continuing qualification evaluation requirements page. This page will be used by the NSPM to establish and record the frequency with which continuing qualification evaluations must be conducted and any subsequent changes that may be determined by the NSPM in accordance with §60.19. See Attachment 4, Figure D4G, of this appendix for a sample Continuing Qualification Evaluation Requirements page.

(3) An FTD information page that provides the information listed in this paragraph, if applicable (see Attachment 4, Figure D4B, of this appendix, for a sample FTD information page). For convertible FTDs, the sponsor must submit a separate page for each configuration of the FTD.

(a) The sponsor's FTD identification number or code.

(b) The helicopter model and series being simulated.

(c) The aerodynamic data revision number or reference.

(d) The source of the basic aerodynamic model and the aerodynamic coefficient data used to modify the basic model.

(e) The engine model(s) and its data revision number or reference.

(f) The flight control data revision number or reference.

(g) The flight management system identification and revision level.

(h) The FTD model and manufacturer.

(i) The date of FTD manufacture.

(j) The FTD computer identification.

(k) The visual system model and manufacturer, including display type.

(l) The motion system type and manufacturer, including degrees of freedom.

(4) A Table of Contents.

(5) A log of revisions and a list of effective pages.

(6) List of all relevant data references.

(7) A glossary of terms and symbols used (including sign conventions and units).

(8) Statements of Compliance and Capability (SOC) with certain requirements.

(9) Recording procedures or equipment required to accomplish the objective tests.

(10) The following information for each objective test designated in Attachment 2 of this appendix, as applicable to the qualification level sought:

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating FTD objective test results.

(g) List of all relevant parameters driven or constrained during the automatic test(s).

(h) List of all relevant parameters driven or constrained during the manual test(s).

(i) Tolerances for relevant parameters.

(j) Source of Validation Data (document and page number).

(k) Copy of the Validation Data (if located in a separate binder, a cross reference for the identification and page number for pertinent data location must be provided).

(l) FTD Objective Test Results as obtained by the sponsor. Each test result must reflect the date completed and must be clearly labeled as a product of the device being tested.

f. A convertible FTD is addressed as a separate FTD for each model and series helicopter to which it will be converted and for the FAA qualification level sought. The NSPM will conduct an evaluation for each configuration. If a sponsor seeks qualification for two or more models of a helicopter type using a convertible FTD, the sponsor must provide a QTG for each helicopter model, or a QTG for the first helicopter model and a supplement to that QTG for each additional helicopter model. The NSPM will conduct evaluations for each helicopter model.

g. The form and manner of presentation of objective test results in the QTG must include the following:

(1) The sponsor's FTD test results must be recorded in a manner acceptable to the NSPM, that allows easy comparison of the FTD test results to the validation data (e.g., use of a multi-channel recorder, line printer, cross plotting, overlays, transparencies).

(2) FTD results must be labeled using terminology common to helicopter parameters as opposed to computer software identifications.

(3) Validation data documents included in a QTG may be photographically reduced only if such reduction will not alter the graphic scaling or cause difficulties in scale interpretation or resolution.

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in Attachment 2, Table D2A of this appendix.

(5) Tests involving time histories, data sheets (or transparencies thereof) and FTD test results must be clearly marked with appropriate reference points to ensure an accurate comparison between FTD and helicopter with respect to time. Time histories recorded via a line printer are to be clearly identified for cross-plotting on the helicopter data. Over-plots may not obscure the reference data.

h. The sponsor may elect to complete the QTG objective and subjective tests at the manufacturer's facility or at the sponsor's training facility. If the tests are conducted at the manufacturer's facility, the sponsor must repeat at least one-third of the tests at the sponsor's training facility in order to substantiate FTD performance. The QTG must be clearly annotated to indicate when and where each test was accomplished. Tests conducted at the manufacturer's facility and at the sponsor's training facility must be conducted after the FTD is assembled with systems and sub-systems functional and operating in an interactive manner. The test results must be submitted to the NSPM.

i. The sponsor must maintain a copy of the MQTG at the FTD location.

j. All FTDs for which the initial qualification is conducted after May 30, 2014, must have an electronic MQTG (eMQTG) including all objective data obtained from helicopter testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the FTD (reformatted or digitized) as prescribed in this appendix. The eMQTG must also contain the general FTD performance or demonstration results (reformatted or digitized) prescribed in this appendix, and a description of the equipment necessary to perform the initial qualification evaluation and the continuing qualification evaluations. The eMQTG must include the original validation data used to validate FTD performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original time-history plots that were provided by the data supplier. A copy of the eMQTG must be provided to the NSPM.

k. All other FTDs (not covered in subparagraph ''j'') must have an electronic copy of the MQTG by and after May 30, 2014. An electronic copy of the MQTG must be provided to the NSPM. This may be provided by an electronic scan presented in a Portable Document File (PDF), or similar format acceptable to the NSPM.

l. During the initial (or upgrade) qualification evaluation conducted by the NSPM, the sponsor must also provide a person knowledgeable about the operation of the aircraft and the operation of the FTD.

END QPS REQUIREMENTS

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BEGIN INFORMATION

m. Only those FTDs that are sponsored by a certificate holder as defined in Appendix F of this part will be evaluated by the NSPM. However, other FTD evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

n. The NSPM will conduct an evaluation for each configuration, and each FTD must be evaluated as completely as possible. To ensure a thorough and uniform evaluation,

each FTD is subjected to the general FTD requirements in Attachment 1 of this appendix, the objective tests listed in Attachment 2 of this appendix, and the subjective tests listed in Attachment 3 of this appendix. The evaluations described herein will include, but not necessarily be limited to the following:

(1) Helicopter responses, including longitudinal and lateral-directional control responses (see Attachment 2 of this appendix).

(2) Performance in authorized portions of the simulated helicopter's operating envelope, to include tasks evaluated by the NSPM in the areas of surface operations, takeoff, climb, cruise, descent, approach and landing, as well as abnormal and emergency operations (see Attachment 2 of this appendix).

(3) Control checks (see Attachment 1 and Attachment 2 of this appendix).

(4) Flight deck configuration (see Attachment 1 of this appendix).

(5) Pilot, flight engineer, and instructor station functions checks (see Attachment 1 and Attachment 3 of this appendix).

(6) Helicopter systems and sub-systems (as appropriate) as compared to the helicopter simulated (see attachment 1 and attachment 3 of this appendix).

(7) FTD systems and sub-systems, including force cueing (motion), visual, and aural (sound) systems, as appropriate (see Attachment 1 and Attachment 2 of this appendix).

(8) Certain additional requirements, depending upon the qualification level sought, including equipment or circumstances that may become hazardous to the occupants. The sponsor may be subject to Occupational Safety and Health Administration requirements.

o. The NSPM administers the objective and subjective tests, which include an examination of functions. The tests include a qualitative assessment of the FTD by an NSP pilot. The NSP evaluation team leader may assign other qualified personnel to assist in accomplishing the functions examination and/or the objective and subjective tests performed during an evaluation when required.

(1) Objective tests provide a basis for measuring and evaluating FTD performance and determining compliance with the requirements of this part.

(2) Subjective tests provide a basis for:

(a) Evaluating the capability of the FTD to perform over a typical utilization period;

(b) Determining that the FTD satisfactorily simulates each required task;

(c) Verifying correct operation of the FTD controls, instruments, and systems; and

(d) Demonstrating compliance with the requirements of this part.

p. The tolerances for the test parameters listed in Attachment 2 of this appendix reflect the range of tolerances acceptable to the NSPM for FTD validation and are not to be confused with design tolerances specified for FTD manufacture. In making decisions regarding tests and test results, the NSPM relies on the use of operational and engineering judgment in the application of data (including consideration of the way in which the flight test was flown and way the data was gathered and applied), data presentations, and the applicable tolerances for each test.

q. In addition to the scheduled continuing qualification evaluation, each FTD is subject to evaluations conducted by the NSPM at any time without prior notification to the sponsor. Such evaluations would be accomplished in a normal manner (i.e., requiring exclusive use of the FTD for the conduct of objective and subjective tests and an examination of functions) if the FTD is not being used for flight crewmember training, testing, or checking. However, if the FTD were being used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the FTD evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the FTD along with the student(s) and observing the operation of the FTD during the training, testing, or checking activities.

r. Problems with objective test results are handled as follows:

(1) If a problem with an objective test result is detected by the NSP evaluation team during an evaluation, the test may be repeated or the QTG may be amended.

(2) If it is determined that the results of an objective test do not support the qualification level requested but do support a lower level, the NSPM may qualify the FTD at a lower level.

s. After an FTD is successfully evaluated, the NSPM issues an SOQ to the sponsor. The NSPM recommends the FTD to the TPAA, who will approve the FTD for use in a flight training program. The SOQ will be issued at the satisfactory conclusion of the initial or continuing qualification evaluation and will list the tasks for which the FTD is qualified, referencing the tasks described in Table D1B in Attachment 1 of this appendix. However, it is the sponsor's responsibility to obtain TPAA approval prior to using the FTD in an FAA-approved flight training program.

t. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within ten (10) working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made. A sponsor may schedule an evaluation date as early as 6 months in advance. However, there may be a delay of 45 days or more in rescheduling and completing the evaluation if the sponsor is unable to meet the scheduled date. See Attachment 4, of this appendix, Figure D4A,

Sample Request for Initial, Upgrade, or Reinstatement Evaluation.

u. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in Attachment 2, FTD Objective Tests, Table D2A of this appendix.

v. Contact the NSPM or visit the NSPM Web site for additional information regarding the preferred qualifications of pilots used to meet the requirements of §60.15(d).

w. Examples of the exclusions for which the FTD might not have been subjectively tested by the sponsor or the NSPM and for which qualification might not be sought or granted, as described in §60.15(g)(6), include approaches to and departures from slopes and pinnacles.

END INFORMATION

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12. ADDITIONAL QUALIFICATIONS FOR CURRENTLY QUALIFIED FTDS (§60.16)

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BEGIN INFORMATION

No additional regulatory or informational material applies to §60.16, Additional Qualifications for a Currently Qualified FTD.

END INFORMATION

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13. PREVIOUSLY QUALIFIED FTDS (§60.17)

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BEGIN QPS REQUIREMENTS

a. In instances where a sponsor plans to remove an FTD from active status for a period of less than two years, the following procedures apply:

(1) The NSPM must be notified in writing and the notification must include an estimate of the period that the FTD will be inactive.

(2) Continuing Qualification evaluations will not be scheduled during the inactive period.

(3) The NSPM will remove the FTD from the list of qualified FTDs on a mutually established date not later than the date on which the first missed continuing qualification evaluation would have been scheduled.

(4) Before the FTD is restored to qualified status, it must be evaluated by the NSPM. The evaluation content and the time required to accomplish the evaluation is based on the number of continuing qualification evaluations and sponsor-conducted quarterly inspections missed during the period of inactivity.

(5) The sponsor must notify the NSPM of any changes to the original scheduled time out of service.

b. FTDs and replacement FTD systems qualified prior to May 30, 2008, are not required to meet the general FTD requirements, the objective test requirements, and the subjective test requirements of Attachments 1, 2, and 3, respectively, of this appendix as long as the FTD continues to meet the test requirements contained in the MQTG developed under the original qualification basis.

c. After (1 year after date of publication of the final rule in the FEDERAL REGISTER) each visual scene and airport model installed in and available for use in a qualified FTD must meet the requirements described in Attachment 3 of this appendix.

d. Simulators qualified prior to May 30, 2008, may be updated. If an evaluation is deemed appropriate or necessary by the NSPM after such an update, the evaluation will not require an evaluation to standards beyond those against which the simulator was originally qualified.

END QPS REQUIREMENTS

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BEGIN INFORMATION

e. Other certificate holders or persons desiring to use an FTD may contract with FTD sponsors to use FTDs previously qualified at a particular level for a helicopter type and approved for use within an FAA-approved flight training program. Such FTDs are not required to undergo an additional qualification process, except as described in §60.16.

f. Each FTD user must obtain approval from the appropriate TPAA to use any FTD in an FAA-approved flight training program.

g. The intent of the requirement listed in §60.17(b), for each FTD to have an SOQ within 6 years, is to have the availability of that statement (including the configuration list and the limitations to authorizations) to provide a complete picture of the FTD inventory regulated by the FAA. The issuance of the statement will not require any additional evaluation or require any adjustment to the evaluation basis for the FTD.

h. Downgrading of an FTD is a permanent change in qualification level and will necessitate the issuance of a revised SOQ to reflect the revised qualification level, as appropriate. If a temporary restriction is placed on an FTD because of a missing, malfunctioning, or inoperative component or ongoing repairs, the restriction is not a permanent change in qualification level. Instead, the restriction is temporary and is removed when the reason for the restriction has been resolved.

i. It is not the intent of the NSPM to discourage the improvement of existing simulation (e.g., the ''updating'' of a control loading system, or the replacement of the IOS with a more capable unit) by requiring the

''updated'' device to meet the qualification standards current at the time of the update. Depending on the extent of the update, the NSPM may require that the updated device be evaluated and may require that an evaluation include all or a portion of the elements of an initial evaluation. However, the standards against which the device would be evaluated are those that are found in the MQTG for that device.

j. The NSPM will determine the evaluation criteria for an FTD that has been removed from active status for a prolonged period. The criteria will be based on the number of continuing qualification evaluations and quarterly inspections missed during the period of inactivity. For example, if the FTD were out of service for a 1 year period, it would be necessary to complete the entire QTG, since all of the quarterly evaluations would have been missed. The NSPM will also consider how the FTD was stored, whether parts were removed from the FTD and whether the FTD was disassembled.

k. The FTD will normally be requalified using the FAA-approved MQTG and the criteria that was in effect prior to its removal from qualification. However, inactive periods of 2 years or more will require re-qualification under the standards in effect and current at the time of requalification.

END INFORMATION

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14. INSPECTION, CONTINUING QUALIFICATION, EVALUATION, AND MAINTENANCE REQUIREMENTS (§60.19)

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BEGIN QPS REQUIREMENT

a. The sponsor must conduct a minimum of four evenly spaced inspections throughout the year. The objective test sequence and content of each inspection in this sequence must be developed by the sponsor and must be acceptable to the NSPM.

b. The description of the functional preflight check must be contained in the sponsor's QMS.

c. Record ''functional preflight'' in the FTD discrepancy log book or other acceptable location, including any item found to be missing, malfunctioning, or inoperative.

d. During the continuing qualification evaluation conducted by the NSPM, the sponsor must also provide a person knowledgeable about the operation of the aircraft and the operation of the FTD.

END QPS REQUIREMENTS

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BEGIN INFORMATION

e. The sponsor's test sequence and the content of each quarterly inspection required in §60.19(a)(1) should include a balance and a mix from the objective test requirement areas listed as follows:

(1) Performance.
(2) Handling qualities.
(3) Motion system (where appropriate).
(4) Visual system (where appropriate).
(5) Sound system (where appropriate).
(6) Other FTD systems.

f. If the NSP evaluator plans to accomplish specific tests during a normal continuing qualification evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; but not less than 72 hours. Examples of such tests include latencies and control sweeps.

g. The continuing qualification evaluations described in §60.19(b) will normally require 4 hours of FTD time. However, flexibility is necessary to address abnormal situations or situations involving aircraft with additional levels of complexity (e.g., computer controlled aircraft). The sponsor should anticipate that some tests may require additional time. The continuing qualification evaluations will consist of the following:

(1) Review of the results of the quarterly inspections conducted by the sponsor since the last scheduled continuing qualification evaluation.

(2) A selection of approximately 8 to 15 objective tests from the MQTG that provide an adequate opportunity to evaluate the performance of the FTD. The tests chosen will be performed either automatically or manually and should be able to be conducted within approximately one-third (1/3) of the allotted FTD time.

(3) A subjective evaluation of the FTD to perform a representative sampling of the tasks set out in attachment 3 of this appendix. This portion of the evaluation should take approximately two-thirds (2/3) of the allotted FTD time.

(4) An examination of the functions of the FTD may include the motion system, visual system, sound system as applicable, instructor operating station, and the normal functions and simulated malfunctions of the simulated helicopter systems. This examination is normally accomplished simultaneously with the subjective evaluation requirements.

h. The requirement established in §60.19(b)(4) regarding the frequency of NSPM-conducted continuing qualification evaluations for each FTD is typically 12 months. However, the establishment and satisfactory implementation of an approved QMS for a sponsor will provide a basis for adjusting the frequency of evaluations to exceed 12-month intervals.

END INFORMATION

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15. LOGGING FTD DISCREPANCIES (§ 60.20)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.20. Logging FTD Discrepancies.

END INFORMATION

16. INTERIM QUALIFICATION OF FTDS FOR NEW HELICOPTER TYPES OR MODELS (§ 60.21)

BEGIN INFORMATION

No additional regulatory or informational material applies to § 60.21, Interim Qualification of FTDs for New Helicopter Types or Models.

END INFORMATION

17. MODIFICATIONS TO FTDS (§ 60.23)

BEGIN QPS REQUIREMENTS

a. The notification described in § 60.23(c)(2) must include a complete description of the planned modification, with a description of the operational and engineering effect the proposed modification will have on the operation of the FTD and the results that are expected with the modification incorporated.

b. Prior to using the modified FTD:

(1) All the applicable objective tests completed with the modification incorporated, including any necessary updates to the MQTG (e.g., accomplishment of FSTD Directives) must be acceptable to the NSPM; and

(2) The sponsor must provide the NSPM with a statement signed by the MR that the factors listed in § 60.15(b) are addressed by the appropriate personnel as described in that section.

END QPS REQUIREMENTS

BEGIN INFORMATION

c. FSTD Directives are considered modification of an FTD. See Attachment 4 of this appendix, Figure D4H for a sample index of effective FSTD Directives. See Attachment 6 of this appendix for a list of all effective FSTD Directives applicable to Helicopter FTDs.

END INFORMATION

18. OPERATION WITH MISSING, MALFUNCTIONING, OR INOPERATIVE COMPONENTS (§ 60.25)

BEGIN INFORMATION

a. The sponsor's responsibility with respect to § 60.25(a) is satisfied when the sponsor fairly and accurately advises the user of the current status of an FTD, including any missing, malfunctioning, or inoperative (MMI) component(s).

b. It is the responsibility of the instructor, check airman, or representative of the administrator conducting training, testing, or checking to exercise reasonable and prudent judgment to determine if any MMI component is necessary for the satisfactory completion of a specific maneuver, procedure, or task.

c. If the 29th or 30th day of the 30-day period described in § 60.25(b) is on a Saturday, a Sunday, or a holiday, the FAA will extend the deadline until the next business day.

d. In accordance with the authorization described in § 60.25(b), the sponsor may develop a discrepancy prioritizing system to accomplish repairs based on the level of impact on the capability of the FTD. Repairs having a larger impact on the FTD's ability to provide the required training, evaluation, or flight experience will have a higher priority for repair or replacement.

END INFORMATION

19. AUTOMATIC LOSS OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§ 60.27)

BEGIN INFORMATION

If the sponsor provides a plan for how the FTD will be maintained during its out-of-service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FTD is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing that is required for requalification.

END INFORMATION

20. OTHER LOSSES OF QUALIFICATION AND PROCEDURES FOR RESTORATION OF QUALIFICATION (§ 60.29)

BEGIN INFORMATION

If the sponsor provides a plan for how the FTD will be maintained during its out-of-

service period (e.g., periodic exercise of mechanical, hydraulic, and electrical systems; routine replacement of hydraulic fluid; control of the environmental factors in which the FTD is to be maintained) there is a greater likelihood that the NSPM will be able to determine the amount of testing that is required for requalification.

END INFORMATION

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21. RECORD KEEPING AND REPORTING (§60.31)

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BEGIN QPS REQUIREMENTS

a. FTD modifications can include hardware or software changes. For FTD modifications involving software programming changes, the record required by §60.31(a)(2) must consist of the name of the aircraft system software, aerodynamic model, or engine model change, the date of the change, a summary of the change, and the reason for the change.

b. If a coded form for record keeping is used, it must provide for the preservation and retrieval of information with appropriate security or controls to prevent the inappropriate alteration of such records after the fact.

END INFORMATION

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22. APPLICATIONS, LOGBOOKS, REPORTS, AND RECORDS: FRAUD, FALSIFICATION, OR INCORRECT STATEMENTS (§60.33)

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BEGIN INFORMATION

No additional regulatory or informational material applies to §60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements

23. [RESERVED]

END INFORMATION

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24. LEVELS OF FTD

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BEGIN INFORMATION

a. The following is a general description of each level of FTD. Detailed standards and tests for the various levels of FTDs are fully defined in Attachments 1 through 3 of this appendix.

(1) Level 4. A Level 4 device is one that may have an open helicopter-specific flight deck area, or an enclosed helicopter-specific flight deck and at least one operating system. Air/ground logic is required (no aerodynamic programming required). All displays may be flat/LCD panel representations or actual representations of displays in the aircraft. All controls, switches, and knobs may be touch sensitive activation (not capable of manual manipulation of the flight controls) or may physically replicate the aircraft in control operation.

(2) Level 5. A Level 5 device is one that may have an open helicopter-specific flight deck area, or an enclosed helicopter-specific flight deck and a generic aerodynamic program with at least one operating system and control loading representative of the simulated helicopter. The control loading need only represent the helicopter at an approach speed and configuration. All displays may be flat/LCD panel representations or actual representations of displays in the aircraft. Primary and secondary flight controls (e.g., rudder, aileron, elevator, flaps, spoilers/speed brakes, engine controls, landing gear, nosewheel steering, trim, brakes) must be physical controls. All other controls, switches, and knobs may be touch sensitive activation.

(3) Level 6. A Level 6 device is one that has an enclosed helicopter-specific flight deck and aerodynamic program with all applicable helicopter systems operating and control loading that is representative of the simulated helicopter throughout its ground and flight envelope and significant sound representation. All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation.

(4) Level 7. A Level 7 device is one that has an enclosed helicopter-specific flight deck and aerodynamic program with all applicable helicopter systems operating and control loading that is representative of the simulated helicopter throughout its ground and flight envelope and significant sound representation. All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation. It also has a visual system that provides an out-of-the-flight deck view, providing cross-flight deck viewing (for both pilots simultaneously) of a field-of-view of at least 146° horizontally and 36° vertically as well as a vibration cueing system for characteristic helicopter vibrations noted at the pilot station(s).

END INFORMATION

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25. FTD QUALIFICATION ON THE BASIS OF A BILATERAL AVIATION SAFETY AGREEMENT (BASA) (§60.37)

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BEGIN INFORMATION

No additional regulatory or informational material applies to §60.37, FTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).

END INFORMATION

## ATTACHMENT 1 TO APPENDIX D TO PART 60—GENERAL FTD REQUIREMENTS

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Certain requirements included in this appendix must be supported with an SOC as defined in Appendix F, which may include objective and subjective tests. The requirements for SOCs are indicated in the ''General FTD Requirements'' column in Table D1A of this appendix.

b. Table D1A describes the requirements for the indicated level of FTD. Many devices include operational systems or functions that exceed the requirements outlined in this section. In any event, all systems will be tested and evaluated in accordance with this appendix to ensure proper operation.

END QPS REQUIREMENTS

BEGIN INFORMATION

2. DISCUSSION

a. This attachment describes the general requirements for qualifying Level 4 through Level 7 FTDs. The sponsor should also consult the objectives tests in Attachment 2 of this appendix and the examination of functions and subjective tests listed in Attachment 3 of this appendix to determine the complete requirements for a specific level FTD.

b. The material contained in this attachment is divided into the following categories:

(1) General Flight Deck Configuration.

(2) Programming.

(3) Equipment Operation.

(4) Equipment and Facilities for Instructor/Evaluator Functions.

(5) Motion System.

(6) Visual System.

(7) Sound System.

c. Table D1A provides the standards for the General FTD Requirements.

d. Table D1B provides the tasks that the sponsor will examine to determine whether the FTD satisfactorily meets the requirements for flight crew training, testing, and experience.

e. Table D1C provides the functions that an instructor/check airman must be able to control in the simulator.

f. It is not required that all of the tasks that appear on the List of Qualified Tasks (part of the SOQ) be accomplished during the initial or continuing qualification evaluation.

END INFORMATION

TABLE D1A—MINIMUM FTD REQUIREMENTS

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| **1. General Flight Deck Configuration.** | | | | | | |

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 1.a. ..... | The FTD must have a flight deck that is a replica of the helicopter, or set of helicopters simulated with controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the helicopter or set of helicopters. The direction of movement of controls and switches must be identical to that in the helicopter or set of helicopters. Crewmember seats must afford the capability for the occupant to be able to achieve the design ''eye position.'' Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate. Fire axes, extinguishers, landing gear pins, and spare light bulbs must be available, and may be represented in silhouette, in the flight simulator. This equipment must be present as near as practical to the original position | | | X | X | For FTD purposes, the flight deck consists of all that space forward of a cross section of the flight deck at the most extreme aft setting of the pilots' seats including additional, required crewmember duty stations and those required bulkheads aft of the pilot seats. Bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, and aircraft documents pouches are not considered essential and may be omitted. If omitted, these items, or the silhouettes of these items, may be placed on the wall of the simulator, or in any other location as near as practical to the original position of these items. |
| 1.b. ..... | The FTD must have equipment (i.e., instruments, panels, systems, circuit breakers, and controls) simulated sufficiently for the authorized training/checking events to be accomplished. The installed equipment, must be located in a spatially correct configuration, and may be in a flight deck or an open flight deck area. Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate. Additional equipment required for the authorized training and checking events must be available in the FTD but may be located in a suitable location as near as practical to the spatially correct position. Actuation of this equipment must replicate the appropriate function in the helicopter. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette | X | X | | | |
| **2. Programming.** | | | | | | |
| 2.a. ..... | The FTD must provide the proper effect of aerodynamic changes for the combinations of drag and thrust normally encountered in flight. This must include the effect of change in helicopter attitude, thrust, drag, altitude, temperature, and configuration. Levels 6 and 7 additionally require the effects of changes in gross weight and center of gravity.Level 5 requires only generic aerodynamic programming.<br>An SOC is required ..... | | X | X | X | |
| 2.b. ..... | The FTD must have the computer (analog or digital) capability (i.e., capacity, accuracy, resolution, and dynamic response) needed to meet the qualification level sought.<br>An SOC is required ..... | X | X | X | X | |

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 2.c. ..... | Relative responses of the flight deck instruments must be measured by latency tests or transport delay tests, and may not exceed 150 milliseconds. The instruments must respond to abrupt input at the pilot's position within the allotted time, but not before the time that the helicopter or set of helicopters respond under the same conditions<br>• Latency: The FTD instrument and, if applicable, the motion system and the visual system response must not be prior to that time when the helicopter responds and may respond up to 150 milliseconds after that time under the same conditions.<br>• Transport Delay: As an alternative to the Latency requirement, a transport delay objective test may be used to demonstrate that the FTD system does not exceed the specified limit. The sponsor must measure all the delay encountered by a step signal migrating from the pilot's control through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the instrument display and, if applicable, the motion system, and the visual system. | | X | X | X | The intent is to verify that the FTD provides instrument cues that are, within the stated time delays, like the helicopter responses. For helicopter response, acceleration in the appropriate, corresponding rotational axis is preferred. |
| **3. Equipment Operation.** | | | | | | |
| 3.a. ..... | All relevant instrument indications involved in the simulation of the helicopter must automatically respond to control movement or external disturbances to the simulated helicopter or set of helicopters; e.g., turbulence or winds | A | X | X | X | |
| 3.b. ..... | Navigation equipment must be installed and operate within the tolerances applicable for the helicopter or set of helicopters. Levels 6 and 7 must also include communication equipment (inter-phone and air/ground) like that in the helicopter. Level 5 only needs that navigation equipment necessary to fly an instrument approach | A | X | X | X | |
| 3.c. ..... | Installed systems must simulate the applicable helicopter system operation both on the ground and in flight. At least one helicopter system must be represented. Systems must be operative to the extent that applicable normal, abnormal, and emergency operating procedures included in the sponsor's training programs can be accomplished. Levels 6 and 7 must simulate all applicable helicopter flight, navigation, and systems operation. Level 5 must have functional flight and navigational controls, displays, and instrumentation | A | X | X | X | |
| 3.d. ..... | The lighting environment for panels and instruments must be sufficient for the operation being conducted | X | X | X | X | Back-lighted panels and instruments may be installed but are not required. |

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 3.e. ..... | The FTD must provide control forces and control travel that correspond to the replicated helicopter or set of helicopters. Control forces must react in the same manner as in the helicopter or set of helicopters under the same flight conditions | | | X | X | |
| 3.f. ..... | The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach. The control forces must react in the same manner as in the helicopter or set of helicopters under the same flight conditions | | X | | | |
| **4. Instructor or Evaluator Facilities.** | | | | | | |
| 4.a. ..... | In addition to the flight crewmember stations, suitable seating arrangements for an instructor/check airman and FAA Inspector must be available. These seats must provide adequate view of crewmember's panel(s) | X | X | X | X | These seats need not be a replica of an aircraft seat and may be as simple as an office chair placed in an appropriate position. |
| 4.b. ..... | The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions, as appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls. | X | X | X | X | |
| **5. Motion System** | | | | | | |
| 5.a. ..... | A motion system may be installed in an FTD. If installed, the motion system operation must not be distracting. If a motion system is installed and additional training, testing, or checking credits are being sought, sensory cues must also be integrated. The motion system must respond to abrupt input at the pilot's position within the allotted time, but not before the time when the helicopter responds under the same conditions. The motion system must be measured by latency tests or transport delay tests and may not exceed 150 milliseconds. Instrument response must not occur prior to motion onset | X | X | X | X | |
| 5.b. ..... | The FTD must have at least a vibration cueing system for characteristic helicopter vibrations noted at the pilot station(s) | | | | X | May be accomplished by a ''seat shaker'' or a bass speaker sufficient to provide the necessary cueing. |
| **6. Visual System** | | | | | | |
| 6.a. ..... | The FTD may have a visual system, if desired, although it is not required. If a visual system is installed, it must meet the following criteria: | | | | | |
| 6.a.1. ..... | The visual system must respond to abrupt input at the pilot's position.<br>An SOC is required ..... | X | X | X | | |
| 6.a.2. ..... | The visual system must be at least a single channel, non-collimated display.<br>An SOC is required ..... | X | X | X | | |

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 6.a.3. ..... | The visual system must provide at least a field-of-view of 18° vertical/24° horizontal for the pilot flying.<br>An SOC is required ..... | X | X | X | | |
| 6.a.4. ..... | The visual system must provide for a maximum parallax of 10° per pilot.<br>An SOC is required ..... | X | X | X | | |
| 6.a.5. ..... | The visual scene content may not be distracting.<br>An SOC is required ..... | X | X | X | | |
| 6.a.6. ..... | The minimum distance from the pilot's eye position to the surface of a direct view display may not be less than the distance to any front panel instrument.<br>An SOC is required ..... | X | X | X | | |
| 6.a.7. ..... | The visual system must provide for a minimum resolution of 5 arc-minutes for both computed and displayed pixel size.<br>An SOC is required ..... | X | X | X | | |
| 6.b. ..... | If a visual system is installed and additional training, testing, or checking credits are being sought on the basis of having a visual system, a visual system meeting the standards set out for at least a Level A FFS (see Appendix A of this part) will be required. A "direct-view," non-collimated visual system (with the other requirements for a Level A visual system met) may be considered satisfactory for those installations where the visual system design "eye point" is appropriately adjusted for each pilot's position such that the parallax error is at or less than 10° simultaneously for each pilot.<br>An SOC is required ..... | X | X | X | | |
| 6.c. ..... | The FTD must provide a continuous visual field-of-view of at least 146° horizontally and 36° vertically for both pilot seats, simultaneously. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained. Capability for a field-of-view in excess of these minima is not required for qualification at Level 7. However, where specific tasks require extended fields of view beyond the 146° by 36° (e.g., to accommodate the use of "chin windows" where the accommodation is either integral with or separate from the primary visual system display), then such extended fields of view must be provided.<br>An SOC is required and must explain the geometry of the installation. | | | | X | Optimization of the vertical field-of-view may be considered with respect to the specific helicopter flight deck cut-off angle. When considering the installation/use of augmented fields of view, as described here, it will be the responsibility of the sponsor to meet with the NSPM to determine the training, testing, checking, or experience tasks for which the augmented field-of-view capability may be critical to that approval. |
| **7. Sound System** | | | | | | |

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | General FTD requirements | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 7.a. ..... | The FTD must simulate significant flight deck sounds resulting from pilot actions that correspond to those heard in the helicopter | | | X | X | |

Note: An ''A'' in the table indicates that the system, task, or procedure may be examined if the appropriate helicopter system or control is simulated in the FTD and is working properly.

TABLE D1B—MINIMUM FTD REQUIREMENTS

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>The FTD must be able to perform the tasks associated with the level of qualification sought. | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| **1. Preflight Procedures** | | | | | | |
| 1.a. ..... | Preflight Inspection (Flight Deck Only) switches, indicators, systems, and equipment. | A | A | X | X | |
| 1.b. ..... | APU/Engine start and run-up. | | | | | |
| 1.b.1. ..... | Normal start procedures ..... | A | A | X | X | |
| 1.b.2. ..... | Alternate start procedures ..... | A | A | X | X | |
| 1.b.3. ..... | Abnormal starts and shutdowns (hot start, hung start). | A | A | X | X | |
| 1.c. ..... | Taxiing—Ground ..... | | | | X | |
| 1.d. ..... | Taxiing—Hover ..... | | | | X | |
| 1.e. ..... | Pre-takeoff Checks ..... | A | A | X | X | |
| **2. Takeoff and Departure Phase** | | | | | | |
| 2.a. ..... | Normal takeoff. | | | | | |
| 2.a.1. ..... | From ground ..... | | | | X | |
| 2.a.2. ..... | From hover ..... | | | | X | |
| 2.a.3 ..... | Running ..... | | | | X | |
| 2.b. ..... | Instrument ..... | | | X | X | |
| 2.c. ..... | Powerplant Failure During Takeoff ..... | | | X | X | |
| 2.d. ..... | Rejected Takeoff ..... | | | | X | |
| 2.e. ..... | Instrument Departure ..... | | | X | X | |
| **3. Climb** | | | | | | |
| 3.a. ..... | Normal ..... | | | X | X | |
| 3.b. ..... | Obstacle clearance ..... | | | | X | |
| 3.c. ..... | Vertical ..... | | | X | X | |
| 3.d. ..... | One engine inoperative ..... | | | X | X | |
| **4. In-flight Maneuvers** | | | | | | |
| 4.a. ..... | Turns (timed, normal, steep) ..... | | X | X | X | |
| 4.b. ..... | Powerplant Failure—Multiengine Helicopters .. | | | X | X | |

TABLE D1B—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements The FTD must be able to perform the tasks associated with the level of qualification sought. | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 4.c. ..... | Powerplant Failure—Single-Engine Helicopters. | | | X | X | |
| 4.d. ..... | Recovery From Unusual Attitudes ..... | | | | X | |
| 4.e. ..... | Settling with Power ..... | | | | X | |
| **5. Instrument Procedures** | | | | | | |
| 5.a. ..... | Instrument Arrival ..... | | | X | X | |
| 5.b. ..... | Holding ..... | | | X | X | |
| 5.c. ..... | Precision Instrument Approach | | | | | |
| 5.c.1. ..... | Normal—All engines operating ..... | | X | X | X | |
| 5.c.2. ..... | Manually controlled—One or more engines inoperative. | | | X | X | |
| 5.d. ..... | Non-precision Instrument Approach ..... | | X | X | X | |
| 5.e. ..... | Missed Approach. | | | | | |
| 5.e.1. ..... | All engines operating ..... | | | X | X | |
| 5.e.2. ..... | One or more engines inoperative ..... | | | X | X | |
| 5.e.3. ..... | Stability augmentation system failure ..... | | | X | X | |
| **6. Landings and Approaches to Landings** | | | | | | |
| 6.a. ..... | Visual Approaches (normal, steep, shallow) ... | | X | X | X | |
| 6.b. ..... | Landings. | | | | | |
| 6.b.1. ..... | Normal/crosswind. | | | | | |
| 6.b.1.a. ..... | Running ..... | | | | X | |
| 6.b.1.b. ..... | From Hover ..... | | | | X | |
| 6.b.2. ..... | One or more engines inoperative ..... | | | | X | |
| 6.b.3. ..... | Rejected Landing ..... | | | | X | |
| **7. Normal and Abnormal Procedures** | | | | | | |
| 7.a. ..... | Powerplant ..... | A | A | X | X | |
| 7.b. ..... | Fuel System ..... | A | A | X | X | |
| 7.c. ..... | Electrical System ..... | A | A | X | X | |
| 7.d. ..... | Hydraulic System ..... | A | A | X | X | |
| 7.e. ..... | Environmental System(s) ..... | A | A | X | X | |
| 7.f. ..... | Fire Detection and Extinguisher Systems ..... | A | A | X | X | |
| 7.g. ..... | Navigation and Aviation Systems ..... | A | A | X | X | |
| 7.h. ..... | Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems. | A | A | X | X | |
| 7.i. ..... | Flight Control Systems ..... | A | A | X | X | |
| 7.j. ..... | Anti-ice and Deice Systems ..... | A | A | X | X | |

TABLE D1B—MINIMUM FTD REQUIREMENTS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements The FTD must be able to perform the tasks associated with the level of qualification sought. | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 7.k. ..... | Aircraft and Personal Emergency Equipment | A | A | X | X | |
| 7.l. ..... | Special Missions tasks (e.g., Night Vision goggles, Forward Looking Infrared System, External Loads and as listed on the SOQ.). | | | | X | |
| **8. Emergency procedures (as applicable)** | | | | | | |
| 8.a. ..... | Emergency Descent ..... | | | X | X | |
| 8.b. ..... | Inflight Fire and Smoke Removal ..... | | | X | X | |
| 8.c. ..... | Emergency Evacuation ..... | | | X | X | |
| 8.d. ..... | Ditching ..... | | | | X | |
| 8.e. ..... | Autorotative Landing ..... | | | | X | |
| 8.f. ..... | Retreating blade stall recovery ..... | | | | X | |
| 8.g. ..... | Mast bumping ..... | | | | X | |
| 8.h. ..... | Loss of tail rotor effectiveness ..... | | | X | X | |
| **9. Postflight Procedures** | | | | | | |
| 9.a. ..... | After-Landing Procedures ..... | A | A | X | X | |
| 9.b. ..... | Parking and Securing | | | | | |
| 9.b.1. ..... | Rotor brake operation ..... | A | A | X | X | |
| 9.b.2. ..... | Abnormal/emergency procedures ..... | A | A | X | X | |

**Note:** An ''A'' in the table indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FTD and is working properly.

TABLE D1C—TABLE OF FTD SYSTEM TASKS

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associate with that level of qualification. | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| **1. Instructor Operating Station (IOS)** | | | | | | |
| 1.a. ..... | Power switch(es) ..... | A | X | X | X | |
| 1.b. ..... | Helicopter conditions ..... | A | A | X | X | e.g., GW, CG, Fuel loading, Systems, Ground. Crew. |
| 1.c. ..... | Airports/Heliports/Helicopter Landing Areas ..... | A | X | X | X | e.g., Selection, Surface, Presets, Lighting controls. |
| 1.d. ..... | Environmental controls ..... | A | X | X | X | e.g., Temp and Wind. |
| 1.e. ..... | Helicopter system malfunctions (Insertion/deletion) ..... | A | A | X | X | |
| 1.f. ..... | Locks, Freezes, and Repositioning (as appropriate) ..... | A | X | X | X | |
| 1.g. ..... | Sound Controls. (On/off/adjustment) ..... | | X | X | X | |
| 1.h. ..... | Motion/Control Loading System, as appropriate. On/off/emergency stop. | | A | X | X | |
| **2. Observer Seats/Stations** | | | | | | |

TABLE D1C—TABLE OF FTD SYSTEM TASKS—Continued

| QPS requirements | | | | | | Information |
|---|---|---|---|---|---|---|
| Entry No. | Subjective requirements<br>In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associate with that level of qualification. | FTD level | | | | Notes |
| | | 4 | 5 | 6 | 7 | |
| 2.a. ..... | Position/Adjustment/Positive restraint system ..... | A | X | X | X | |

**Note:** An ''A'' in the table indicates that the system, task, or procedure may be examined if the appropriate simulator system or control is in the FTD and is working properly.

ATTACHMENT 2 TO APPENDIX D TO PART 60—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

BEGIN INFORMATION

1. DISCUSSION

a. If relevant winds are present in the objective data, the wind vector (magnitude and direction) should be noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for the test.

b. The format for numbering the objective tests in Appendix C of this part, Attachment 2, Table C2A, and the objective tests in Appendix D of this part, Attachment 2, Table D2A, is identical. However, each test required for FFSs is not necessarily required for FTDs, and each test required for FTDs is not necessarily required for FFSs. When a test number (or series of numbers) is not required, the term ''Reserved'' is used in the table at that location. Following this numbering format provides a degree of commonality between the two tables and substantially reduces the potential for confusion when referring to objective test numbers for either FFSs or FTDs.

c. A Level 4 FTD does not require objective tests and is not addressed in the following table.

END INFORMATION

BEGIN QPS REQUIREMENTS

2. TEST REQUIREMENTS

a. The ground and flight tests required for qualification are listed in Table D2A Objective Evaluation Tests. Computer generated FTD test results must be provided for each test except where an alternate test is specifically authorized by the NSPM. If a flight condition or operating condition is required for the test but does not apply to the helicopter being simulated or to the qualification level sought, it may be disregarded (e.g., engine out climb capability for a single-engine helicopter). Each test result is compared against the validation data described in §60.13, and in Appendix B of this part. The results must be produced on an appropriate recording device acceptable to the NSPM and must include FTD number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the validation data. Time histories are required unless otherwise indicated in Table D2A. All results must be labeled using the tolerances and units given.

b. Table D2A in this attachment sets out the test results required, including the parameters, tolerances, and flight conditions for FTD validation. Tolerances are provided for the listed tests because mathematical modeling and acquisition and development of reference data are often inexact. All tolerances listed in the following tables are applied to FTD performance. When two tolerance values are given for a parameter, the less restrictive may be used unless otherwise indicated. In those cases where a tolerance is expressed only as a percentage, the tolerance percentage applies to the maximum value of that parameter within its normal operating range as measured from the neutral or zero position unless otherwise indicated.

c. Certain tests included in this attachment must be supported with an SOC. In Table D2A, requirements for SOCs are indicated in the ''Test Details'' column.

d. When operational or engineering judgment is used in making assessments for flight test data applications for FTD validity, such judgment must not be limited to a single parameter. For example, data that exhibit rapid variations of the measured parameters may require interpolations or a ''best fit'' data section. All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match FTD to helicopter data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

e. The FTD may not be programmed so that the mathematical modeling is correct only at the validation test points. Unless noted otherwise, tests must represent helicopter performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation. If a test is

supported by aircraft data at one extreme weight or CG, another test supported by aircraft data at mid-conditions or as close as possible to the other extreme is necessary. Certain tests that are relevant only at one extreme CG or weight condition need not be repeated at the other extreme. The results of the tests for Level 6 are expected to be indicative of the device's performance and handling qualities throughout all of the following:

(1) The helicopter weight and CG envelope.

(2) The operational envelope.

(3) Varying atmospheric ambient and environmental conditions—including the extremes authorized for the respective helicopter or set of helicopters.

f. When comparing the parameters listed to those of the helicopter, sufficient data must also be provided to verify the correct flight condition and helicopter configuration changes. For example, to show that control force is within the parameters for a static stability test, data to show the correct airspeed, power, thrust or torque, helicopter configuration, altitude, and other appropriate datum identification parameters must also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the helicopter, but airspeed, altitude, control input, helicopter configuration, and other appropriate data must also be given. If comparing landing gear change dynamics, pitch, airspeed, and altitude may be used to establish a match to the helicopter, but landing gear position must also be provided. All airspeed values must be properly annotated (e.g., indicated versus calibrated). In addition, the same variables must be used for comparison (e.g., compare inches to inches rather than inches to centimeters).

g. The QTG provided by the sponsor must clearly describe how the FTD will be set up and operated for each test. Each FTD subsystem may be tested independently, but overall integrated testing of the FTD must be accomplished to assure that the total FTD system meets the prescribed standards. A manual test procedure with explicit and detailed steps for completing each test must also be provided.

h. For previously qualified FTDs, the tests and tolerances of this attachment may be used in subsequent continuing qualification evaluations for any given test if the sponsor has submitted a proposed MQTG revision to the NSPM and has received NSPM approval.

i. Tests of handling qualities must include validation of augmentation devices. FTDs for highly augmented helicopters will be validated both in the unaugmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. For those performance and static handling qualities tests where the primary concern is control position in the unaugmented configuration, unaugmented data are not required if the design of the system precludes any affect on control position. In those instances where the unaugmented helicopter response is divergent and non-repeatable, it may not be feasible to meet the specified tolerances. Alternative requirements for testing will be mutually agreed upon by the sponsor and the NSPM on a case-by-case basis.

j. Some tests will not be required for helicopters using helicopter hardware in the FTD flight deck (e.g., ''helicopter modular controller''). These exceptions are noted in Section 2 ''Handling Qualities'' in Table D2A of this attachment. However, in these cases, the sponsor must provide a statement that the helicopter hardware meets the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

k. In cases where light-class helicopters are being simulated, prior coordination with the NSPM on acceptable weight ranges is required. The terms ''light,'' ''medium,'' and ''near maximum,'' may not be appropriate for the simulation of light-class helicopters.

END QPS REQUIREMENTS

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BEGIN INFORMATION

l. In those cases where the objective test results authorize a ''snapshot test'' or a ''series of snapshot test'' results in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.'' The steady state condition must exist from 4 seconds prior to, through 1 second following, the instant of time captured by the snap shot.

m. Refer to AC 120–27, Aircraft Weight and Balance; and FAA–H–8083–1, Aircraft Weight and Balance Handbook, for more information.

END INFORMATION

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TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | | Notes |
| Entry No. | Title | | | | 5 | 6 | 7 | |
| **1.** | **Performance** | | | | | | | |
| 1.a. | Engine Assessment. | | | | | | | |
| 1.a.1. | Start Operations. | | | | | | | |
| 1.a.1.a. | Engine start and acceleration (transient). | Light Off Time—±10% or ±1 sec. Torque—±5% Rotor Speed—±3% Fuel Flow—±10% Gas Generator Speed—±5% Power Turbine Speed—±5% Gas Turbine Temp—±30 °C. | Ground with the Rotor Brake Used and Not Used. | Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM. | | X | X | |
| 1.a.1.b. | Steady State Idle and Operating RPM conditions. | Torque—±3% Rotor Speed—±1.5% Fuel Flow—±5% Gas Generator Speed—±2% Power Turbine Speed—±2% Turbine Gas Temp—±20 °C. | Ground | Record both steady state idle and operating RPM conditions. May be a series of snapshot tests. | X | X | X | |
| 1.a.2. | Power Turbine Speed Trim. | ±10% of total change of power turbine speed; or ±0.5% change of rotor speed. | Ground | Record engine response to trim system actuation in both directions. | | X | X | |
| 1.a.3. | Engine and Rotor Speed Governing. | Torque—±5% Rotor Speed—±1.5%. | Climb Descent | Record results using a step input to the collective. May be conducted concurrently with climb and descent performance tests. | | X | X | |
| 1.b. | Reserved. | | | | | | | |
| 1.c. | Takeoff. | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.c.1. | All Engines | Airspeed—±3 kt, Altitude—±20 ft (6.1 m) Torque—±3%, Rotor Speed—±1.5%, Vertical Velocity—±100 fpm (0.50 m/sec) or 10%, Pitch Attitude—±1.5°, Bank Attitude—±2°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Ground/Takeoff and Initial Segment of Climb. | Record results of takeoff flight path (running takeoff and takeoff from a hover). The criteria apply only to those segments at airspeeds above effective translational lift. Results must be recorded from the initiation of the takeoff to at least 200 ft (61 m) AGL. | | | X | |
| 1.c.2. through 1.c.3 | Reserved. | | | | | | | |
| 1.d. | Hover. | | | | | | | |
| | Performance | Torque—±3%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%. | In Ground Effect (IGE); and Out of Ground Effect (OGE). | Record results for light and heavy gross weights. May be a series of snapshot tests. | | | X | |
| 1.e. | Vertical Climb. | | | | | | | |
| | Performance | Vertical Velocity—±100 fpm (0.50 m/sec) or ±10%, Directional Control Position—±5%, Collective Control Position—±5%. | From OGE Hover | Record results for light and heavy gross weights. May be a series of snapshot tests. | | | X | |
| 1.f. | Level Flight. | | | | | | | |
| | Performance and Trimmed Flight Control Positions. | Torque—±3% Pitch Attitude—±1.5° Sideslip Angle—±2° Longitudinal Control Position—±5% Lateral Control position—±5% Directional Control Position—±5% Collective Control Position—±5%. | Cruise (Augmentation On and Off). | Record results for two gross weight and CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests. | X | X | X | This test validates performance at speeds above maximum endurance airspeed. |
| 1.g. | Climb. | | | | | | | |

TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | | Notes |
| Entry No. | Title | | | | 5 | 6 | 7 | |
| | Performance and Trimmed Flight Control Positions. | Vertical Velocity—±100 fpm (61 m/sec) or ±10% Pitch Attitude—±1.5° Sideslip Angle—±2° Longitudinal Control Position—±5% Lateral Control Position—±5% Directional Control Position—±5% Collective Control Position—±5%. | All engines operating<br>One engine inoperative.<br>Augmentation System(s) On and Off. | Record results for two gross weight and CG combinations. The data presented must be for normal climb power conditions. May be a series of snapshot tests. | X | X | X | |
| 1.h. | Descent. | | | | | | | |
| 1.h.1. | Descent Performance and Trimmed Flight Control Positions. | Torque—±3% Pitch Attitude—±1.5° Sideslip Angle—±2° Longitudinal Control Position—±5% Lateral Control Position—±5% Directional Control Position—±5% Collective Control Position—±5%. | At or near 1,000 fpm (5 m/sec) rate of descent (RoD) at normal approach speed.<br>Augmentation System(s) On and Off. | Record results for two gross weight and CG combinations. May be a series of snapshot tests. | X | X | X | |
| 1.h.2. | Autorotation Performance and Trimmed Flight Control Positions. | Pitch Attitude—±1.5° Sideslip Angle—±2° Longitudinal Control Position—±5% Lateral Control Position—±5% Directional Control Position—±5% Collective Control Position—±5%. | Steady descents.<br>Augmentation System(s) On and Off. | Record results for two gross weight conditions. Data must be recorded for normal operating RPM. (Rotor speed tolerance applies only if collective control position is full down.) Data must be recorded for speeds from 50 kts, ±5 kts through at least maximum glide distance airspeed. May be a series of snapshot tests. | X | X | X | |
| 1.i. | Autorotation. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Entry | Rotor Speed—±3% Pitch Attitude ±2° Roll Attitude—±3° Yaw Attitude—±5° Airspeed—±5 kts. Vertical Velocity—±200 fpm (1.00 m/sec) or 10%. | Cruise; or Climb | Record results of a rapid throttle reduction to idle. If accomplished in cruise, results must be for the maximum range airspeed. If accomplished in climb, results must be for the maximum rate of climb airspeed at or near maximum continuous power. | | X | X |
| 1.j. | Landing. | | | | | | |
| 1.j.1. | All Engines | Airspeed—±3 kts, Altitude—±20 ft (6.1 m) Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Approach | Record results of the approach and landing profile (running landing or approach to a hover). The criteria apply only to those segments at airspeeds above effective translational lift. Record the results from 200 ft AGL (61 m) to the landing or to where the hover is established prior to landing. | | X | |
| 1.j.2. through 1.j.3 | Reserved. | | | | | | |

TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | | Notes |
| Entry No. | Title | | | | 5 | 6 | 7 | |
| 1.j.4. ..... | Autorotational Landing .. | Torque—±3%, Rotor Speed—±3%, Vertical Velocity—±100 fpm (0.50 m/sec) or 10%, Pitch Attitude—±2°, Bank Attitude—±2°, Heading—±5°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%. | Landing ..... | Record the results of an autorotational deceleration and landing from a stabilized autorotational descent, to touch down. | | | X | If flight test data containing all required parameters for a complete power-off landing is not available from the aircraft manufacturer for this test, and other qualified flight test personnel are not available to acquire this data, the sponsor must coordinate with the NSPM to determine if it would be appropriate to accept alternative testing means. Alternative approaches to this data acquisition that may be acceptable are: (1) A simulated autorotational flare and reduction of rate of descent (ROD) at altitude; or (2) a power-on termination following an autorotational approach and flare. |
| **2.** | **Handling Qualities** | | | | | | | |
| 2.a. ..... | Control System Mechanical Characteristics. | Contact the NSPM for clarification of any issue regarding helicopters with reversible controls. | | | | | | |
| 2.a.1. ..... | Cyclic ..... | Breakout—±0.25 lbs (0.112 daN) or 25%. Force—±1.0 lb (0.224 daN) or 10%. | Ground; Static conditions. Trim On and Off. Friction Off. Augmentation On and Off. | Record results for an uninterrupted control sweep to the stops. (This test does not apply if aircraft hardware modular controllers are used.). | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.a.2. | Collective and Pedals | Breakout—±0.5 lb (0.224 daN) or 25%. Force—±1.0 lb (0.224 daN) or 10%. | Ground; Static conditions. Trim On and Off. Friction Off. Augmentation On and Off. | Record results for an uninterrupted control sweep to the stops. | X | X | X | |
| 2.a.3. | Brake Pedal Force vs. Position. | ±5 lbs (2.224 daN) or 10% | Ground; Static conditions. | | X | X | X | |
| 2.a.4. | Trim System Rate (all applicable systems). | Rate—±10% | Ground; Static conditions. Trim On. Friction Off. | The tolerance applies to the recorded value of the trim rate. | X | X | X | |
| 2.a.5. | Control Dynamics (all axes). | ±10% of time for first zero crossing and ±10 (N + 1)% of period thereafter. ±10% of amplitude of first overshoot. ±20% of amplitude of 2nd and subsequent overshoots greater than 5% of initial displacement. ±1 overshoot. | Hover/Cruise Trim On Friction Off. | Results must be recorded for a normal control displacement in both directions in each axis, using 25% to 50% of full throw. | | X | X | Control Dynamics for irreversible control systems may be evaluated in a ground/static condition. Refer to paragraph 3 of this attachment for additional information. "N" is the sequential period of a full cycle of oscillation. |
| 2.a.6. | Freeplay | ±0.10 in. (±2.5 mm) | Ground; Static conditions. | Record and compare results for all controls. | X | X | X | |
| 2.b. | Low Airspeed Handling Qualities. | | | | | | | |
| 2.b.1. | Trimmed Flight Control Positions. | Torque ±3% Pitch Attitude ±1.5° Bank Attitude ±2° Longitudinal Control Position ±5% Lateral Control Position ±5% Directional Control Position ±5% Collective Control Position ±5%. | Translational Flight IGE—Sideward, rearward, and forward flight. Augmentation On and Off. | Record results for several airspeed increments to the translational airspeed limits and for 45 kts. forward airspeed. May be a series of snapshot tests. | | | X | |
| 2.b.2. | Critical Azimuth | Torque ±3% Pitch Attitude ±1.5°, Bank Attitude ±2°, Longitudinal Control Position ±5%, Lateral Control Position ±5%, Directional Control Position ±5%, Collective Control Position ±5%. | Stationary Hover. Augmentation On and Off. | Record results for three relative wind directions (including the most critical case) in the critical quadrant. May be a series of snapshot tests. | | | X | |
| 2.b.3. | Control Response. | | | | | | | |

TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | | Notes |
| Entry No. | Title | | | | 5 | 6 | 7 | |
| 2.b.3.a. | Longitudinal | Pitch Rate—±10% or ±2°/sec. Pitch Attitude Change—±10% or 1.5°. | Hover. Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for un-augmented cases. This test must be conducted in a hover, in ground effect, without entering translational flight. | | | X | This is a "short time" test. |
| 2.b.3.b. | Lateral | Roll Rate—±10% or ±3°/sec. Roll Attitude Change—±10% or ±3°. | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for un-augmented cases. | | | X | This is a "short time" test conducted in a hover, in ground effect, without entering translational flight, to provide better visual reference. |
| 2.b.3.c. | Directional | Yaw Rate—±10% or ±2°/sec. Heading Change—±10% or ±2°. | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for un-augmented cases. This test must be conducted in a hover, in ground effect, without entering translational flight. | | | X | This is a "short time" test. |
| 2.b.3.d. | Vertical | Normal Acceleration ±0.1g | Hover Augmentation On and Off. | Record results for a step control input. The Off-axis response must show correct trend for un-augmented cases. | | | X | |
| 2.c. | Longitudinal Handling Qualities. | | | | | | | |
| 2.c.1. | Control Response | Pitch Rate—±10% or ±2°/sec. Pitch Attitude Change—±10% or ±1.5°. | Cruise Augmentation On and Off. | Results must be recorded for two cruise airspeeds to include minimum power required speed. Record data for a step control input. The Off-axis response must show correct trend for un-augmented cases. | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.c.2. | Static Stability | Longitudinal Control Position: ±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Force: ±0.5 lb. (0.223 daN) or ±10%. | Cruise or Climb. Autorotation. Augmentation On and Off. | Record results for a minimum of two speeds on each side of the trim speed. May be a series of snapshot tests. | X | X | X | |
| 2.c.3. | Dynamic Stability. | | | | | | | |
| 2.c.3.a. | Long Term Response | ±10% of calculated period. ±10% of time to ½ or double amplitude, or ±0.02 of damping ratio. For non-periodic responses, the time history must be matched within ±3° pitch; and ±5 kts airspeed over a 20 sec period following release of the controls. | Cruise Augmentation On and Off. | Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. For non-periodic responses, the test may be terminated prior to 20 sec if the test pilot determines that the results are becoming uncontrollably divergent. Displace the cyclic for one second or less to excite the test. The result will be either convergent or divergent and must be recorded. If this method fails to excite the test, displace the cyclic to the predetermined maximum desired pitch attitude and return to the original position. If this method is used, record the results. | X | X | X | The response for certain helicopters may be unrepeatable throughout the stated time. In these cases, the test should show at least that a divergence is identifiable. For example: Displacing the cyclic for a given time normally excites this test or until a given pitch attitude is achieved and then return the cyclic to the original position. For non-periodic responses, results should show the same convergent or divergent character as the flight test data. |
| 2.c.3.b. | Short Term Response | ±1.5° Pitch or ±2°/sec. Pitch Rate. ±0.1 g Normal Acceleration. | Cruise or Climb. Augmentation On and Off. | Record results for at least two airspeeds. | | X | X | A control doublet inserted at the natural frequency of the aircraft normally excites this test. However, while input doublets are preferred over pulse inputs for Augmentation-Off tests, for Augmentation-On cases, when the short term response exhibits 1st-order or deadbeat characteristics, longitudinal pulse inputs may produce a more coherent response. |

TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | | Notes |
| Entry No. | Title | | | | 5 | 6 | 7 | |
| 2.c.4. | Maneuvering Stability | Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Forces—±0.5 lb. (0.223 daN) or ±10%. | Cruise or Climb. Augmentation On and Off. | Record results for at least two airspeeds at 30°–45° bank angle. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests. | | X | X | |
| 2.d. | Lateral and Directional Handling Qualities. | | | | | | | |
| 2.d.1. | Control Response. | | | | | | | |
| 2.d.1.a. | Lateral | Roll Rate—±10% or ±3°/sec. Roll Attitude Change—±10% or ±3°. | Cruise Augmentation On and Offd. | Record results for at least two airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | X | X | X | |
| 2.d.1.b. | Directional | Yaw Rate—±10% or ±2°/sec. Yaw Attitude Change—±10% or ±2°. | Cruise Augmentation On and Off. | Record data for at least two Airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases. | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.d.2. ..... | Directional Static Stability. | Lateral Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Lateral Control Force—±0.5 lb. (0.223 daN) or 10%. Roll Attitude—±1.5 Directional Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Directional Control Force—±1 lb. (0.448 daN) or 10%. Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm). Vertical Velocity—±100 fpm (0.50m/sec) or 10%. | Cruise; or Climb (may use Descent instead of Climb if desired) Augmentation On and Off. | Record results for at least two sideslip angles on either side of the trim point. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests. | X | | X | This is a steady heading sideslip test at a fixed collective position. |
| 2.d.3. ..... | Dynamic Lateral and Directional Stability. | | | | | | | |
| 2.d.3.a. ..... | Lateral-Directional Oscillations. | ±0.5 sec. or ±10% of period. ±10% of time to ½ or double amplitude or ±0.02 of damping ratio. ±20% or ±1 sec of time difference between peaks of bank and sideslip. For non-periodic responses, the time history must be matched within ±10 knots Airspeed; ±5°/s Roll Rate or ±5° Roll Attitude; ±4°/s Yaw Rate or ±4° Yaw Angle over a 20 sec period roll angle following release of the controls. | Cruise or Climb Augmentation On and Off. | Record results for at least two airspeeds. The test must be initiated with a cyclic or a pedal doublet input. Record results for six full cycles (12 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. The test may be terminated prior to 20 sec if the test pilot determines that the results are becoming uncontrollably divergent. | X | X | X | |
| 2.d.3.b. ..... | Spiral Stability ..... | ±2° or ±10% roll angle ..... | Cruise or Climb. Augmentation On and Off. | Record the results of a release from pedal only or cyclic only turns for 20 sec. Results must be recorded from turns in both directions. Terminate check at zero roll angle or when the test pilot determines that the attitude is becoming uncontrollably divergent. | X | X | X | |
| 2.d.3.c. ..... | Adverse/Proverse Yaw .. | Correct Trend. ±2° transient sideslip angle. | Cruise or Climb. Augmentation On and Off. | Record the time history of initial entry into cyclic only turns, using only a moderate rate for cyclic input. Results must be recorded for turns in both directions. | X | X | X | |
| **3.** | **Reserved** | | | | | | | |

TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | | Information |
|---|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | | Notes |
| Entry No. | Title | | | | 5 | 6 | 7 | |
| **4.** | **Visual System** | | | | | | | |
| 4.a. | Visual System Response Time: (Choose either test 4.a.1. or 4.a.2. to satisfy test 4.a., Visual System Response Time Test. This test is also sufficient for flight deck instrument response timing.) | | | | | .... | .... | |
| 4.a.1. | Latency. | | | | | | | |
| | | 150 ms (or less) after helicopter response. | Takeoff, climb, and descent. | One test is required in each axis (pitch, roll and yaw) for each of the three conditions (take-off, cruise, and approach or landing). | | | X | |
| 4.a.2. | Transport Delay. | | | | | | | |
| | | 150 ms (or less) after controller movement. | N/A | A separate test is required in each axis (pitch, roll, and yaw). | | | X | |
| 4.b. | Field-of-view. | | | | | | | |
| 4.b.1. | Reserved. | | | | | | | |
| 4.b.2. | Continuous visual field-of-view. | Minimum continuous field-of-view providing 146° horizontal and 36° vertical field-of-view for each pilot simultaneously and any geometric error between the Image Generator eye point and the pilot eye point is 8° or less. | N/A | An SOC is required and must explain the geometry of the installation. Horizontal field-of-view must not be less than a total of 146° (including not less than 73° measured either side of the center of the design eye point). Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained. Vertical field-of-view: Not less than a total of 36° measured from the pilot's and co-pilot's eye point. | | | X | Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. |
| 4.b.3. | Reserved. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4.c. | Surface contrast ratio | Not less than 5:1 | N/A | The ratio is calculated by dividing the brightness level of the center, bright square (providing at least 2 foot-lamberts or 7 cd/m$^2$) by the brightness level of any adjacent dark square. | | X | Measurements may be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5 per square, with a white square in the center of each channel. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.d. | Highlight brightness | Not less than three (3) foot-lamberts (10 cd/m$^2$). | N/A | Measure the brightness of the center white square while superimposing a highlight on that white square. The use of calligraphic capabilities to enhance the raster brightness is acceptable, but measuring light points is not acceptable. | | X | Measurements may be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5 per square, with a white square in the center of each channel. |
| 4.e. | Surface resolution | Not greater than two (2) arc minutes. | N/A | An SOC is required and must include the relevant calculations. | | X | When the eye is positioned on a 3° glide slope at the slant range distances indicated with white runway markings on a black runway surface, the eye will subtend two (2) arc minutes: (1) A slant range of 6,876 ft with stripes 150 ft long and 16 ft wide, spaced 4 ft apart. (2) For Configuration A: a slant range of 5,157 feet with stripes 150 ft long and 12 ft wide, spaced 3 ft apart. (3) For Configuration B; a slant range of 9,884 feet, with stripes 150 ft long and 5.75 ft wide, spaced 5.75 ft apart. |

TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued

| QPS requirements | | | | | | | Information |
|---|---|---|---|---|---|---|---|
| Test | | Tolerances | Flight conditions | Test details | FTD level | | Notes |
| Entry No. | Title | | | | 5 | 6 7 | |
| 4.f. | Light point size | Not greater than five (5) arc-minutes. | N/A | An SOC is required and must include the relevant calculations. | | X | Light point size may be measured using a test pattern consisting of a centrally located single row of light points reduced in length until modulation is just discernible in each visual channel. A row of 48 lights will form a 4° angle or less. |
| 4.g. | Light point contrast ratio | | | | | | A 1° spot photometer may be used to measure a square of at least 1° filled with light points (where light point modulation is just discernible) and compare the results to the measured adjacent background. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. |
| 4.g.1. | Reserved. | | | | | | |
| 4.g.2. | | Not less than 25:1 | N/A | An SOC is required and must include the relevant calculations. | | X | |
| 4.h. | Visual ground segment. | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | The visible segment in the simulator must be within 20% of the segment computed to be visible from the helicopter flight deck. The tolerance(s) may be applied at either end or at both ends of the displayed segment. However, lights and ground objects computed to be visible from the helicopter flight deck at the near end of the visible segment must be visible in the simulator. | Landing configuration, trimmed for appropriate airspeed, at 100 ft (30m) above the touchdown zone, on glide slope with an RVR value set at 1,200 ft (350m). | The QTG must contain relevant calculations and a drawing showing the data used to establish the helicopter location and the segment of the ground that is visible considering design eyepoint, helicopter attitude, flight deck cut-off angle, and a visibility of 1200 ft (350 m) RVR. Simulator performance must be measured against the QTG calculations. The data submitted must include at least the following: (1) Static helicopter dimensions as follows: (i) Horizontal and vertical distance from main landing gear (MLG) to glideslope reception antenna. (ii) Horizontal and vertical distance from MLG to pilot's eyepoint. (iii) Static flight deck cutoff angle. (2) Approach data as follows: (i) Identification of runway. (ii) Horizontal distance from runway threshold to glideslope intercept with runway. (iii) Glideslope angle. (iv) Helicopter pitch angle on approach. (3) Helicopter data for manual testing: (i) Gross weight. (ii) Helicopter configuration. (iii) Approach airspeed. If non-homogenous fog is used to obscure visibility, the vertical variation in horizontal visibility must be described and be included in the slant range visibility calculation used in the computations. | | X | Pre-position for this test is encouraged, but may be achieved via manual or autopilot control to the desired position. |
| 5. | **Reserved** | | | | | | |

BEGIN INFORMATION

3. CONTROL DYNAMICS

a. The characteristics of a helicopter flight control system have a major effect on the handling qualities. A significant consideration in pilot acceptability of a helicopter is the ''feel'' provided through the flight deck controls. Considerable effort is expended on helicopter feel system design in order to deliver a system with which pilots will be comfortable and consider the helicopter desirable to fly. In order for an FTD to be representative, it too must present the pilot with the proper feel; that of the respective helicopter. Compliance with this requirement is determined by comparing a recording of the control feel dynamics of the FFS to actual helicopter measurements in the hover and cruise configurations.

(1) Recordings such as free response to an impulse or step function are classically used to estimate the dynamic properties of electromechanical systems. It is only possible to estimate the dynamic properties as a result of only being able to estimate true inputs and responses. Therefore, it is imperative that the best possible data be collected since close matching of the FTD control loading system to the helicopter systems is essential. Control feel dynamic tests are described in the Table of Objective Tests in this appendix. Where accomplished, the free response is measured after a step or pulse input is used to excite the system.

(2) For initial and upgrade evaluations, it is required that control dynamic characteristics be measured at and recorded directly from the flight deck controls. This procedure is usually accomplished by measuring the free response of the controls using a step or pulse input to excite the system. The procedure must be accomplished in hover, climb, cruise, and autorotation. For helicopters with irreversible control systems, measurements may be obtained on the ground. The procedure should be accomplished in the hover and cruise flight conditions and configurations. Proper pitot-static inputs (if appropriate) must be provided to represent airspeeds typical of those encountered in flight.

(3) It may be shown that for some helicopters, climb, cruise, and autorotation have like effects. Thus, some tests for one may suffice for some tests for another. If either or both considerations apply, engineering validation or helicopter manufacturer rationale must be submitted as justification for ground tests or for eliminating a configuration. For FTDs requiring static and dynamic tests at the controls, special test fixtures will not be required during initial and upgrade evaluations if the sponsor's QTG shows both test fixture results and the results of an alternative approach, such as computer plots which were produced concurrently and show satisfactory agreement. Repeat of the alternative method during the initial evaluation satisfies this test requirement.

b. Control Dynamics Evaluations. The dynamic properties of control systems are often stated in terms of frequency, damping, and a number of other classical measurements which can be found in texts on control systems. In order to establish a consistent means of validating test results for FTD control loading, criteria are needed that will clearly define the interpretation of the measurements and the tolerances to be applied. Criteria are needed for both the underdamped system and the overdamped system, including the critically damped case. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or overdamped systems, the frequency and damping is not readily measured from a response time history. Therefore, some other measurement must be used.

(1) Tests to verify that control feel dynamics represent the helicopter must show that the dynamic damping cycles (free response of the control) match that of the helicopter within specified tolerances. The method of evaluating the response and the tolerance to be applied are described below for the underdamped and critically damped cases.

(a) Underdamped Response. Two measurements are required for the period, the time to first zero crossing (in case a rate limit is present) and the subsequent frequency of oscillation. It is necessary to measure cycles on an individual basis in case there are nonuniform periods in the response. Each period will be independently compared to the respective period of the helicopter control system and, consequently, will enjoy the full tolerance specified for that period.

(b) The damping tolerance will be applied to overshoots on an individual basis. Care must be taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 percent of the total initial displacement will be considered significant. The residual band, labeled $T(A_d)$ on Figure 1 of this attachment is ±5 percent of the initial displacement amplitude, $A_d$, from the steady state value of the oscillation. Oscillations within the residual band are considered insignificant. When comparing simulator data to helicopter data, the process would begin by overlaying or aligning the simulator and helicopter steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual periods of oscillation. To be satisfactory, the simulator must show the same number of significant overshoots to within one when compared against

the helicopter data. The procedure for evaluating the response is illustrated in Figure 1 of this attachment.

(c) Critically Damped and Overdamped Response. Due to the nature of critically damped responses (no overshoots), the time to reach 90 percent of the steady state (neutral point) value must be the same as the helicopter within ±10 percent. The simulator response must be critically damped also. Figure 2 of this attachment illustrates the procedure.

(d) Special considerations. Control systems that exhibit characteristics other than classical overdamped or underdamped responses should meet specified tolerances. In addition, special consideration should be given to ensure that significant trends are maintained.

(2) Tolerances.

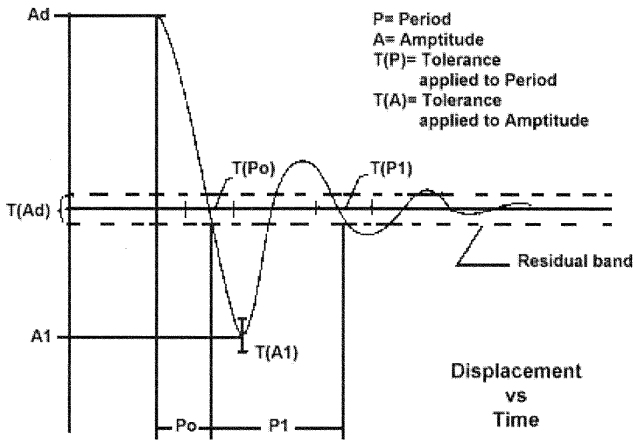
(a) The following summarizes the tolerances, ''T'' for underdamped systems, and ''n'' is the sequential period of a full cycle of oscillation. See Figure D2A of this attachment for an illustration of the referenced measurements.

$T(P_0)$ ±10% of $P_0$
$T(P_1)$ ±20% of $P_1$
$T(P_2)$ ±30% of $P_2$
$T(P_n)$ ±10(n + 1)% of $P_n$
$T(A_n)$ ±10% of $A_1$
$T(A_d)$ ±5% of $A_d$ = residual band
Significant overshoots First overshoot and ±1 subsequent overshoots

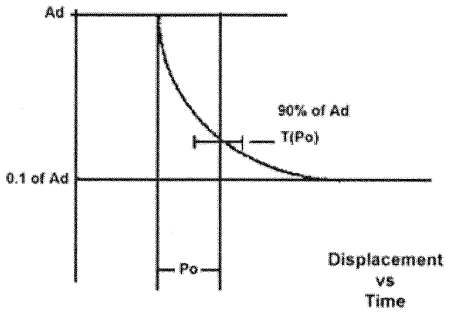
(b) The following tolerance applies to critically damped and overdamped systems only. See Figure D2B for an illustration of the reference measurements:

$T(P_0)$ ±10% of $P_0$

**Attachment 2 to Appendix D to Part 60—**
**Figure D2A. Under-Damped Step Response**




**Attachment 2 to Appendix D to Part 60—**
**Figure D2B. Critically-Damped Step Response**




**End Information**

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**Begin QPS Requirement**

c. Alternative method for control dynamics evaluation.

(1) An alternative means for validating control dynamics for aircraft with hydraulically powered flight controls and artificial feel systems is by the measurement of control force and rate of movement. For each axis of pitch, roll, and yaw, the control must be forced to its maximum extreme position for the following distinct rates. These tests are conducted under normal flight and ground conditions.

(a) Static test—Slowly move the control so that a full sweep is achieved within 95–105 seconds. A full sweep is defined as movement of the controller from neutral to the stop, usually aft or right stop, then to the opposite stop, then to the neutral position.

(b) Slow dynamic test—Achieve a full sweep within 8–12 seconds.

(c) Fast dynamic test—Achieve a full sweep within 3–5 seconds.

NOTE: Dynamic sweeps may be limited to forces not exceeding 100 lbs. (44.5 daN).

(d) Tolerances.

(i) Static test; see Table D2A, Flight Training Device (FTD) Objective Tests, Entries 2.a.1., 2.a.2., and 2.a.3.

(ii) Dynamic test—±2 lbs (0.9 daN) or ±10% on dynamic increment above static test.

END QPS REQUIREMENT

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BEGIN INFORMATION

d. The FAA is open to alternative means that are justified and appropriate to the application. For example, the method described here may not apply to all manufacturers' systems and certainly not to aircraft with reversible control systems. Each case is considered on its own merit on an ad hoc basis. If the FAA finds that alternative methods do not result in satisfactory performance, more conventionally accepted methods will have to be used.

4. FOR ADDITIONAL INFORMATION ON THE FOLLOWING TOPICS, PLEASE REFER TO APPENDIX C OF THIS PART, ATTACHMENT 2, AND THE INDICATED PARAGRAPH WITHIN THAT ATTACHMENT

• Additional Information About Flight Simulator Qualification for New or Derivative Helicopters, paragraph 8.

• Engineering Simulator Validation Data, paragraph 9.

• Validation Test Tolerances, paragraph 11.

• Validation Data Road Map, paragraph 12.

• Acceptance Guidelines for Alternative Avionics, paragraph 13.

• Transport Delay Testing, paragraph 15.

• Continuing Qualification Evaluation Validation Data Presentation, paragraph 16.

END INFORMATION

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ATTACHMENT 3 TO APPENDIX D TO PART 60—FLIGHT TRAINING DEVICE (FTD) SUBJECTIVE EVALUATION

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BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Except for special use airport models, all airport models required by this part must be representations of real-world, operational airports or representations of fictional airports and must meet the requirements set out in Tables D3B or D3C of this attachment, as appropriate.

b. If fictional airports are used, the sponsor must ensure that navigational aids and all appropriate maps, charts, and other navigational reference material for the fictional airports (and surrounding areas as necessary) are compatible, complete, and accurate with respect to the visual presentation and the airport model of this fictional airport. An SOC must be submitted that addresses navigation aid installation and performance and other criteria (including obstruction clearance protection) for all instrument approaches to the fictional airports that are available in the simulator. The SOC must reference and account for information in the terminal instrument procedures manual and the construction and availability of the required maps, charts, and other navigational material. This material must be clearly marked ''for training purposes only.''

c. When the simulator is being used by an instructor or evaluator for purposes of training, checking, or testing under this chapter, only airport models classified as Class I, Class II, or Class III may be used by the instructor or evaluator. Detailed descriptions/definitions of these classifications are found in Appendix F of this part.

d. When a person sponsors an FTD maintained by a person other than a U.S. certificate holder, the sponsor is accountable for that FTD originally meeting, and continuing to meet, the criteria under which it was originally qualified and the appropriate Part 60 criteria, including the visual scenes and airport models that may be used by instructors or evaluators for purposes of training, checking, or testing under this chapter.

e. Neither Class II nor Class III airport visual models are required to appear on the SOQ, and the method used for keeping instructors and evaluators apprised of the airport models that meet Class II or Class III requirements on any given simulator is at the option of the sponsor, but the method used must be available for review by the TPAA.

f. When an airport model represents a real world airport and a permanent change is made to that real world airport (e.g., a new runway, an extended taxiway, a new lighting system, a runway closure) without a written extension grant from the NSPM (described in paragraph 1.g., of this section), an update to that airport model must be made in accordance with the following time limits:

(1) For a new airport runway, a runway extension, a new airport taxiway, a taxiway extension, or a runway/taxiway closure—within 90 days of the opening for use of the new airport runway, runway extension, new airport taxiway, or taxiway extension; or within 90 days of the closure of the runway or taxiway.

(2) For a new or modified approach light system—within 45 days of the activation of the new or modified approach light system.

(3) For other facility or structural changes on the airport (e.g., new terminal, relocation of Air Traffic Control Tower)—within 180 days of the opening of the new or changed facility or structure.

g. If a sponsor desires an extension to the time limit for an update to a visual scene or airport model or has an objection to what must be updated in the specific airport model requirement, the sponsor must provide a written extension request to the NPSM stating the reason for the update delay and a proposed completion date or provide an explanation for the objection, explaining why the identified airport change will not have an impact on flight training, testing, or checking. A copy of this request or objection must also be sent to the POI/TCPM. The NSPM will send the official response to the sponsor and a copy to the POI/TCPM; however, if there is an objection, after consultation with the appropriate POI/TCPM regarding the training, testing, or checking impact, the NSPM will send the official response to the sponsor and a copy to the POI/TCPM.

h. Examples of situations that may warrant Class_III model designation by the TPAA include the following:

(a) Training, testing, or checking on very low visibility operations, including SMGCS operations.

(b) Instrument operations training (including instrument takeoff, departure, arrival, approach, and missed approach training, testing, or checking) using—

(i) A specific model that has been geographically ''moved'' to a different location and aligned with an instrument procedure for another airport.

(ii) A model that does not match changes made at the real-world airport (or landing area for helicopters) being modeled.

(iii) A model generated with an ''off-board'' or an ''on-board'' model development tool (by providing proper latitude/longitude reference; correct runway or landing area orientation, length, width, marking, and lighting information; and appropriate adjacent taxiway location) to generate a facsimile of a real world airport or landing area.

These airport models may be accepted by the TPAA without individual observation provided the sponsor provides the TPAA with an acceptable description of the process for determining the acceptability of a specific airport model, outlines the conditions under which such an airport model may be used, and adequately describes what restrictions will be applied to each resulting airport or landing area model.

END QPS REQUIREMENTS

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BEGIN INFORMATION

2. DISCUSSION

a. The subjective tests and the examination of functions provide a basis for evaluating the capability of the FTD to perform over a typical utilization period; determining that the FTD satisfactorily meets the appropriate training/testing/checking objectives and competently simulates each required maneuver, procedure, or task; and verifying correct operation of the FTD controls, instruments, and systems. The items in the list of operations tasks are for FTD evaluation purposes only. They must not be used to limit or exceed the authorizations for use of a given level of FTD as found in the Practical Test Standards or as approved by the TPAA. All items in the following paragraphs are subject to an examination of function.

b. The List of Operations Tasks in Table D3A addressing pilot functions and maneuvers is divided by flight phases. All simulated helicopter systems functions will be assessed for normal and, where appropriate, alternate operations. Normal, abnormal, and emergency operations associated with a flight phase will be assessed during the evaluation of maneuvers or events within that flight phase.

c. Systems to be evaluated are listed separately under ''Any Flight Phase'' to ensure appropriate attention to systems checks. Operational navigation systems (including inertial navigation systems, global positioning systems, or other long-range systems) and the associated electronic display systems will be evaluated if installed. The NSP pilot will include in his report to the TPAA, the effect of the system operation and any system limitation.

d. At the request of the TPAA, the NSP Pilot may assess the FTD for a special aspect of a sponsor's training program during the functions and subjective portion of an evaluation. Such an assessment may include a portion of a specific operation (e.g., a Line Oriented Flight Training (LOFT) scenario) or special emphasis items in the sponsor's training program. Unless directly related to a requirement for the qualification level, the results of such an evaluation would not necessarily affect the qualification of the FTD.

e. The FAA intends to allow the use of Class III airport models on a limited basis when the sponsor provides the TPAA (or other regulatory authority) an appropriate

analysis of the skills, knowledge, and abilities (SKAs) necessary for competent performance of the tasks in which this particular media element is used. The analysis should describe the ability of the FTD/visual media to provide an adequate environment in which the required SKAs are satisfactorily performed and learned. The analysis should also include the specific media element, such as the visual scene or airport model. Additional sources of information on the conduct of task and capability analysis may be found on the FAA's Advanced Qualification Program (AQP) Web site at: *http://www.faa.gov/education_research/training/aqp*.

END INFORMATION

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List or a Level 7 FTD. Items not installed, not functional on the FTD, and not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ. | |
| **1. Preflight Procedures** | |
| 1.a. | Preflight Inspection (Flight Deck Only) switches, indicators, systems, and equipment. |
| 1.b. | APU/Engine start and run-up. |
| 1.b.1. | Normal start procedures. |
| 1.b.2. | Alternate start procedures. |
| 1.b.3. | Abnormal starts and shutdowns (hot start, hung start). |
| 1.b.4. | Rotor engagement. |
| 1.b.5. | System checks. |
| 1.c. | Taxiing—Ground. |
| 1.c.1. | Power required to taxi. |
| 1.c.2. | Brake effectiveness. |
| 1.c.3. | Ground handling. |
| 1.c.4. | Abnormal/emergency procedures, for example: |
| 1.c.4.a. | Brake system failure. |
| 1.c.4.b. | Ground resonance. |
| 1.c.4.c. | Other (listed on the SOQ). |
| 1.d. | Taxiing—Hover. |
| 1.d.1. | Takeoff to a hover. |
| 1.d.2. | Instrument response. |
| 1.d.2.a. | Engine instruments. |
| 1.d.2.a. | Flight instruments. |
| 1.d.3. | Hovering turns. |
| 1.d.4. | Hover power checks. |
| 1.d.4.a. | In ground effect (IGE). |
| 1.d.4.b. | Out of ground effect (OGE). |
| 1.d.5. | Crosswind/tailwind hover. |
| 1.d.6. | Abnormal/emergency procedures: |
| 1.d.6.a. | Engine failure. |

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 1.d.6.b. | Fuel governing system failure. |
| 1.d.6.c. | Settling with power (OGE). |
| 1.d.6.d. | Stability augmentation system failure. |
| 1.d.6.e. | Directional control malfunction (including Loss of Tail Rotor Effectiveness, LTE). |
| 1.d.6.f. | Other (listed on the SOQ). |
| 1.e. | Pre-takeoff Checks. |
| **2. Takeoff and Departure Phase** | |
| 2.a. | Normal and Crosswind Takeoff. |
| 2.a.1. | From ground. |
| 2.a.2. | From hover. |
| 2.a.3. | Running. |
| 2.a.4. | Crosswind/tailwind. |
| 2.a.5. | Maximum performance. |
| 2.b. | Instrument. |
| 2.c. | Powerplant Failure During Takeoff. |
| 2.c.1. | Takeoff with engine failure after critical decision point (CDP). |
| 2.d. | Rejected Takeoff. |
| 2.e. | Instrument Departure. |
| 2.f. | Other (listed on the SOQ). |
| **3. Climb** | |
| 3.a. | Normal. |
| 3.b. | Obstacle clearance. |
| 3.c. | Vertical. |
| 3.d. | One engine inoperative. |
| 3.e. | Other (listed on the SOQ). |
| **4. Inflight Maneuvers** | |
| 4.a. | Performance. |
| 4.b. | Flying qualities. |
| 4.c. | Turns. |
| 4.c.1. | Timed. |
| 4.c.2. | Normal. |
| 4.c.3. | Steep. |
| 4.d. | Accelerations and decelerations. |
| 4.e. | High-speed vibrations. |
| 4.f. | Abnormal/emergency procedures, for example: |
| 4.f.1. | Engine fire. |

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 4.f.2. | Engine failure. |
| 4.f.2.a. | Powerplant Failure—Multiengine Helicopters. |
| 4.f.2.b. | Powerplant Failure—Single-Engine Helicopters. |
| 4.f.3. | Inflight engine shutdown (and restart, if applicable). |
| 4.f.4. | Fuel governing system failures (e.g., FADEC malfunction). |
| 4.f.5. | Directional control malfunction. |
| 4.f.6. | Hydraulic failure. |
| 4.f.7. | Stability augmentation system failure. |
| 4.f.8. | Rotor vibrations. |
| 4.f.9. | Recovery From Unusual Attitudes. |
| 4.f.10. | Settling with Power. |
| 4.g. | Other (listed on the SOQ). |
| **5. Instrument Procedures** | |
| 5.a. | Instrument Arrival. |
| 5.b. | Holding. |
| 5.c. | Precision Instrument Approach. |
| 5.c.1. | Normal—All engines operating. |
| 5.c.2. | Manually controlled—One or more engines inoperative. |
| 5.c.3. | Approach procedures: |
| 5.c.3.a. | PAR. |
| 5.c.3.b. | GPS. |
| 5.c.3.c. | ILS. |
| 5.c.3.c.1. | Manual (raw data). |
| 5.c.3.c.2. | Autopilot* only. |
| 5.c.3.c.3. | Flight director only. |
| 5.c.3.c.4. | Autopilot* and flight director (if appropriate) coupled. |
| 5.c.3.d. | Other (listed on the SOQ). |
| 5.d. | Non-precision Instrument Approach. |
| 5.d.1. | Normal—All engines operating. |
| 5.d.2. | One or more engines inoperative. |
| 5.d.3. | Approach procedures: |
| 5.d.3.a. | NDB. |
| 5.d.3.b. | VOR, RNAV, TACAN, GPS. |
| 5.d.3.c. | ASR. |
| 5.d.3.d. | Circling. |
| 5.d.3.e. | Helicopter only. |

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 5.d.3.f. | Other (listed on the SOQ). |
| 5.e. | Missed Approach. |
| 5.e.1. | All engines operating. |
| 5.e.2. | One or more engines inoperative. |
| 5.e.3. | Stability augmentation system failure. |
| 5.e.4. | Other (listed on the SOQ). |
| **6. Landings and Approaches to Landings** | |
| 6.a. | Visual Approaches. |
| 6.a.1. | Normal. |
| 6.a.2. | Steep. |
| 6.a.3. | Shallow. |
| 6.a.4. | Crosswind. |
| 6.b. | Landings. |
| 6.b.1. | Normal. |
| 6.b.1.a. | Running. |
| 6.b.1.b. | From Hover. |
| 6.b.2. | Crosswind. |
| 6.b.3. | Tailwind. |
| 6.b.4. | One or more engines inoperative. |
| 6.b.5. | Rejected Landing. |
| 6.b.6. | Other (listed on the SOQ). |
| **7. Normal and Abnormal Procedures (any phase of flight)** | |
| 7.a. | Helicopter and powerplant systems operation (as applicable). |
| 7.a.1. | Anti-icing/deicing systems. |
| 7.a.2. | Auxiliary powerplant. |
| 7.a.3. | Communications. |
| 7.a.4. | Electrical system. |
| 7.a.5. | Environmental system. |
| 7.a.6. | Fire detection and suppression. |
| 7.a.7. | Flight control system. |
| 7.a.8. | Fuel system. |
| 7.a.9. | Engine oil system. |
| 7.a.10. | Hydraulic system. |
| 7.a.11. | Landing gear. |
| 7.a.12. | Oxygen. |
| 7.a.13. | Pneumatic. |

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 7.a.14. | Powerplant. |
| 7.a.15. | Flight control computers. |
| 7.a.16. | Fly-by-wire controls. |
| 7.a.17. | Stabilizer. |
| 7.a.18. | Stability augmentation and control augmentation system(s). |
| 7.a.19. | Other (listed on the SOQ). |
| 7.b. | Flight management and guidance system (as applicable). |
| 7.b.1. | Airborne radar. |
| 7.b.2. | Automatic landing aids. |
| 7.b.3. | Autopilot.* |
| 7.b.4. | Collision avoidance system. |
| 7.b.5. | Flight data displays. |
| 7.b.6. | Flight management computers. |
| 7.b.7. | Head-up displays. |
| 7.b.8. | Navigation systems. |
| 7.b.9. | Other (listed on the SOQ). |
| **8. Emergency Procedures (as applicable)** | |
| 8.a. | Autorotative Landing. |
| 8.b. | Air hazard avoidance. |
| 8.c. | Ditching. |
| 8.d. | Emergency evacuation. |
| 8.e. | Inflight fire and smoke removal. |
| 8.f. | Retreating blade stall recovery. |
| 8.g. | Mast bumping. |
| 8.h. | Loss of tail rotor effectiveness. |
| 8.i. | Other (listed on the SOQ). |
| **9. Postflight Procedures** | |
| 9.a. | After-Landing Procedures. |
| 9.b. | Parking and Securing. |
| 9.b.1. | Engine and systems operation. |
| 9.b.2. | Parking brake operation. |
| 9.b.3. | Rotor brake operation. |
| 9.b.4. | Abnormal/emergency procedures. |
| **10. Instructor Operating Station (IOS), as appropriate** | |
| 10.a. | Power Switch(es). |
| 10.b. | Helicopter conditions. |

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 10.b.1. | Gross weight, center of gravity, fuel loading and allocation, etc. |
| 10.b.2. | Helicopter systems status. |
| 10.b.3. | Ground crew functions (e.g., ext. power). |
| 10.c. | Airports. |
| 10.c.1. | Selection. |
| 10.c.2. | Runway selection. |
| 10.c.3. | Preset positions (e.g., ramp, over final approach fix). |
| 10.d. | Environmental controls. |
| 10.d.1. | Temperature. |
| 10.d.2. | Climate conditions (e.g., ice, rain). |
| 10.d.3. | Wind speed and direction. |
| 10.e. | Helicopter system malfunctions. |
| 10.e.1. | Insertion/deletion. |
| 10.e.2. | Problem clear. |
| 10.f. | Locks, Freezes, and Repositioning. |
| 10.f.1. | Problem (all) freeze/release. |
| 10.f.2. | Position (geographic) freeze/release. |
| 10.f.3. | Repositioning (locations, freezes, and releases). |
| 10.f.4. | Ground speed control. |
| 10.g. | Sound Controls. |
| 10.g.1. | On/off/adjustment. |
| 10.h. | Control Loading System (as applicable). |
| 10.h.1. | On/off/emergency stop. |
| 10.i. | Observer Stations. |
| 10.i.1. | Position. |
| 10.i.2. | Adjustments. |

*''Autopilot'' means attitude retention mode of operation.

TABLE D3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS AIRPORT OR LANDING AREA CONTENT REQUIREMENTS FOR QUALIFICATION AT LEVEL 7 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| This table specifies the minimum airport visual model content and functionality to qualify an FTD at the indicated level. This table applies only to the airport/helicopter landing area scenes required for FTD qualification. | |
| **1.** | **Functional test content** requirements for Level 7 FTDs. The following is the minimum airport/landing area model content requirement to satisfy visual capability tests, and provides suitable visual cues to allow completion of all functions and subjective tests described in this attachment for Level 7 FTDs. |

TABLE D3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS AIRPORT OR LANDING AREA CONTENT REQUIREMENTS FOR QUALIFICATION AT LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 1.a. ..... | A minimum of one (1) representative airport and one (1) representative helicopter landing area model. The airport and the helicopter landing area may be contained within the same visual model. If this option is selected, the approach path to the airport runway(s) and the approach path to the helicopter landing area must be different. The model(s) used to meet the following requirements may be demonstrated at either a fictional or a real-world airport or helicopter landing area, but each must be acceptable to the sponsor's TPAA, selectable from the IOS, and listed on the SOQ. |
| 1.b. ..... | Fidelity of the Visual Scene. The fidelity of the visual scene must be sufficient for the aircrew to visually identify the airport and/or helicopter landing area; determine the position of the simulated helicopter within the visual scene; successfully accomplish take-offs, approaches, and landings; and maneuver around the airport and/or helicopter landing area on the ground, or hover taxi, as necessary. |
| 1.b.1. ..... | For each of the airport/helicopter landing areas described in 1.a., the FTD visual system must be able to provide at least the following: |
| 1.b.1.a. ..... | A night and twilight (dusk) environment. |
| 1.b.1.b. ..... | A daylight environment. |
| 1.c. ..... | Runways: |
| 1.c.1. ..... | Visible runway number. |
| 1.c.2. ..... | Runway threshold elevations and locations must be modeled to provide sufficient correlation with helicopter systems (e.g., altimeter). |
| 1.c.3. ..... | Runway surface and markings. |
| 1.c.4. ..... | Lighting for the runway in use including runway edge and centerline. |
| 1.c.5. ..... | Lighting, visual approach aid (VASI or PAPI) and approach lighting of appropriate colors. |
| 1.c.6 ..... | Taxiway lights. |
| 1.d. ..... | Helicopter landing area. |
| 1.d.1. ..... | Standard heliport designation (''H'') marking, properly sized and oriented. |
| 1.d.2. ..... | Perimeter markings for the Touchdown and Lift-Off Area (TLOF) or the Final Approach and Takeoff Area (FATO), as appropriate. |
| 1.d.3. ..... | Perimeter lighting for the TLOF or the FATO areas, as appropriate. |
| 1.d.4. ..... | Appropriate markings and lighting to allow movement from the runway or helicopter landing area to another part of the landing facility. |
| **2.** ..... | **Visual scene management.**<br>The following is the minimum visual scene management requirements for a Level 7 FTD. |
| 2.a. ..... | Runway and helicopter landing area approach lighting must fade into view appropriately in accordance with the environmental conditions set in the FTD. |
| 2.b. ..... | The direction of strobe lights, approach lights, runway edge lights, visual landing aids, runway centerline lights, threshold lights, touchdown zone lights, and TLOF or FATO lights must be replicated. |
| **3.** ..... | **Visual feature recognition.**<br>The following are the minimum distances at which runway features must be visible. Distances are measured from runway threshold or a helicopter landing area to a helicopter aligned with the runway or helicopter landing area on an extended 3° glide-slope in simulated meteorological conditions. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. |
| 3.a. ..... | For runways: Runway definition, strobe lights, approach lights, and edge lights from 5 sm (8 km) of the threshold. |
| 3.b. ..... | For runways: Centerline lights and taxiway definition from 3 sm (5 km). |
| 3.c. ..... | For runways: Visual Approach Aid lights (VASI or PAPI) from 5 sm (8 km) of the threshold. |
| 3.d. ..... | For runways: Runway threshold lights and touchdown zone from 2 sm (3 km). |

TABLE D3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS AIRPORT OR LANDING AREA CONTENT REQUIREMENTS FOR QUALIFICATION AT LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 3.e. ..... | For runways and helicopter landing areas: Markings within range of landing lights for night/twilight scenes and the surface resolution test on daylight scenes, as required. |
| 3.f. ..... | For circling approaches: The runway of intended landing and associated lighting must fade into view in a non-distracting manner. |
| 3.g. ..... | For helicopter landing areas: Landing direction lights and raised FATO lights from 1 sm (1.5 km). |
| 3.h. ..... | For helicopter landing areas: Flush mounted FATO lights, TLOF lights, and the lighted windsock from 0.5 sm (750 m). |
| **4.** ..... | **Airport or Helicopter Landing Area Model Content.** The following prescribes the minimum requirements for an airport/helicopter landing area visual model and identifies other aspects of the environment that must correspond with that model for a Level 7 FTD. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. If all runways or landing areas in a visual model used to meet the requirements of this attachment are not designated as ''in use,'' then the ''in use'' runways/landing areas must be listed on the SOQ (e.g., KORD, Rwys 9R, 14L, 22R). Models of airports or helicopter landing areas with more than one runway or landing area must have all significant runways or landing areas not ''in-use'' visually depicted for airport/runway/landing area recognition purposes. The use of white or off white light strings that identify the runway or landing area for twilight and night scenes are acceptable for this requirement; and rectangular surface depictions are acceptable for daylight scenes. A visual system's capabilities must be balanced between providing visual models with an accurate representation of the airport and a realistic representation of the surrounding environment. Each runway or helicopter landing area designated as an ''in-use'' runway or area must include the following detail that is developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material; however, this does not require that such models contain details that are beyond the design capability of the currently qualified visual system. Only one ''primary'' taxi route from parking to the runway end or helicopter takeoff/landing area will be required for each ''in-use'' runway or helicopter takeoff/landing area. |
| 4.a. ..... | The surface and markings for each ''in-use'' runway or helicopter landing area must include the following: |
| 4.a.1. ..... | For airports: Runway threshold markings, runway numbers, touchdown zone markings, fixed distance markings, runway edge markings, and runway centerline stripes. |
| 4.a.2. ..... | For helicopter landing areas: Markings for standard heliport identification (''H'') and TLOF, FATO, and safety areas. |
| 4.b. ..... | The lighting for each ''in-use'' runway or helicopter landing area must include the following: |
| 4.b.1. ..... | For airports: Runway approach, threshold, edge, end, centerline (if applicable), touchdown zone (if applicable), leadoff, and visual landing aid lights or light systems for that runway. |
| 4.b.2. ..... | For helicopter landing areas: Landing direction, raised and flush FATO, TLOF, windsock lighting. |
| 4.c. ..... | The taxiway surface and markings associated with each ''in-use'' runway or helicopter landing area must include the following: |
| 4.c.1. ..... | For airports: Taxiway edge, centerline (if appropriate), runway hold lines, and ILS critical area(s). |
| 4.c.2. ..... | For helicopter landing areas: Taxiways, taxi routes, and aprons. |
| 4.d. ..... | The taxiway lighting associated with each ''in-use'' runway or helicopter landing area must include the following: |
| 4.d.1. ..... | For airports: Taxiway edge, centerline (if appropriate), runway hold lines, ILS critical areas. |
| 4.d.2. ..... | For helicopter landing areas: Taxiways, taxi routes, and aprons. |
| 4.d.3. ..... | For airports: Taxiway lighting of correct color. |
| 4.e. ..... | Airport signage associated with each ''in-use'' runway or helicopter landing area must include the following: |
| 4.e.1. ..... | For airports: Signs for runway distance remaining, intersecting runway with taxiway, and intersecting taxiway with taxiway. |
| 4.e.2. ..... | For helicopter landing areas: As appropriate for the model used. |
| 4.f. ..... | Required visual model correlation with other aspects of the airport or helicopter landing environment simulation: |

TABLE D3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS AIRPORT OR LANDING AREA CONTENT REQUIREMENTS FOR QUALIFICATION AT LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 4.f.1. ..... | The airport or helicopter landing area model must be properly aligned with the navigational aids that are associated with operations at the ''in-use'' runway or helicopter landing area. |
| 4.f.2. ..... | The simulation of runway or helicopter landing area contaminants must be correlated with the displayed runway surface and lighting, if applicable. |
| **5.** ..... | **Correlation with helicopter and associated equipment.**<br>The following are the minimum correlation comparisons that must be made for a Level 7 FTD. |
| 5.a. ..... | Visual system compatibility with aerodynamic programming. |
| 5.b. ..... | Visual cues to assess sink rate and depth perception during landings. |
| 5.c. ..... | Accurate portrayal of environment relating to FTD attitudes. |
| 5.d. ..... | The visual scene must correlate with integrated helicopter systems, where installed (e.g., terrain, traffic and weather avoidance systems and Head-up Guidance System (HGS)). |
| 5.e. ..... | Representative visual effects for each visible, own-ship, helicopter external light(s)—taxi and landing light lobes (including independent operation, if appropriate). |
| 5.f. ..... | The effect of rain removal devices. |
| 6. ..... | **Scene quality.**<br>The following are the minimum scene quality tests that must be conducted for a Level 7 FTD. |
| 6.a. ..... | System light points must be free from distracting jitter, smearing and streaking. |
| 6.b. ..... | Demonstration of occulting through each channel of the system in an operational scene. |
| 6.c. ..... | Six discrete light step controls (0–5). |
| **7.** ..... | **Special weather representations, which include visibility and RVR, measured in terms of distance.**<br>Visibility/RVR checked at 2,000 ft (600 m) above the airport or helicopter landing area and at two heights below 2,000 ft with at least 500 ft of separation between the measurements. The measurements must be taken within a radius of 10 sm (16 km) from the airport or helicopter landing area. |
| 7.a. ..... | Effects of fog on airport lighting such as halos and defocus. |
| 7.b. ..... | Effect of own-ship lighting in reduced visibility, such as reflected glare, including landing lights, strobes, and beacons. |
| **8.** ..... | **Instructor control of the following:**<br>The following are the minimum instructor controls that must be available in a Level 7 FTD. |
| 8.a. ..... | Environmental effects: E.g., cloud base, cloud effects, cloud density, visibility in statute miles/kilometers and RVR in feet/meters. |
| 8.b. ..... | Airport or helicopter landing area selection. |
| 8.c. ..... | Airport or helicopter landing area lighting, including variable intensity. |
| 8.d. ..... | Dynamic effects including ground and flight traffic. |
| **End QPS Requirement** | |
| **Begin Information** | |
| 9. ..... | An example of being able to combine two airport models to achieve two ''in-use'' runways: One runway designated as the ''in-use'' runway in the first model of the airport, and the second runway designated as the ''in-use'' runway in the second model of the same airport. For example, the clearance is for the ILS approach to Runway 27, Circle to Land on Runway 18 right. Two airport visual models might be used: The first with Runway 27 designated as the ''in use'' runway for the approach to runway 27, and the second with Runway 18 Right designated as the ''in use'' runway. When the pilot breaks off the ILS approach to runway 27, the instructor may change to the second airport visual model in which runway 18 Right is designated as the ''in use'' runway, and the pilot would make a visual approach and landing. This process is acceptable to the FAA as long as the temporary interruption due to the visual model change is not distracting to the pilot. |

TABLE D3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS AIRPORT OR LANDING AREA CONTENT REQUIREMENTS FOR QUALIFICATION AT LEVEL 7 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 10. ..... | Sponsors are not required to provide every detail of a runway, but the detail that is provided should be correct within reasonable limits. |
| **End Information** | |

TABLE D3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD VISUAL REQUIREMENTS ADDITIONAL VISUAL MODELS BEYOND MINIMUM REQUIRED FOR QUALIFICATION CLASS II AIRPORT OR HELICOPTER LANDING AREA MODELS

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| This table specifies the minimum airport or helicopter landing area visual model content and functionality necessary to add visual models to an FTD's visual model library (i.e., beyond those necessary for qualification at the stated level) without the necessity of further involvement of the NSPM or TPAA. | |
| **1.** ..... | Visual scene management.<br>**The following is the minimum visual scene management requirements.** |
| 1.a. ..... | The installation and direction of the following lights must be replicated for the ''in-use'' surface: |
| 1.a.1. ..... | For ''in-use'' runways: Strobe lights, approach lights, runway edge lights, visual landing aids, runway centerline lights, threshold lights, and touchdown zone lights. |
| 1.a.2. ..... | For ''in-use'' helicopter landing areas: Ground level TLOF perimeter lights, elevated TLOF perimeter lights (if applicable), Optional TLOF lights (if applicable), ground FATO perimeter lights, elevated TLOF lights (if applicable), landing direction lights. |
| **2.** ..... | **Visual feature recognition.**<br>The following are the minimum distances at which runway or landing area features must be visible. Distances are measured from runway threshold or a helicopter landing area to an aircraft aligned with the runway or helicopter landing area on a 3° glide-slope from the aircraft to the touchdown point, in simulated meteorological conditions. For circling approaches, all tests apply to the runway used for the initial approach and to the runway of intended landing. |
| 2.a. ..... | For Runways. |
| 2.a.1. ..... | Strobe lights, approach lights, and edge lights from 5 sm (8 km) of the threshold. |
| 2.a.2. ..... | Centerline lights and taxiway definition from 3 sm (5 km). |
| 2.a.3. ..... | Visual Approach Aid lights (VASI or PAPI) from 5 sm (8 km) of the threshold. |
| 2.a.4. ..... | Threshold lights and touchdown zone lights from 2 sm (3 km). |
| 2.a.5. ..... | Markings within range of landing lights for night/twilight (dusk) scenes and as required by the surface resolution test on daylight scenes. |
| 2.a.6. ..... | For circling approaches, the runway of intended landing and associated lighting must fade into view in a non-distracting manner. |
| 2.b. ..... | For Helicopter landing areas. |
| 2.b.1. ..... | Landing direction lights and raised FATO lights from 2 sm (3 km). |
| 2.b.2. ..... | Flush mounted FATO lights, TOFL lights, and the lighted windsock from 1 sm (1500 m). |
| 2.b.3. ..... | Hover taxiway lighting (yellow/blue/yellow cylinders) from TOFL area. |
| 2.b.4. ..... | Markings within range of landing lights for night/twilight (dusk) scenes and as required by the surface resolution test on daylight scenes. |

TABLE D3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD VISUAL REQUIREMENTS ADDITIONAL VISUAL MODELS BEYOND MINIMUM REQUIRED FOR QUALIFICATION CLASS II AIRPORT OR HELICOPTER LANDING AREA MODELS—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| **3.** ..... | Airport or Helicopter Landing Area Model Content.<br>The following prescribes the minimum requirements for what must be provided in an airport visual model and identifies other aspects of the airport environment that must correspond with that model. The detail must be developed using airport pictures, construction drawings and maps, or other similar data, or developed in accordance with published regulatory material; however, this does not require that airport or helicopter landing area models contain details that are beyond the designed capability of the currently qualified visual system. For circling approaches, all requirements of this section apply to the runway used for the initial approach and to the runway of intended landing. Only one ''primary'' taxi route from parking to the runway end or helicopter takeoff/landing area will be required for each ''in-use'' runway or helicopter takeoff/landing area. |
| 3.a. ..... | The surface and markings for each ''in-use'' runway or helicopter landing area must include the following: |
| 3.a.1. ..... | For airports: Runway threshold markings, runway numbers, touchdown zone markings, fixed distance markings, runway edge markings, and runway centerline stripes. |
| 3.a.2. ..... | For helicopter landing areas: Standard heliport marking (''H''), TOFL, FATO, and safety areas. |
| 3.b. ..... | The lighting for each ''in-use'' runway or helicopter landing area must include the following: |
| 3.b.1. ..... | For airports: Runway approach, threshold, edge, end, centerline (if applicable), touchdown zone (if applicable), leadoff, and visual landing aid lights or light systems for that runway. |
| 3.b.2. ..... | For helicopter landing areas: Landing direction, raised and flush FATO, TOFL, windsock lighting. |
| 3.c. ..... | The taxiway surface and markings associated with each ''in-use'' runway or helicopter landing area must include the following: |
| 3.c.1. ..... | For airports: Taxiway edge, centerline (if appropriate), runway hold lines, and ILS critical area(s). |
| 3.c.2. ..... | For helicopter landing areas: Taxiways, taxi routes, and aprons. |
| 3.d. ..... | The taxiway lighting associated with each ''in-use'' runway or helicopter landing area must include the following: |
| 3.d.1. ..... | For airports: Runway edge, centerline (if appropriate), runway hold lines, ILS critical areas. |
| 3.d.2. ..... | For helicopter landing areas: Taxiways, taxi routes, and aprons. |
| **4.** ..... | **Required visual model correlation with other aspects of the airport environment simulation.**<br>The following are the minimum visual model correlation tests that must be conducted for Level 7 FTD. |
| 4.a. ..... | The airport model must be properly aligned with the navigational aids that are associated with operations at the ''in-use'' runway. |
| 4.b. ..... | Slopes in runways, taxiways, and ramp areas, if depicted in the visual scene, must not cause distracting or unrealistic effects. |
| **5.** ..... | **Correlation with helicopter and associated equipment.**<br>The following are the minimum correlation comparisons that must be made. |
| 5.a. ..... | Visual system compatibility with aerodynamic programming. |
| 5.b. ..... | Accurate portrayal of environment relating to flight simulator attitudes. |
| 5.c. ..... | Visual cues to assess sink rate and depth perception during landings. |
| **6.** ..... | **Scene quality.**<br>The following are the minimum scene quality tests that must be conducted. |
| 6.a. ..... | Light points free from distracting jitter, smearing or streaking. |
| 6.b. ..... | Surfaces and textural cues free from apparent and distracting quantization (aliasing). |
| **7.** ..... | **Instructor controls of the following.**<br>The following are the minimum instructor controls that must be available. |
| 7.a. ..... | Environmental effects, e.g., cloud base (if used), cloud effects, cloud density, visibility in statute miles/kilometers and RVR in feet/meters. |

TABLE D3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 7 FTD VISUAL REQUIREMENTS ADDITIONAL VISUAL MODELS BEYOND MINIMUM REQUIRED FOR QUALIFICATION CLASS II AIRPORT OR HELICOPTER LANDING AREA MODELS—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 7.b. ..... | Airport/Heliport selection. |
| 7.c. ..... | Airport/Heliport lighting including variable intensity. |
| 7.d. ..... | Dynamic effects including ground and flight traffic. |
| **End QPS Requirements** | |
| **Begin Information** | |
| 8. ..... | Sponsors are not required to provide every detail of a runway or helicopter landing area, but the detail that is provided must be correct within the capabilities of the system. |
| **End Information** | |

TABLE D3D—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List or for a Level 6 FTD. Items not installed or not functional on the FTD and not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ. | |
| **1. Preflight Procedures** | |
| 1.a. ..... | Preflight Inspection (Flight Deck Only) switches, indicators, systems, and equipment. |
| 1.b. ..... | APU/Engine start and run-up. |
| 1.b.1. ..... | Normal start procedures. |
| 1.b.2. ..... | Alternate start procedures. |
| 1.b.3. ..... | Abnormal starts and shutdowns. |
| 1.b.4. ..... | Rotor engagement. |
| 1.b.5 ..... | System checks. |
| **2. Takeoff and Departure Phase** | |
| 2.a. ..... | Instrument. |
| 2.b. ..... | Takeoff with engine failure after critical decision point (CDP). |
| **3. Climb** | |
| 3.a. ..... | Normal. |
| 3.b. ..... | One engine inoperative. |
| **4. Inflight Maneuvers** | |
| 4.a. ..... | Performance. |
| 4.b. ..... | Flying qualities. |
| 4.c. ..... | Turns. |
| 4.c.1. ..... | Timed. |
| 4.c.2. ..... | Normal. |
| 4.c.3. ..... | Steep. |
| 4.d. ..... | Accelerations and decelerations. |

TABLE D3D—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 4.e. | Abnormal/emergency procedures: |
| 4.e.1. | Engine fire. |
| 4.e.2. | Engine failure. |
| 4.e.3. | In-flight engine shutdown (and restart, if applicable). |
| 4.e.4. | Fuel governing system failures (e.g., FADEC malfunction). |
| 4.e.5. | Directional control malfunction (restricted to the extent that the maneuver may not terminate in a landing). |
| 4.e.6. | Hydraulic failure. |
| 4.e.7. | Stability augmentation system failure. |
| **5. Instrument Procedures** | |
| 5.a. | Holding. |
| 5.b. | Precision Instrument Approach. |
| 5.b.1. | All engines operating. |
| 5.b.2. | One or more engines inoperative. |
| 5.b.3. | Approach procedures: |
| 5.b.4. | PAR. |
| 5.b.5. | ILS. |
| 5.b.6. | Manual (raw data). |
| 5.b.7. | Flight director only. |
| 5.b.8. | Autopilot* and flight director (if appropriate) coupled. |
| 5.c. | Non-precision Instrument Approach. |
| 5.c. | Normal—All engines operating. |
| 5.c. | One or more engines inoperative. |
| 5.c. | Approach procedures: |
| 5.c.1. | NDB. |
| 5.c.2. | VOR, RNAV, TACAN, GPS. |
| 5.c.3. | ASR. |
| 5.c.4. | Helicopter only. |
| 5.d. | Missed Approach. |
| 5.d.1. | All engines operating. |
| 5.d.2. | One or more engines inoperative. |
| 5.d.3. | Stability augmentation system failure. |
| **6. Normal and Abnormal Procedures (any phase of flight)** | |
| 6.a. | Helicopter and powerplant systems operation (as applicable). |
| 6.a.1. | Anti-icing/deicing systems. |
| 6.a.2. | Auxiliary power-plant. |
| 6.a.3. | Communications. |

TABLE D3D—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 6.a.4. | Electrical system. |
| 6.a.5. | Environmental system. |
| 6.a.6. | Fire detection and suppression. |
| 6.a.7. | Flight control system. |
| 6.a.8. | Fuel system. |
| 6.a.9. | Engine oil system. |
| 6.a.10. | Hydraulic system. |
| 6.a.11 | Landing gear. |
| 6.a.12. | Oxygen. |
| 6.a.13. | Pneumatic. |
| 6.a.14. | Powerplant. |
| 6.a.15. | Flight control computers. |
| 6.a.16. | Stability augmentation and control augmentation system(s). |
| 6.b. | Flight management and guidance system (as applicable). |
| 6.b.1. | Airborne radar. |
| 6.b.2. | Automatic landing aids. |
| 6.b.3. | Autopilot.* |
| 6.b.4. | Collision avoidance system. |
| 6.b.5. | Flight data displays. |
| 6.b.6. | Flight management computers. |
| 6.b.7. | Navigation systems. |
| **7. Postflight Procedures** | |
| 7.a. | Parking and Securing. |
| 7.b. | Engine and systems operation. |
| 7.c. | Parking brake operation. |
| 7.d. | Rotor brake operation. |
| 7.e. | Abnormal/emergency procedures. |
| **8. Instructor Operating Station (IOS), as appropriate** | |
| 8.a. | Power Switch(es). |
| 8.b.1. | Helicopter conditions. |
| 8.b.2. | Gross weight, center of gravity, fuel loading and allocation, etc. |
| 8.b.3. | Helicopter systems status. |
| 8.b.4. | Ground crew functions (e.g., ext. power). |
| 8.c. | Airports and landing areas. |
| 8.c.1. | Number and selection. |
| 8.c.2. | Runway or landing area selection. |

TABLE D3D—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| 8.c.3. | Preset positions (e.g., ramp, over FAF). |
| 8.c.4. | Lighting controls. |
| 8.d. | Environmental controls. |
| 8.d.1 | Temperature. |
| 8.d.2. | Climate conditions (e.g., ice, rain). |
| 8.d.3. | Wind speed and direction. |
| 8.e. | Helicopter system malfunctions. |
| 8.e.1. | Insertion/deletion. |
| 8.e.2. | Problem clear. |
| 8.f. | Locks, Freezes, and Repositioning. |
| 8.f.1. | Problem (all) freeze/release. |
| 8.f.2. | Position (geographic) freeze/release. |
| 8.f.3. | Repositioning (locations, freezes, and releases). |
| 8.f.4. | Ground speed control. |
| 8.g. | Sound Controls. On/off/adjustment. |
| 8.h. | Control Loading System (as applicable) On/off/emergency stop. |
| 8.i. | Observer Stations. |
| 8.i.1. | Position. |
| 8.i.2. | Adjustments. |

*''Autopilot'' means attitude retention mode of operation.

TABLE D3E—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 5 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List or for a Level 5 FTD. Items not installed or not functional on the FTD and not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ. | |
| **1. Preflight Procedures** | |
| 1.a. | Preflight Inspection (Flight Deck Only) switches, indicators, systems, and equipment. |
| 1.b. | APU/Engine start and run-up. |
| 1.b.1. | Normal start procedures. |
| 1.b.2. | Alternate start procedures. |
| 1.b.3. | Abnormal starts and shutdowns. |
| **2. Climb** | |
| 2.a. | Normal. |
| **3. Inflight Maneuvers** | |
| 3.a. | Performance. |
| 3.b. | Turns, Normal. |

TABLE D3E—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 5 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| **4. Instrument Procedures** | |
| 4.a. | Coupled instrument approach maneuvers (as applicable for the systems installed). |
| **5. Normal and Abnormal Procedures (any phase of flight)** | |
| 5.a. | Normal system operation (installed systems). |
| 5.b. | Abnormal/Emergency system operation (installed systems). |
| **6. Postflight Procedures** | |
| 6.a. | Parking and Securing. |
| 6.b. | Engine and systems operation. |
| 6.c. | Parking brake operation. |
| 6.d. | Rotor brake operation. |
| 6.e. | Abnormal/emergency procedures. |
| **7. Instructor Operating Station (IOS), as appropriate** | |
| 7.a. | Power Switch(es). |
| 7.b. | Preset positions (ground; air) |
| 7.c. | Helicopter system malfunctions. |
| 7.c.1. | Insertion/deletion. |
| 7.c.2. | Problem clear. |
| 7.d. | Control Loading System (as applicable) On/off/emergency stop. |
| 7.e. | Observer Stations. |
| 7.e.1. | Position. |
| 7.e.2. | Adjustments. |

TABLE D3F—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 4 FTD

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List or for a Level 4 FTD. Items not installed or not functional on the FTD and not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ. | |
| **1. Preflight Procedures** | |
| 1.a. | Preflight Inspection (Flight Deck Only) switches, indicators, systems, and equipment. |
| 1.b. | APU/Engine start and run-up. |
| 1.b.1. | Normal start procedures. |
| 1.b.2. | Alternate start procedures. |
| 1.b.3. | Abnormal starts and shutdowns. |
| **2. Normal and Abnormal Procedures (any phase of flight)** | |
| 2.a. | Normal system operation (installed systems). |
| 2.b. | Abnormal/Emergency system operation (installed systems). |

TABLE D3F—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 4 FTD—Continued

| QPS requirements | |
|---|---|
| Entry No. | Operations tasks |
| **3. Postflight Procedures** | |
| 3.a. | Parking and Securing. |
| 3.b. | Engine and systems operation. |
| 3.c. | Parking brake operation. |
| **4. Instructor Operating Station (IOS), as appropriate** | |
| 4.a. | Power Switch(es). |
| 4.b. | Preset positions (ground; air) |
| 4.c. | Helicopter system malfunctions. |
| 4.c.1. | Insertion/deletion. |
| 4.c.2. | Problem clear. |

ATTACHMENT 4 TO APPENDIX D TO PART 60—SAMPLE DOCUMENTS

TABLE OF CONTENTS

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**Attachment 4 to Appendix D to Part 60—**
**Figure D4A – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**INFORMATION**

Date _____

Mr. Charles A. Spillner
Manager, National Simulator Program
Federal Aviation Administration
100 Hartsfield Centre Parkway, Suite 400
Atlanta, GA 30354

Dear Mr. Spillner:

**RE: Request for Initial/Upgrade Evaluation Date**

This is to advise you of our intent to request an (initial or upgrade) evaluation of our (FTD Manufacturer), (Aircraft Type/Level) Flight Training Device (FTD), (FAA ID Number, if previously qualified), located in (City, State) at the (Facility) on (Proposed Evaluation Date). (The proposed evaluation date shall not be more than 180 days following the date of this letter.) The FTD will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FTD will be sponsored as follows; (Select One)

☐ The FTD will be used within the sponsor's FAA approved training program and placed on the sponsor's Training/Operations Specifications.

☐ The FTD will be used for dry lease only.

We agree to provide the formal request for the evaluation to your staff as follows: (check one)

☐ For QTG tests run at the factory, not later, than 45 days prior to the proposed evaluation date with the additional "l/3 on-site" tests provided not later than 14 days prior to the proposed evaluation date.

☐ For QTG tests run on-site, not later than 30 days prior to the proposed evaluation date.

We understand that the formal request will contain the following documents:

10. Sponsor's Letter of Request (*Company Compliance Letter*).
11. Principal Operations Inspector (POI) or Training Center Program Manager's (TCPM) endorsement.
12. Complete QTG.

*If we are unable to meet the above requirements, we understand this may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation.*

(The sponsor should add additional comments as necessary).

Please contact (Name Telephone and Fax Number of Sponsor's Contact) to confirm the date for this initial evaluation. We understand a member of your National Simulator Program staff will respond to this request within 14 days.

A copy of this letter of intent has been provided to (Name), the Principal Operations Inspector (POI) and/or Training Center Program Manager (TCPM).

Sincerely,

Attachment: FTD Information Form
cc: POI/TCPM

**Attachment 4 to Appendix D to Part 60—**
**Figure D4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**

**INFORMATION**

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ | **Physical Address:** | ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | ____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:**____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐ **Yes:** | **Date of Manufacture:** | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** ____ | |
| **Engine model(s) and data revision:** ____ | | **Source of aerodynamic model:** ____ | |
| **FMS identification and revision level:** ____ | | **Source of aerodynamic coefficient data:** ____ | |
| **Visual system manufacturer/model:** ____ | | **Aerodynamic data revision number:** ____ | |
| **Flight control data revision:** ____ | | **Visual system display:** ____ | |
| **Mot ion system manufacturer/type:** ____ | | **FSTD computer(s) identification:** ____ | |
| **National Aviation Authority (NAA):** (If Applicable) | ____ | | |
| **NAA FSTD ID No:** | ____ | **Last NAA Evaluation Date:** | ____ |
| **NAA Qualification Level:** | ____ | | |
| **NAA Qualification Basis:** | ____ | | |
| **Visual System Manufacturer and Type:** | ____ | **FSTD Seats Available:** ____ | **Motion System Manufacturer and Type:** ____: |

**Attachment 4 to Appendix D to Part 60—**
**Figure D4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**

**INFORMATION**

| Aircraft Equipment: | Engine Type(s): | Flight Instrumentation: | Engine Instrumentation: |
|---|---|---|---|
| | _____<br>_____ | ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS<br>☐ TCAS ☐ GPWS ☐ Plain View<br>☐ GPS ☐ FMS Type: __<br>☐ WX Radar ☐ Other: __ | ☐ EICAS ☐ FADEC<br>☐ Other: __ |

| | | | |
|---|---|---|---|
| Airport Models: | 3.6.1 _____<br>Airport Designator | 3.6.2_____<br>Airport Designator | 3.6.3 _____<br>Airport Designator |
| Circle to Land: | 3. 7.1 _____<br>Airport Designator | 3. 7.2_____<br>Approach | 3. 7.3 _____<br>Landing Runway |
| Visual Ground Segment | 3.8.1 _____<br>Airport Designator | 3.8 .2_____<br>Approach | 3. 8.3 _____<br>Landing Runway |

| Section 2. Supplementary Information | | | |
|---|---|---|---|
| FAA Training Program Approval Authority: | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| Name: | _____ | Office: | _____ |
| Tel: | _____ | Fax: | _____ |
| Email: | _____ | | |
| FSTD Scheduling Person: | | | |
| Name: | _____ | | |
| Address 1: | _____ | Address 2 | _____ |
| City: | _____ | State: | _____ |
| ZIP: | _____ | Email: | _____ |
| Tel: | _____ | Fax: | _____ |
| FSTD Technical Contact: | | | |
| Name: | _____ | | |
| Address 1: | _____ | Address 2 | _____ |
| City: | _____ | State: | _____ |
| ZIP: | _____ | Email: | _____ |
| Tel: | _____ | Fax: | _____ |

| Section 3. Training, Testing and Checking Considerations | | |
|---|---|---|
| Area/Function/Maneuver | Requested | Remarks |
| Private Pilot - Training / Checks: (142) | ☐ | _____ |
| Commercial Pilot - Training /Checks:(142) | ☐ | _____ |
| Multi-Engine Rating - Training / Checks (142) | ☐ | _____ |
| Instrument Rating -Training / Checks (142) | ☐ | _____ |
| Type Rating - Training / Checks (135/121/142) | ☐ | _____ |
| Proficiency Checks (135/121/142) | ☐ | _____ |
| CAT I: (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |

**Attachment 4 to Appendix D to Part 60—**
**Figure D4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**
**Attachment: FSTD Information Form**

**INFORMATION**

| | | |
|---|---|---|
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III** * (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix D to Part 60—**
**Figure D4C – Sample Letter of Compliance**
**INFORMATION**

(Date)

Mr. (Name of Training Program Approval Authority):
(Name of FAA FSDO)
(Address)
(City/State/Zip)

Dear Mr. (Name of TPAA):

**RE: Letter of Compliance**

(Operator Sponsor Name) requests evaluation of our (Aircraft Type) FTD for Level (__) qualification. The (FTD Manufacturer Name) FTD with (Visual System Manufacturer Name/Model) system is fully defined on the FTD Information page of the accompanying Qualification Test Guide (QTG). We have completed the tests of the FTD and certify that it meets all applicable requirements of FAR parts 121, 125, or 135), and the guidance of (AC 120-40B or 14 CFR Part 60). Appropriate hardware and software configuration control procedures have been established. Our Pilot(s), (Name(s)), who are qualified on (Aircraft Type) aircraft have assessed the FTD and have found that it conforms to the (Operator/Sponsor) (Aircraft Type) flight deck configuration and that the simulated systems and subsystems function equivalently to those in the aircraft. The above named pilot(s) have also assessed the performance and the flying qualities of the FTD and find that it represents the respective aircraft.

(Added Comments may be placed here)

Sincerely,
(Sponsor Representative)

cc:
FAA, National Simulator Program

**Attachment 4 to Appendix D to Part 60—**
**Figure D4D – Sample Qualification Test Guide Cover Page**

**INFORMATION**

SPONSOR NAME

SPONSOR ADDRESS

FAA QUALIFICATION TEST GUIDE

(SPECIFIC HELICOPTER MODEL)

( *for example* )

( Vertiflite AB-320 )

(FTD Identification Including Manufacturer, Serial Number, Visual System Used)

(FTD Level)

(Qualification Performance Standard Used)

(FTD Location)

FAA Initial Evaluation

Date: _____

_____ Date: _____
(Sponsor)

_____ Date: _____
Manager, National Simulator Program, FAA

**Attachment 4 to Appendix D to Part 60—**
**Figure D4E – Sample Statement of Qualification - Certificate**

**INFORMATION**

Federal Aviation Administration
National Simulator Program

# *Certificate of Qualification*

**This is to certify that representatives of the National Simulator Program Completed an evaluation of the**

## Go-Fast Training Center
## Vertiflite AB-320 Flight Training Device
FAA Identification Number 889

And found it to meet the standards set forth in
**14 CFR Part 60, Appendix D**
**Qualification Performance Standards**

**The Master Qualification Test Guide and the attached Configuration List and List of Qualified Tasks Provide the Qualification Basis for this device to operate at**

***Level 6***

**Until April 30, 2010**

**Unless sooner rescinded or extended by the National Simulator Program Manager**

March 15, 2009 (date)

*C. Nordlie* (for the NSPM)

Attachment 4 to Appendix D to Part 60—
Figure D4F – Sample Statement of Qualification – Configuration List
INFORMATION

# STATEMENT of QUALIFICATION
# CONFIGURATION LIST

| | | | |
|---|---|---|---|
| **Date:** ____ | | | |
| **Section 1. FSTD Information and Characteristics** | | | |
| **Sponsor Name:** | ____ | **FSTD Location:** | |
| **Address:** | ____ ____ | **Physical Address:** | ____ ____ |
| **City:** | ____ | **City:** | ____ |
| **State:** | ____ | **State:** | ____ |
| **Country:** | ____ | **Country:** | ____ |
| **ZIP:** | ____ | **ZIP:** | ____ |
| **Manager** | ____ | | |
| **Sponsor ID No:** (Four Letter FAA Designator) | ____ | **Nearest Airport:** (Airport Designator) | ____ |
| | | | |
| **Type of Evaluation Requested:** | ☐ **Initial** ☐ **Upgrade** ☐ **Continuing Qualification** ☐ **Special** ☐ **Reinstatement** | | |
| **Aircraft Make/model/series:** | ____ | | |
| **Initial Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | **Manufacturer's Identification or Serial Number** | _____ |
| **Upgrade Qualification:** (If Applicable) | **Date:** ____ **Level** ____ MM/DD/YYYY | ☐ **eMQTG** | |
| **Qualification Basis:**_____ | ☐ **A** ☐ **B** ☐ **Interim C** ☐ **C** ☐ **D** ☐ **6** ☐ **7** ☐ **Provisional Status** | | |
| | | | |
| **Other Technical Information:** | | | |
| **FAA FSTD ID No:** (If Applicable) | ____ | **FSTD Manufacturer:** | ____ |
| **Convertible FSTD:** | ☐ **Yes:** | **Date of Manufacture:** | ____ MM/DD/YYYY |
| **Related FAA ID No.** (If Applicable) | ____ ____ ____ | **Sponsor FSTD ID No:** _____ | |
| **Engine model(s) and data revision:** _____ | | **Source of aerodynamic model:** _____ | |
| **FMS identification and revision level:** _____ | | **Source of aerodynamic coefficient data:** _____ | |
| **Visual system manufacturer/model:** _____ | | **Aerodynamic data revision number:** _____ | |
| **Flight control data revision:** _____ | | **Visual system display:** _____ | |
| **Mot ion system manufacturer/type:** _____ | | **FSTD computer(s) identification:** _____ | |
| | | | |
| **National Aviation Authority (NAA):** (If Applicable) | _____ | | |
| **NAA FSTD ID No:** | _____ | **Last NAA Evaluation Date:** | _____ |
| **NAA Qualification Level:** | _____ | | |
| **NAA Qualification Basis:** | ____ | | |

**Attachment 4 to Appendix D to Part 60—**
**Figure D4F – Sample Statement of Qualification – Configuration List**
**INFORMATION**

| | | | | | |
|---|---|---|---|---|---|
| **Visual System Manufacturer and Type:** | _____ | **FSTD Seats Available:** _____ | **Motion System Manufacturer and Type:** | _____: | |
| **Aircraft Equipment:** | **Engine Type(s):** _____ _____ | **Flight Instrumentation:** ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS ☐ TCAS ☐ GPWS ☐ Plain View ☐ GPS ☐ FMS Type: __ ☐ WX Radar ☐ Other: __ | | **Engine Instrumentation:** ☐ EICAS ☐ FADEC ☐ Other: __ | |
| | | | | | |
| **Airport Models:** | 3.6.1 _____ Airport Designator | | 3.6.2_____ Airport Designator | | 3.6.3 _____ Airport Designator |
| **Circle to Land:** | 3. 7.1 _____ Airport Designator | | 3. 7.2_____ Approach | | 3. 7.3 _____ Landing Runway |
| **Visual Ground Segment** | 3.8.1 _____ Airport Designator | | 3.8 .2_____ Approach | | 3. 8.3 _____ Landing Runway |

| **Section 2. Supplementary Information** | | | |
|---|---|---|---|
| **FAA Training Program Approval Authority:** | | ☐ POI ☐ TCPM ☐ Other: _____ | |
| **Name:** | _____ | **Office:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| **Email:** | _____ | | |
| | | | |
| **FSTD Scheduling Person:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |
| | | | |
| **FSTD Technical Contact:** | | | |
| **Name:** | _____ | | |
| **Address 1:** | _____ | **Address 2** | _____ |
| **City:** | _____ | **State:** | _____ |
| **ZIP:** | _____ | **Email:** | _____ |
| **Tel:** | _____ | **Fax:** | _____ |

| **Section 3. Training, Testing and Checking Considerations** | | |
|---|---|---|
| **Area/Function/Maneuver** | **Requested** | **Remarks** |
| **Private Pilot - Training / Checks:** (142) | ☐ | _____ |
| **Commercial Pilot - Training /Checks:**(142) | ☐ | _____ |
| **Multi-Engine Rating - Training / Checks** (142) | ☐ | _____ |
| **Instrument Rating -Training / Checks** (142) | ☐ | _____ |
| **Type Rating - Training / Checks** (135/121/142) | ☐ | _____ |
| **Proficiency Checks** (135/121/142) | ☐ | _____ |

**Attachment 4 to Appendix D to Part 60—**
**Figure D4F – Sample Statement of Qualification – Configuration List**
**INFORMATION**

| | | |
|---|---|---|
| **CAT I:** (RVR 2400/1800 ft. DH200 ft) | ☐ | _____ |
| **CAT II**: (RVR 1200 ft. DH 100 ft) | ☐ | _____ |
| **CAT III *** (lowest minimum) _____ RVR _____ ft.<br>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.) | ☐ | _____ |
| **Circling Approach** | ☐ | _____ |
| **Windshear Training**: | ☐ | _____ |
| **Windshear Training** IAW 121.409(d) (121 Turbojets Only) | ☐ | _____ |
| **Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope** | ☐ | _____ |
| **Specific Unusual Attitudes Recoveries** | ☐ | _____ |
| **Auto-coupled Approach/Auto Go Around** | ☐ | _____ |
| **Auto-land / Roll Out Guidance** | ☐ | _____ |
| **TCAS/ACAS I / II** | ☐ | _____ |
| **WX-Radar** | ☐ | _____ |
| **HUD** | ☐ | _____ |
| **HGS** | ☐ | _____ |
| **EFVS** | ☐ | _____ |
| **Future Air Navigation Systems** | ☐ | _____ |
| **GPWS / EGPWS** | ☐ | _____ |
| **ETOPS Capability** | ☐ | _____ |
| **GPS** | ☐ | _____ |
| **SMGCS** | ☐ | _____ |
| **Helicopter Slope Landings** | ☐ | _____ |
| **Helicopter External Load Operations** | ☐ | _____ |
| **Helicopter Pinnacle Approach to Landings** | ☐ | _____ |
| **Helicopter Night Vision Maneuvers** | ☐ | _____ |
| **Helicopter Category A Takeoffs** | ☐ | _____ |

**Attachment 4 to Appendix D to Part 60—**
**Figure D4G – Sample Statement of Qualification – List of Qualified Tasks**
**INFORMATION**

**STATEMENT of QUALIFICATION**
**LIST of QUALIFIED TASKS**

**Go-Fast Training Center Vertiflite AB-320 -- Level C -- FAA ID# 888**

| |
|---|
| **The FTD is qualified to perform all of the Maneuvers, Procedures, Tasks, and Functions Listed in Appendix D, Attachment 1, Table D1B, Minimum FTD Requirements In Effect on [mm/dd/yyyy] except for the following listed Tasks or Functions.** |
| (*Example*)<br><br>**Excepted Tasks:**<br><br>**6.f.** Fire Detection and Extinguisher System.<br>**7.d.** Ditching. |
| ***Excepted Simulator Systems:***<br><br>Remote IOS |
| **Additional Qualified Tasks or Functions in addition to those listed in Appendix D, Attachment 3, Table D1B, Minimum FTD Requirements.**<br><br>(None) |
| |

**Attachment 4 to Appendix A to Part 60—**
**Figure A4H – Sample Continuing Qualification Evaluation Requirements Page**
**INFORMATION**

| **Continuing qualification Evaluation Requirements**<br>***Completed at conclusion of Initial Evaluation*** | |
|---|---|
| Continuing qualification Evaluations to be conducted each<br><br>_(fill in)__ months<br><br>Allotting _____ hours of FTD time.<br><br>Signed:<br>_____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

---

| **Revision:**<br><br>Based on (enter reasoning): | |
|---|---|
| | |
| | |
| Continuing qualification Evaluations are to be conducted each<br><br>_(fill in)__ months. Allotting _____ hours.<br><br>Signed:<br>_____<br>NSPM / Evaluation Team Leader | Continuing qualification evaluations are due as follows:<br><br>_(month)__ and __(month)_ and __(month)_<br>(enter or strike out, as appropriate)<br><br>_____<br>Date |

(Repeat as Necessary)

**Attachment 4 to Appendix D to Part 60—**
**Figure D4I – Sample MQTG Index of Effective FTD Directives**
**INFORMATION**

| Index of Effective FSTD Directives Filed in this Section | | | |
|---|---|---|---|
| **Number** | **Effective Date** | **Date of Notification** | **Details** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Continue as Necessary....

[Doc. No. FAA–2002–12461, 73 FR 26490, May 9, 2008]

## APPENDIX E TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR QUALITY MANAGEMENT SYSTEMS FOR FLIGHT SIMULATION TRAINING DEVICES

BEGIN QPS REQUIREMENTS

a. Not later than May 30, 2010, each current sponsor of an FSTD must submit to the NSPM a proposed Quality Management System (QMS) program as described in this appendix. The NSPM will notify the sponsor of the acceptability of the program, including any required adjustments. Within 6 months of the notification of acceptability, the sponsor must implement the program, conduct internal audits, make required program adjustments as a result of any internal audit, and schedule the NSPM initial audit.

b. First-time FSTD sponsors must submit to the NSPM the proposed QMS program no later than 120 days before the initial FSTD evaluation. The NSPM will notify the sponsor of the acceptability of the program, including any required adjustments. Within 6 months of the notification of acceptability, the sponsor must implement the program, conduct internal audits, make required program adjustments as a result of any internal audit, and schedule the NSPM initial audit.

c. The Director of Operations for a Part 119 certificate holder, the Chief Instructor for a Part 141 certificate holder, or the equivalent for a Part 142 or Flight Engineer School sponsor must designate a Management Representative (MR) who has the authority to establish and modify the sponsor's policies, practices, and procedures regarding the QMS program for the recurring qualification and the daily use of each FSTD.

d. The minimum content required for an acceptable QMS is found in Table E1. The policies, processes, or procedures described in this table must be maintained in a Quality Manual and will serve as the basis for the following:

(1) The sponsor-conducted initial and recurring periodic assessments;

(2) The NSPM-conducted initial and recurring periodic assessments; and

(3) The continuing surveillance and analysis by the NSPM of the sponsor's performance and effectiveness in providing a satisfactory FSTD for use on a regular basis.

e. The sponsor must conduct assessments of its QMS program in segments. The segments will be established by the NSPM at the initial assessment, and the interval for the segment assessments will be every 6

months. The intervals for the segment assessments may be extended beyond 6 months as the QMS program matures, but will not be extended beyond 12 months. The entire QMS program must be assessed every 24 months.

f. The periodic assessments conducted by the NSPM will be conducted at intervals not less than once every 24 months, and include a comprehensive review of the QMS program. These reviews will be conducted more frequently if warranted.

END QPS REQUIREMENTS

---

BEGIN INFORMATION

g. An example of a segment assessment—At the initial QMS assessment, the NSPM will divide the QMS program into segments (e.g., 6 separate segments). There must be an assessment of a certain number of segments every 6 months (i.e., segments 1 and 2 at the end of the first 6 month period; segments 3 and 4 at the end of the second 6 month period (or one year); and segments 5 and 6 at the end of the third 6 month period (or 18 months). As the program matures, the interval between assessments may be extended to 12 months (e.g., segments 1, 2, and 3 at the end of the first year; and segments 4, 5, and 6 at the end of the second year). In both cases, the entire QMS program is assessed at least every 24 months.

h. The following materials are presented to assist sponsors in preparing for an NSPM evaluation of the QMS program. The sample documents include:

(1) The NSPM desk assessment tool for initial evaluation of the required elements of a QMS program.

(2) The NSPM on-site assessment tool for initial and continuing evaluation of the required elements of a QMS program.

(3) An Element Assessment Table that describes the circumstances that exist to warrant a finding of ''non-compliance,'' or ''nonconformity''; ''partial compliance,'' or ''partial conformity''; and ''acceptable compliance,'' or ''acceptable conformity.''

(4) A sample Continuation Sheet for additional comments that may be added by the sponsor or the NSPM during a QMS evaluation.

(5) A sample Sponsor Checklist to assist the sponsor in verifying the elements that comprise the required QMS program.

(6) A table showing the essential functions, processes, and procedures that relate to the required QMS components and a cross-reference to each represented task.

i. Additional Information.

(1) In addition to specifically designated QMS evaluations, the NSPM will evaluate the sponsor's QMS program as part of regularly scheduled FSTD continuing qualification evaluations and no-notice FSTD evaluations, focusing in part on the effectiveness and viability of the QMS program and its contribution to the overall capability of the FSTD to meet the requirements of this part.

(2) The sponsor or MR may delegate duties associated with maintaining the qualification of the FSTD (e.g., corrective and preventive maintenance, scheduling and conducting tests or inspections, functional preflight checks) but retain the responsibility and authority for the day-to-day qualification of the FSTD. One person may serve as the sponsor or MR for more than one FSTD, but one FSTD may not have more than one sponsor or MR.

(3) A QMS program may be applicable to more than one certificate holder (e.g., part 119 and part 142 or two part 119 certificate holders) and an MR may work for more than one certificate holder (e.g., part 119 and part 142 or two part 119 certificate holders) as long as the sponsor's QMS program requirements and the MR requirements are met for each certificate holder.

(4) Standard Measurements for Flight Simulator Quality: A quality system based on FSTD performance will improve and maintain training quality. See *http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/nsp/sqms/* for more information on measuring FSTD performance.

j. The FAA does not mandate a specific QMS program format, but an acceptable QMS program should contain the following:

(1) A Quality Policy. This is a formal written Quality Policy Statement that is a commitment by the sponsor outlining what the Quality System will achieve.

(2) A MR who has overall authority for monitoring the on-going qualification of assigned FSTDs to ensure that all FSTD qualification issues are resolved as required by this part. The MR should ensure that the QMS program is properly implemented and maintained, and should:

(a) Brief the sponsor's management on the qualification processes;

(b) Serve as the primary contact point for all matters between the sponsor and the NSPM regarding the qualification of the assigned FSTDs; and

(c) Oversee the day-to-day quality control.

(3) The system and processes outlined in the QMS should enable the sponsor to monitor compliance with all applicable regulations and ensure correct maintenance and performance of the FSTD in accordance with part 60.

(4) A QMS program and a statement acknowledging completion of a periodic review by the MR should include the following:

(a) A maintenance facility that provides suitable FSTD hardware and software tests and maintenance capability.

(b) A recording system in the form of a technical log in which defects, deferred defects, and development projects are listed,

assigned and reviewed within a specified time period.

(c) Routine maintenance of the FSTD and performance of the QTG tests with adequate staffing to cover FSTD operating periods.

(d) A planned internal assessment schedule and a periodic review should be used to verify that corrective action was complete and effective. The assessor should have adequate knowledge of FSTDs and should be acceptable to the NSPM.

(5) The MR should receive Quality System training and brief other personnel on the procedures.

END INFORMATION

TABLE E1—FSTD QUALITY MANAGEMENT SYSTEM

| Entry No. | QPS requirement | Information (reference) |
|---|---|---|
| E1.1. | A QMS manual that prescribes the policies, processes, or procedures outlined in this table. | § 60.5(a). |
| E1.2. | A policy, process, or procedure specifying how the sponsor will identify deficiencies in the QMS. | § 60.5(b). |
| E1.3. | A policy, process, or procedure specifying how the sponsor will document how the QMS program will be changed to address deficiencies. | § 60.5(b). |
| E1.4. | A policy, process, or procedure specifying how the sponsor will address proposed program changes (for programs that do not meet the minimum requirements as notified by the NSPM) to the NSPM and receive approval prior to their implementation. | § 60.5(c). |
| E1.5. | A policy, process, or procedure specifying how the sponsor will document that at least one FSTD is used within the sponsor's FAA-approved flight training program for the aircraft or set of aircraft at least once within the 12-month period following the initial or upgrade evaluation conducted by the NSPM and at least once within each subsequent 12-month period thereafter. | § 60.7(b)(5). |
| E1.6. | A policy, process, or procedure specifying how the sponsor will document that at least one FSTD is used within the sponsor's FAA-approved flight training program for the aircraft or set of aircraft at least once within the 12-month period following the first continuing qualification evaluation conducted by the NSP and at least once within each subsequent 12-month period thereafter. | § 60.7(b)(6). |
| E1.7. | A policy, process, or procedure specifying how the sponsor will obtain an annual written statement from a qualified pilot (who has flown the subject aircraft or set of aircraft during the preceding 12-month period) that the performance and handling qualities of the subject FSTD represents the subject aircraft or set of aircraft (within the normal operating envelope). Required only if the subject FSTD is not used in the sponsor's FAA-approved flight training program for the aircraft or set of aircraft at least once within the preceding 12-month period. | § 60.5(b)(7) and § 60.7(d)(2). |
| E1.8. | A policy, process, or procedure specifying how independent feedback (from persons recently completing training, evaluation, or obtaining flight experience; instructors and check airmen using the FSTD for training, evaluation, or flight experience sessions; and FSTD technicians and maintenance personnel) will be received and addressed by the sponsor regarding the FSTD and its operation. | § 60.9(b)(1). |
| E1.9. | A policy, process, or procedure specifying how and where the FSTD SOQ will be posted, or accessed by an appropriate terminal or display, in or adjacent to the FSTD. | § 60.9(b)(2). |
| E1.10. | A policy, process, or procedure specifying how the sponsor's management representative (MR) is selected and identified by name to the NSPM. | § 60.9(c) and Appendix E, paragraph (d). |
| E1.11. | A policy, process, or procedure specifying the MR authority and responsibility for the following: | § 60.9(c)(2), (3), and (4). |
| E1.11.a. | Monitoring the on-going qualification of assigned FSTDs to ensure all matters regarding FSTD qualification are completed as required by this part. | |
| E1.11.b. | Ensuring that the QMS is properly maintained by overseeing the QMS policies, practices, or procedures and modifying as necessary. | |

TABLE E1—FSTD QUALITY MANAGEMENT SYSTEM—Continued

| Entry No. | QPS requirement | Information (reference) |
|---|---|---|
| E1.11.c. | Regularly briefing sponsor's management on the status of the on-going FSTD qualification program and the effectiveness and efficiency of the QMS. | |
| E1.11.d. | Serving as the primary contact point for all matters between the sponsor and the NSPM regarding the qualification of assigned FSTDs. | |
| E1.11.e. | Delegating the MR assigned duties to an individual at each of the sponsor's locations, as appropriate. | |
| E1.12. | A policy, process, or procedure specifying how the sponsor will: | §60.13; QPS Appendices A, B, C, and D. |
| E1.12.a. | Ensure that the data made available to the NSPM (the validation data package) includes the aircraft manufacturer's flight test data (or other data approved by the NSPM) and all relevant data developed after the type certificate was issued (e.g., data developed in response to an airworthiness directive) if the data results from a change in performance, handling qualities, functions, or other characteristics of the aircraft that must be considered for flight crewmember training, evaluation, or experience requirements. | |
| E1.12.b. | Notify the NSPM within 10 working days of becoming aware that an addition to or a revision of the flight related data or airplane systems related data is available if this data is used to program or operate a qualified FSTD. | |
| E1.12.c. | Maintain a liaison with the manufacturer of the aircraft being simulated (or with the holder of the aircraft type certificate for the aircraft being simulated if the manufacturer is no longer in business), and if appropriate, with the person who supplied the aircraft data package for the FFS for the purposes of receiving notification of data package changes. | |
| E1.13. | A policy, process, or procedure specifying how the sponsor will make available all special equipment and qualified personnel needed to conduct tests during initial, continuing qualification, or special evaluations. | §60.14. |
| E1.14. | A policy, process, or procedure specifying how the sponsor will submit to the NSPM a request to evaluate the FSTD for initial qualification at a specific level and simultaneously request the TPAA forward a concurring letter to the NSPM; including how the MR will use qualified personnel to confirm the following: | §60.15(a)–(d); §60.15(b); §60.15(b)(i); §60.15(b)(ii); §60.15(b)(iii). |
| E1.14.a. | That the performance and handling qualities of the FSTD represent those of the aircraft or set of aircraft within the normal operating envelope. | |
| E1.14.b. | The FSTD systems and sub-systems (including the simulated aircraft systems) functionally represent those in the aircraft or set of aircraft. | |
| E1.14.c. | The flight deck represents the configuration of the specific type or aircraft make, model, and series aircraft being simulated, as appropriate. | |
| E1.15. | A policy, process, or procedure specifying how the subjective and objective tests are completed at the sponsor's training facility for an initial evaluation. | §60.15(e). |
| E1.16. | A policy, process, or procedure specifying how the sponsor will update the QTG with the results of the FAA-witnessed tests and demonstrations together with the results of the objective tests and demonstrations after the NSPM completes the evaluation for initial qualification. | §60.15(h). |
| E1.17. | A policy, process, or procedure specifying how the sponsor will make the MQTG available to the NSPM upon request. | §60.15(i). |
| E1.18. | A policy, process, or procedure specifying how the sponsor will apply to the NSPM for additional qualification(s) to the SOQ. | §60.16(a); §60.16(a)(1)(i); and §60.16(a)(1)(ii). |
| E1.19. | A policy, process, or procedure specifying how the sponsor completes all required Attachment 2 objective tests each year in a minimum of four evenly spaced inspections as specified in the appropriate QPS. | §60.19(a)(1) QPS Appendices A, B, C, or D. |
| E1.20. | A policy, process, or procedure specifying how the sponsor completes and records a functional preflight check of the FSTD within the preceding 24 hours of FSTD use, including a description of the functional preflight. | §60.19(a)(2) QPS Appendices A, B, C, or D. |

TABLE E1—FSTD QUALITY MANAGEMENT SYSTEM—Continued

| Entry No. | QPS requirement | Information (reference) |
|---|---|---|
| E1.21. | A policy, process, or procedure specifying how the sponsor schedules continuing qualification evaluations with the NSPM. | § 60.19(b)(2). |
| E1.22. | A policy, process, or procedure specifying how the sponsor ensures that the FSTD has received a continuing qualification evaluation at the interval described in the MQTG. | § 60.19(b)(5)–(6). |
| E1.23. | A policy, process, or procedure describing how discrepancies are recorded in the FSTD discrepancy log, including: | § 60.19(c); § 60.19(c)(2)(i); § 60.19(c)(2)(ii). |
| E1.23.a. | A description of how the discrepancies are entered and maintained in the log until corrected. | |
| E1.23.b. | A description of the corrective action taken for each discrepancy, the identity of the individual taking the action, and the date that action is taken. | |
| E1.24. | A policy, process, or procedure specifying how the discrepancy log is kept in a form and manner acceptable to the Administrator and kept in or adjacent to the FSTD. (An electronic log that may be accessed by an appropriate terminal or display in or adjacent to the FSTD is satisfactory.). | § 60.19(c)(2)(iii). |
| E1.25. | A policy, process, or procedure that requires each instructor, check airman, or representative of the Administrator conducting training, evaluation, or flight experience, and each person conducting the preflight inspection, who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the FSTD, to write or cause to be written a description of that discrepancy into the discrepancy log at the end of the FSTD preflight or FSTD use session. | § 60.20. |
| E1.26. | A policy, process, or procedure specifying how the sponsor will apply for initial qualification based on the final aircraft data package approved by the aircraft manufacturer if operating an FSTD based on an interim qualification. | § 60.21(c). |
| E1.27. | A policy, process, or procedure specifying how the sponsor determines whether an FSTD change qualifies as a modification as defined in § 60.23. | § 60.23(a)(1)–(2). |
| E1.28. | A policy, process, or procedure specifying how the sponsor will ensure the FSTD is modified in accordance with any FSTD Directive regardless of the original qualification basis. | § 60.23(b). |
| E1.29. | A policy, process, or procedure specifying how the sponsor will notify the NSPM and TPAA of their intent to use a modified FSTD and to ensure that the modified FSTD will not be used prior to: | § 60.23(c)(1)(i), (ii), and (iv). |
| E1.29.a. | Twenty-one days since the sponsor notified the NSPM and the TPAA of the proposed modification and the sponsor has not received any response from either the NSPM or the TPAA; or | |
| E1.29.b. | Twenty-one days since the sponsor notified the NSPM and the TPAA of the proposed modification and one has approved the proposed modification and the other has not responded; or | |
| E1.29.c. | The FSTD successfully completing any evaluation the NSPM may require in accordance with the standards for an evaluation for initial qualification or any part thereof before the modified FSTD is placed in service. | |
| E1.30. | A policy, process, or procedure specifying how, after an FSTD modification is approved by the NSPM, the sponsor will: | § 60.23(d)–(e). |
| E1.30.a. | Post an addendum to the SOQ until as the NSPM issues a permanent, updated SOQ. | |
| E1.30.b. | Update the MQTG with current objective test results and appropriate objective data for each affected objective test or other MQTG section affected by the modification. | |
| E1.30.c. | File in the MQTG the requirement from the NSPM to make the modification and the record of the modification completion. | |

TABLE E1—FSTD QUALITY MANAGEMENT SYSTEM—Continued

| Entry No. | QPS requirement | Information (reference) |
|---|---|---|
| E1.31. | A policy, process, or procedure specifying how the sponsor will track the length of time a component has been missing, malfunctioning, or inoperative (MMI), including: | § 60.25(b)–(c), and QPS Appendices A, B, C, or D. |
| E1.31.a. | How the sponsor will post a list of MMI components in or adjacent to the FSTD. | |
| E1.31.b. | How the sponsor will notify the NSPM if the MMI has not been repaired or replaced within 30 days.* | |
| E1.32. | A policy, process, or procedure specifying how the sponsor will notify the NSPM and how the sponsor will seek requalification of the FSTD if the FSTD is moved and reinstalled in a different location. | § 60.27(a)(3). |
| E1.33. | A policy, process, or procedure specifying how the sponsor will maintain control of the following: (The sponsor must specify how these records are maintained in plain language form or in coded form; but if the coded form is used, the sponsor must specify how the preservation and retrieval of information will be conducted.). | § 60.31. |
| E1.33.a. | The MQTG and each amendment. | |
| E1.33.b. | A record of all FSTD modifications required by this part since the issuance of the original SOQ. | |
| E1.33.c. | Results of the qualification evaluations (initial and each upgrade) since the issuance of the original SOQ. | |
| E1.33.d. | Results of the objective tests conducted in accordance with this part for a period of 2 years. | |
| E1.33.e. | Results of the previous three continuing qualification evaluations, or the continuing qualification evaluations from the previous 2 years, whichever covers a longer period. | |
| E1.33.f. | Comments obtained in accordance with § 60.9(b); | |
| E1.33.g. | A record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following: | |
| E1.33.g.1. | A list of the components or equipment that were or are missing, malfunctioning, or inoperative. | |
| E1.33.g.2. | The action taken to correct the discrepancy. | |
| E1.33.g.3. | The date the corrective action was taken. | |
| E1.33.g.4. | The identity of the person determining that the discrepancy has been corrected. | |

*Note: If the sponsor has an approved discrepancy prioritization system, this item is satisfied by describing how discrepancies are prioritized, what actions are taken, and how the sponsor will notify the NSPM if the MMI has not been repaired or replaced within the specified timeframe.

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## APPENDIX F TO PART 60—DEFINITIONS AND ABBREVIATIONS FOR FLIGHT SIMULATION TRAINING DEVICES

BEGIN INFORMATION

1. SOME OF THE DEFINITIONS PRESENTED BELOW ARE REPEATED FROM THE DEFINITIONS FOUND IN 14 CFR PART 1, AS INDICATED PARENTHETICALLY

END INFORMATION

BEGIN QPS REQUIREMENTS

2. DEFINITIONS

*1st Segment*—the portion of the takeoff profile from liftoff to gear retraction.

*2nd Segment*—the portion of the takeoff profile from after gear retraction to initial flap/slat retraction.

*3rd Segment*—the portion of the takeoff profile after flap/slat retraction is complete.

*Aircraft Data Package*—a combination of the various types of data used to design, program, manufacture, modify, and test the FSTD.

*Airspeed*—calibrated airspeed unless otherwise specified and expressed in terms of nautical miles per hour (knots).

*Airport Model*—

*Class I.* Whether modeling real world or fictional airports (or landing areas for helicopters), these airport models (or landing areas for helicopters) are those that meet the requirements of Table A3B or C3B, found in attachment 2 of Appendix A or C, as appropriate, are evaluated by the NSPM, and are listed on the SOQ.

*Class II.* Whether modeling real world or fictional airports (or landing areas for helicopters), these airport models (or landing areas for helicopters) are those models that are in excess of those used for simulator qualification at a specified level. The FSTD sponsor is responsible for determining that these models meet the requirements set out in Table A3C or C3C, found in attachment 2 of Appendix A or C, as appropriate.

*Class III.* This is a special class of airport model (or landing area for helicopters), used for specific purposes, and includes models that may be incomplete or inaccurate when viewed without restriction, but when appropriate limits are applied (e.g., ''valid for use only in visibility conditions less than ½ statute mile or RVR2400 feet,'' ''valid for use only for approaches to Runway 22L and 22R''), those features that may be incomplete or inaccurate may not be able to be recognized as such by the crewmember being trained, tested, or checked. Class III airport models used for training, testing, or checking activities under this Chapter requires the certificate holder to submit to the TPAA an appropriate analysis of the skills, knowledge, and abilities necessary for competent performance of the task(s) in which this particular model is to be used, and requires TPAA acceptance of each Class III model.

*Altitude*—pressure altitude (meters or feet) unless specified otherwise.

*Angle of Attack*—the angle between the airplane longitudinal axis and the relative wind vector projected onto the airplane plane of symmetry.

*Automatic Testing*—FSTD testing where all stimuli are under computer control.

*Bank*—the airplane attitude with respect to or around the longitudinal axis, or roll angle (degrees).

*Breakout*—the force required at the pilot's primary controls to achieve initial movement of the control position.

*Certificate Holder*—a person issued a certificate under parts 119, 141, or 142 of this chapter or a person holding an approved course of training for flight engineers in accordance with part 63 of this chapter.

*Closed Loop Testing*—a test method where the input stimuli are generated by controllers that drive the FSTD to follow a pre-defined target response.

*Computer Controlled Aircraft*—an aircraft where all pilot inputs to the control surfaces are transferred and augmented by computers.

*Confined Area (helicopter operations)*—an area where the flight of the helicopter is limited in some direction by terrain or the presence of natural or man-made obstructions (e.g., a clearing in the woods, a city street, or a road bordered by trees or power lines are regarded as confined areas).

*Control Sweep*—movement of the appropriate pilot controller from neutral to an extreme limit in one direction (Forward, Aft, Right, or Left), a continuous movement back through neutral to the opposite extreme position, and then a return to the neutral position.

*Convertible FSTD*—an FSTD in which hardware and software can be changed so that the FSTD becomes a replica of a different model, usually of the same type aircraft. The same FSTD platform, flight deck shell, motion system, visual system, computers, and peripheral equipment can be used in more than one simulation.

*Critical Engine Parameter*—the parameter that is the most accurate measure of propulsive force.

*Deadband*—the amount of movement of the input for a system for which there is no reaction in the output or state of the system observed.

*Distance*—the length of space between two points, expressed in terms of nautical miles unless otherwise specified.

*Discrepancy*—as used in this part, an aspect of the FSTD that is not correct with respect to the aircraft being simulated. This includes missing, malfunctioning, or inoperative components that are required to be present and operate correctly for training, evaluation, and experience functions to be creditable. It also includes errors in the documentation used to support the FSTD (e.g., MQTG errors, information missing from the MQTG, or required statements from appropriately qualified personnel).

*Downgrade*—a permanent change in the qualification level of an FSTD to a lower level.

*Driven*—a test method where the input stimulus or variable is positioned by automatic means, usually a computer input.

*Electronic Copy of the MQTG*—an electronic copy of the MQTG provided by an electronic scan presented in a format, acceptable to the NSPM.

*Electronic Master Qualification Test Guide*—an electronic version of the MQTG (eMQTG), where all objective data obtained from airplane testing, or another approved source, together with correlating objective test results obtained from the performance of the FSTD and a description of the equipment necessary to perform the evaluation for the initial and the continuing qualification evaluations is stored, archived, or presented in either reformatted or digitized electronic format.

*Engine*—as used in this part, the appliance or structure that supplies propulsive force for movement of the aircraft: i.e., The turbine engine for turbine powered aircraft; the turbine engine and propeller assembly for turbo-propeller powered aircraft; and the reciprocating engine and propeller assembly for reciprocating engine powered aircraft. For purposes of this part, engine failure is the failure of either the engine or propeller assembly to provide thrust higher than idle power thrust due to a failure of either the engine or the propeller assembly.

*Evaluation*—with respect to an individual, the checking, testing, or review associated with flight crewmember qualification, training, and certification under parts 61, 63, 121, or 135 of this chapter. With respect to an FSTD, the qualification activities for the device (e.g., the objective and subjective tests, the inspections, or the continuing qualification evaluations) associated with the requirements of this part.

*Fictional Airport*—a visual model of an airport that is a collection of ''non-real world'' terrain, instrument approach procedures, navigation aids, maps, and visual modeling detail sufficient to enable completion of an Airline Transport Pilot Certificate or Type Rating.

*Flight Experience*—recency of flight experience for landing credit purposes.

*Flight Simulation Training Device (FSTD)*—a full flight simulator (FFS) or a flight training device (FTD). (Part 1)

*Flight Test Data*—(a subset of objective data) aircraft data collected by the aircraft manufacturer or other acceptable data supplier during an aircraft flight test program.

*Flight Training Device (FTD)*—a replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft flight deck replica. It includes the equipment and computer programs necessary to represent aircraft (or set of aircraft) operations in ground and flight conditions having the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standard (QPS) for a specific FTD qualification level. (Part 1)

*Free Response*—the response of the FSTD after completion of a control input or disturbance.

*Frozen*—a test condition where one or more variables are held constant with time.

*FSTD Approval*—the extent to which an FSTD may be used by a certificate holder as authorized by the FAA.

*FSTD Directive*—a document issued by the FAA to an FSTD sponsor requiring a modification to the FSTD due to a safety-of-flight issue and amending the qualification basis for the FSTD.

*FSTD Latency*—the additional time for the FSTD to respond to input that is beyond the response time of the aircraft.

*FSTD Performance*—the overall performance of the FSTD, including aircraft performance (e.g., thrust/drag relationships, climb, range) and flight and ground handling.

*Full Flight Simulator (FFS)*—a replica of a specific type, make, model, or series aircraft. It includes the equipment and computer programs necessary to represent aircraft operations in ground and flight conditions, a visual system providing an out-of-the-flight deck view, a system that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and has the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the QPS for a specific FFS qualification level. (Part 1)

*Gate Clutter*—the static and moving ground traffic (e.g., other airplanes; tugs; power or baggage carts; fueling, catering, or cargo trucks; pedestrians) presented to pose a potential conflict with the simulated aircraft during ground operations around the point where the simulated airplane is to be parked between flights

*Generic Airport Model*—a Class III visual model that combines correct navigation aids for a real world airport with a visual model that does not depict that same airport.

*Grandfathering*—as used in this part, the practice of assigning a qualification basis for an FSTD based on the period of time during which a published set of standards governed the requirements for the initial and continuing qualification of FSTDs. Each FSTD manufactured during this specified period of time is ''grandfathered'' or held to the standards that were in effect during that time period. The grandfathered standards remain applicable to each FSTD manufactured during the stated time period regardless of any subsequent modification to those standards and regardless of the sponsor, as long as the FSTD remains qualified or is maintained in a non-qualified status in accordance with the specific requirements and time periods prescribed in this part.

*Gross Weight*—For objective test purposes:

*Basic Operating Weight (BOW)*—the empty weight of the aircraft plus the weight of the following: Normal oil quantity; lavatory servicing fluid; potable water; required crewmembers and their baggage; and emergency equipment.

*Light Gross Weight*—a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the aircraft being simulated or the minimum practical operating weight of the test aircraft.

*Medium Gross Weight*—a weight chosen by the sponsor or data provider that is within 10% of the average of the numerical values of the BOW and the maximum certificated gross weight.

*Near Maximum Gross Weight*—a weight chosen by the sponsor or data provider that is not less than the BOW of the aircraft being simulated plus 80% of the difference between the maximum certificated gross weight (either takeoff weight or landing weight, as appropriate for the test) and the BOW.

*Ground Effect*—the change in aerodynamic characteristics due to of the change in the airflow past the aircraft caused by the proximity of the earth's surface to the airplane.

*Hands Off*—a test maneuver conducted without pilot control inputs.

*Hands On*—a test maneuver conducted with pilot control inputs as required.

*Heave*—FSTD movement with respect to or along the vertical axis.

*Height*—the height above ground level (or AGL) expressed in meters or feet.

*''In Use'' Runway*—as used in this part, the runway that is currently selected, able to be used for takeoffs and landings, and has the surface lighting and markings required by this part. Also known as the ''active'' runway.

*Integrated Testing*—testing of the FSTD so that all aircraft system models are active and contribute appropriately to the results. With integrated testing, none of the models used are substituted with models or other algorithms intended for testing only.

*Irreversible Control System*—a control system where movement of the control surface will not backdrive the pilot's control on the flight deck.

*Locked*—a test condition where one or more variables are held constant with time.

*Manual Testing*—FSTD testing conducted without computer inputs except for initial setup, and all modules of the simulation are active.

*Master Qualification Test Guide (MQTG)*—the FAA-approved Qualification Test Guide with the addition of the FAA-witnessed test results, applicable to each individual FSTD.

*Medium*—the normal operational weight for a given flight segment.

*National Simulator Program Manager (NSPM)*—the FAA manager responsible for the overall administration and direction of the National Simulator Program (NSP), or a person approved by that FAA manager.

*Near Limiting Performance*—the performance level the operating engine must be required to achieve to have sufficient power to land a helicopter after experiencing a single engine failure during takeoff of a multiengine helicopter. The operating engine must be required to operate within at least 5 percent of the maximum RPM or temperature limits of the gas turbine or power turbine, or operate within at least 5 percent of the maximum drive train torque limits. Near limiting performance is based on the existing combination of density altitude, temperature, and helicopter gross weight.

*Nominal*—the normal operating configuration, atmospheric conditions, and flight parameters for the specified flight segment.

*Non-Normal Control*—a term used in reference to Computer Controlled Aircraft. It is the state where one or more of the intended control, augmentation, or protection functions are not fully working. Note: Specific terms such as ALTERNATE, DIRECT, SECONDARY, or BACKUP may be used to define an actual level of degradation.

*Normal Control*—a term used in reference to Computer Controlled Aircraft. It is the state where the intended control, augmentation, and protection functions are fully working.

*Objective Data*—quantitative data, acceptable to the NSPM, used to evaluate the FSTD.

*Objective Test*—a quantitative measurement and evaluation of FSTD performance.

*Pitch*—the airplane attitude with respect to, or around, the lateral axis expressed in degrees.

*Power Lever Angle (PLA)*—the angle of the pilot's primary engine control lever(s) on the flight deck. This may also be referred to as THROTTLE or POWER LEVER.

*Predicted Data*—estimations or extrapolations of existing flight test data or data from other simulation models using engineering analyses, engineering simulations, design data, or wind tunnel data.

*Protection Functions*—systems functions designed to protect an airplane from exceeding its flight maneuver limitations.

*Pulse Input*—a step input to a control followed by an immediate return to the initial position.

*Qualification Level*—the categorization of an FSTD established by the NSPM based on the FSTDs demonstrated technical and operational capabilities as prescribed in this part.

*Qualification Performance Standard (QPS)*—the collection of procedures and criteria used when conducting objective and subjective tests, to establish FSTD qualification levels. The QPS are published in the appendices to this part, as follows: Appendix A, for Airplane Simulators; Appendix B, for Airplane

Flight Training Devices; Appendix C, for Helicopter Simulators; Appendix D, for Helicopter Flight Training Devices; Appendix E, for Quality Management Systems for Flight Simulation Training Devices; and Appendix F, for Definitions and Abbreviations for Flight Simulation Training Devices.

*Qualification Test Guide (QTG)*—the primary reference document used for evaluating an aircraft FSTD. It contains test results, statements of compliance and capability, the configuration of the aircraft simulated, and other information for the evaluator to assess the FSTD against the applicable regulatory criteria.

*Quality Management System (QMS)*—a flight simulation quality-systems that can be used for external quality-assurance purposes. It is designed to identify the processes needed, determine the sequence and interaction of the processes, determine criteria and methods required to ensure the effective operation and control of the processes, ensure the availability of information necessary to support the operation and monitoring of the processes, measure, monitor, and analyze the processes, and implement the actions necessary to achieve planned results.

*Real-World Airport*—as used in this part in reference to airport visual models, a computer generated visual depiction of an existing airport.

*Representative*—when used as an adjective in this part, typical, demonstrative, or characteristic of, the feature being described. For example, ''representative sampling of tests'' means a sub-set of the complete set of all tests such that the sample includes one or more of the tests in each of the major categories, the results of which provide the evaluator with an overall understanding of the performance and handling characteristics of the FSTD.

*Reversible Control System*—a control system in which movement of the control surface will backdrive the pilot's control on the flight deck.

*Roll*—the airplane attitude with respect to, or around, the longitudinal axis expressed in degrees.

*Set of Aircraft*—aircraft that share similar handling and operating characteristics, similar operating envelopes, and have the same number and type of engines or powerplants.

*Sideslip Angle*—the angle between the relative wind vector and the airplane plane of symmetry. (Note: this definition replaces the current definition of ''sideslip.'')

*Simulation Quality Management System (SQMS)*—the elements of a quality management system for FSTD continuing qualification.

*Snapshot*—a presentation of one or more variables at a given instant of time.

*Special Evaluation*—an evaluation of the FSTD for purposes other than initial, upgrade, or continuing qualification. Circumstances that may require a special evaluation include movement of the FSTD to a different location, or an update to FSTD software or hardware that might affect performance or flying qualities.

*Sponsor*—a certificate holder who seeks or maintains FSTD qualification and is responsible for the prescribed actions as prescribed in this part and the QPS for the appropriate FSTD and qualification level.

*Statement of Compliance and Capability (SOC)*—a declaration that a specific requirement has been met and explaining how the requirement was met (e.g., gear modeling approach, coefficient of friction sources). The SOC must also describe the capability of the FSTD to meet the requirement, including references to sources of information for showing compliance, rationale to explain how the referenced material is used, mathematical equations and parameter values used, and conclusions reached.

*Step Input*—an abrupt control input held at a constant value.

*Subjective Test*—a qualitative assessment of the performance and operation of the FSTD.

*Surge*—FSTD movement with respect to or along the longitudinal axis.

*Sway*—FSTD movement with respect to or along the lateral axis.

$T_f$—Total time of the flare maneuver.

$T_i$—Total time from initial throttle movement until a 10% response of a critical engine parameter.

$T_t$—Total time from initial throttle movement to an increase of 90% of go around power or a decrease of 90% from maximum take-off power.

*Time History*—a presentation of the change of a variable with respect to time.

*Training Program Approval Authority (TPAA)*—a person authorized by the Administrator to approve the aircraft flight training program in which the FSTD will be used.

*Training Restriction*—a temporary condition where an FSTD with missing, malfunctioning, or inoperative (MMI) components may continue to be used at the qualification level indicated on its SOQ, but restricted from completing the tasks for which the correct function of the MMI component is required.

*Transport Delay or ''Throughput''*—the total FSTD system processing time required for an input signal from a pilot primary flight control until motion system, visual system, or instrument response. It is the overall time delay incurred from signal input to output response. It does not include the characteristic delay of the airplane simulated.

*Update*—an improvement to or modernization of the quality or the accuracy of the FSTD without affecting the qualification level of the FSTD.

*Upgrade*—the improvement or enhancement of an FSTD for the purpose of achieving a higher qualification level.

*Validation Data*—objective data used to determine if the FSTD performance is within the tolerances prescribed in the QPS.

*Validation Test*—an objective test where FSTD parameters are compared to the relevant validation data to ensure that the FSTD performance is within the tolerances prescribed in the QPS.

*Visual Data Base*—a display that may include one or more airport models.

*Visual System Response Time*—the interval from a control input to the completion of the visual display scan of the first video field containing the resulting different information.

*Yaw*—the airplane attitude with respect to, or around, the vertical axis expressed in degrees.

3. Abbreviations

AFM Airplane Flight Manual.
AGL Above Ground Level (meters or feet).
AOA Angle of Attack (degrees).
APD Aircrew Program Designee.
CCA Computer Controlled Aircraft.
cd/m2 candela/meter$^2$, 3.4263 candela/m$^2$ = 1 ft-Lambert.
CFR Code of Federal Regulations.
cm(s) centimeter, centimeters.
daN decaNewtons, one (1) decaNewton = 2.27 pounds.
deg(s) degree, degrees.
DOF Degrees-of-freedom.
eMQTG Electronic Master Qualification Test Guide.
EPR Engine Pressure Ratio.
FAA Federal Aviation Administration (U.S.).
FATO Final Approach and Take Off area
fpm feet per minute.
ft foot/feet, 1 foot = 0.304801 meters.
ft-Lambert foot-Lambert, 1 ft-Lambert = 3.4263 candela/m$^2$.
g Acceleration due to Gravity (meters or feet/sec$^2$); 1g = 9.81 m/sec$^2$ or 32.2 feet/sec$^2$.
G/S Glideslope.
IATA International Airline Transport Association.
ICAO International Civil Aviation Organization.
IGE In ground effect.
ILS Instrument Landing System.
IOS Instructor Operating Station.
IQTG International Qualification Test Guide.
km Kilometers; 1 km = 0.62137 Statute Miles.
kPa KiloPascal (Kilo Newton/Meters2). 1 psi = 6.89476 kPa.
kts Knots calibrated airspeed unless otherwise specified, 1 knot = 0.5148 m/sec or 1.689 ft/sec.
lb(s) pound(s), one (1) pound = 0.44 decaNewton.
LDP Landing decision point.
MQTG Master Qualification Test Guide
M,m Meters, 1 Meter = 3.28083 feet.
Min(s) Minute, minutes.
MLG Main Landing Gear.
Mpa MegaPascals (1 psi = 6894.76 pascals).
ms millisecond(s).
N NORMAL CONTROL Used in reference to Computer Controlled Aircraft.
nm Nautical Mile(s) 1 Nautical Mile = 6,080 feet.
NN NON-NORMAL CONTROL Used in reference to Computer Controlled Aircraft.
N1 Low Pressure Rotor revolutions per minute, expressed in percent of maximum.
N2 High Pressure Rotor revolutions per minute, expressed in percent of maximum.
N3 High Pressure Rotor revolutions per minute, expressed in percent of maximum.
NSPM National Simulator Program Manager.
NWA Nosewheel Angle (degrees).
OGE Out of ground effect.
PAPI Precision Approach Path Indicator System.
Pf Impact or Feel Pressure, often expressed as ''q.''
PLA Power Lever Angle.
PLF Power for Level Flight.
psi pounds per square inch.
QPS Qualification Performance Standard.
QTG Qualification Test Guide.
RAE Royal Aerospace Establishment.
R/C Rate of Climb (meters/sec or feet/min).
R/D Rate of Descent (meters/sec or feet/min).
REIL Runway End Identifier Lights.
RVR Runway Visual Range (meters or feet).
s second(s).
sec(s) second, seconds.
sm Statute Mile(s) 1 Statute Mile = 5,280 feet.
SMGCS Surface Movement Guidance and Control System.
SOC Statement of Compliance and Capability.
SOQ Statement of Qualification.
TIR Type Inspection Report.
TLOF Touchdown and Loft Off area.
T/O Takeoff.
VASI Visual Approach Slope Indicator System.
VGS Visual Ground Segment.
$V_1$ Decision speed.
$V_2$ Takeoff safety speed.
Vmc Minimum Control Speed.
Vmca Minimum Control Speed in the air.
Vmcg Minimum Control Speed on the ground.
Vmcl Minimum Control Speed—Landing.
Vmu The speed at which the last main landing gear leaves the ground.
$V_R$ Rotate Speed.
$V_S$ Stall Speed or minimum speed in the stall.
WAT Weight, Altitude, Temperature.

END QPS REQUIREMENTS

[Doc. No. FAA–2002–12461, 73 FR 26490, May 9, 2008]

# PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

SPECIAL FEDERAL AVIATION REGULATION NO. 73
SPECIAL FEDERAL AVIATION REGULATION NO. 100–2
SPECIAL FEDERAL AVIATION REGULATION NO. 108 [NOTE]

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SOURCE: Docket No. 25910, 62 FR 16298, Apr. 4, 1997, unless otherwise noted.

## SPECIAL FEDERAL AVIATION REGULATION NO. 73—ROBINSON R–22/R–44 SPECIAL TRAINING AND EXPERIENCE REQUIREMENTS

Sections

1. Applicability.
2. Required training, aeronautical experience, endorsements, and flight review.
3. Expiration date.

1. Applicability. Under the procedures prescribed herein, this SFAR applies to all persons who seek to manipulate the controls or act as pilot in command of a Robinson model R–22 or R–44 helicopter. The requirements stated in this SFAR are in addition to the current requirements of part 61.

2. Required training, aeronautical experience, endorsements, and flight review.

(a) Awareness Training:

(1) Except as provided in paragraph (a)(2) of this section, no person may manipulate the controls of a Robinson model R–22 or R–44 helicopter after March 27, 1995, for the purpose of flight unless the awareness training specified in paragraph (a)(3) of this section is completed and the person's logbook has been endorsed by a certified flight instructor authorized under paragraph (b)(5) of this section.

(2) A person who holds a rotorcraft category and helicopter class rating on that person's pilot certificate and meets the experience requirements of paragraph (b)(1) or paragraph (b)(2) of this section may not manipulate the controls of a Robinson model R–22 or R–44 helicopter for the purpose of flight after April 26, 1995, unless the awareness training specified in paragraph (a)(3) of this section is completed and the person's logbook has been endorsed by a certified flight instructor authorized under paragraph (b)(5) of this section.

(3) Awareness training must be conducted by a certified flight instructor who has been endorsed under paragraph (b)(5) of this section and consists of instruction in the following general subject areas:

(i) Energy management;

(ii) Mast bumping;

(iii) Low rotor RPM (blade stall);

(iv) Low G hazards; and

(v) Rotor RPM decay.

(4) A person who can show satisfactory completion of the manufacturer's safety course after January 1, 1994, may obtain an endorsement from an FAA aviation safety inspector in lieu of completing the awareness training required in paragraphs (a)(1) and (a)(2) of this section.

(b) Aeronautical Experience:

(1) No person may act as pilot in command of a Robinson model R–22 unless that person:

(i) Has had at least 200 flight hours in helicopters, at least 50 flight hours of which were in the Robinson R–22; or

(ii) Has had at least 10 hours dual instruction in the Robinson R–22 and has received an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that the individual has been given the training required by this paragraph and is proficient to act as pilot in command of an R–22. Beginning 12 calendar months after the date of the endorsement, the individual may not act as pilot in command unless the individual has completed a flight review in an R–22 within the preceding 12 calendar months and obtained an endorsement for that flight review. The dual instruction must include at least the following

abnormal and emergency procedures flight training:

(A) Enhanced training in autorotation procedures,

(B) Engine rotor RPM control without the use of the governor,

(C) Low rotor RPM recognition and recovery, and

(D) Effects of low G maneuvers and proper recovery procedures.

(2) No person may act as pilot in command of a Robinson R–44 unless that person—

(i) Has had at least 200 flight hours in helicopters, at least 50 flight hours of which were in the Robinson R–44. The pilot in command may credit up to 25 flight hours in the Robinson R–22 toward the 50 hour requirement in the Robinson R–44; or

(ii) Has had at least 10 hours dual instruction in a Robinson helicopter, at least 5 hours of which must have been accomplished in the Robinson R–44 helicopter and has received an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that the individual has been given the training required by this paragraph and is proficient to act as pilot in command of an R–44. Beginning 12 calendar months after the date of the endorsement, the individual may not act as pilot in command unless the individual has completed a flight review in a Robinson R–44 within the preceding 12 calendar months and obtained an endorsement for that flight review. The dual instruction must include at least the following abnormal and emergency procedures flight training—

(A) Enhanced training in autorotation procedures;

(B) Engine rotor RPM control without the use of the governor;

(C) Low rotor RPM recognition and recovery; and

(D) Effects of low G maneuvers and proper recovery procedures.

(3) A person who does not hold a rotorcraft category and helicopter class rating must have had at least 20 hours of dual instruction in a Robinson R–22 helicopter prior to operating it in solo flight. In addition, the person must obtain an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that instruction has been given in those maneuvers and procedures, and the instructor has found the applicant proficient to solo a Robinson R–22. This endorsement is valid for a period of 90 days. The dual instruction must include at least the following abnormal and emergency procedures flight training:

(i) Enhanced training in autorotation procedures,

(ii) Engine rotor RPM control without the use of the governor,

(iii) Low rotor RPM recognition and recovery, and

(iv) Effects of low G maneuvers and proper recovery procedures.

(4) A person who does not hold a rotorcraft category and helicopter class rating must have had at least 20 hours of dual instruction in a Robinson R–44 helicopter prior to operating it in solo flight. In addition, the person must obtain an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that instruction has been given in those maneuvers and procedures, and the instructor has found the applicant proficient to solo a Robinson R–44. This endorsement is valid for a period of 90 days. The dual instruction must include at least the following abnormal and emergency procedures flight training:

(i) Enhanced training in autorotation procedures,

(ii) Engine rotor RPM control without the use of the governor,

(iii) Low rotor RPM recognition and recovery, and

(iv) Effects of low G maneuvers and proper recovery procedures.

(5) No certificated flight instructor may provide instruction or conduct a flight review in a Robinson R–22 or R–44 unless that instructor—

(i) Completes the awareness training in paragraph 2(a) of this SFAR.

(ii) For the Robinson R–22, has had at least 200 flight hours in helicopters, at least 50 flight hours of which were in the Robinson R–22, or for the Robinson R–44, has had at least 200 flight hours in helicopters, 50 flight hours of which were in Robinson helicopters. Up to 25 flight hours of Robinson R–22 flight time may be credited toward the 50 hour requirement.

(iii) Has completed flight training in a Robinson R–22, R–44, or both, on the following abnormal and emergency procedures—

(A) Enhanced training in autorotation procedures;

(B) Engine rotor RPM control without the use of the governor;

(C) Low rotor RPM recognition and recovery; and

(D) Effects of low G maneuvers and proper recovery procedures.

(iv) Has been authorized by endorsement from an FAA aviation safety inspector or authorized designated examiner that the instructor has completed the appropriate training, meets the experience requirements and has satisfactorily demonstrated an ability to provide instruction on the general subject areas of paragraph 2(a)(3) of this SFAR, and the flight training identified in paragraph 2(b)(5)(iii) of this SFAR.

(c) Flight Review:

(1) No flight review completed to satisfy §61.56 by an individual after becoming eligible to function as pilot in command in a Robinson R–22 helicopter shall be valid for

the operation of R–22 helicopter unless that flight review was taken in an R–22.

(2) No flight review completed to satisfy §61.56 by individual after becoming eligible to function as pilot in command in a Robinson R–44 helicopter shall be valid for the operation of R–44 helicopter unless that flight review was taken in the R–44.

(3) The flight review will include a review of the awareness training subject areas of paragraph 2(a)(3) of this SFAR and the flight training identified in paragraph 2(b) of this SFAR.

(d) Currency Requirements: No person may act as pilot in command of a Robinson model R–22 or R–44 helicopter carrying passengers unless the pilot in command has met the recency of flight experience requirements of §61.57 in an R–22 or R–44, as appropriate.

3. *Expiration date.* This SFAR No. 73 shall remain in effect until it is revised or rescinded.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by SFAR 73–1, 63 FR 666, Jan. 7, 1998; 68 FR 43, Jan. 2, 2003; Amdt. 61–120, 73 FR 17246, Apr. 1, 2008; Amdt. SFAR 73–2, 74 FR 25650, May 29, 2009]

### SPECIAL FEDERAL AVIATION REGULATION NO. 100–2—RELIEF FOR U.S. MILITARY AND CIVILIAN PERSONNEL WHO ARE ASSIGNED OUTSIDE THE UNITED STATES IN SUPPORT OF U.S. ARMED FORCES OPERATIONS

1. *Applicability.* Flight Standards District Offices are authorized to accept from an eligible person, as described in paragraph 2 of this SFAR, the following:

(a) An expired flight instructor certificate to show eligibility for renewal of a flight instructor certificate under §61.197, or an expired written test report to show eligibility under part 61 to take a practical test;

(b) An expired written test report to show eligibility under §§63.33 and 63.57 to take a practical test; and

(c) An expired written test report to show eligibility to take a practical test required under part 65 or an expired inspection authorization to show eligibility for renewal under §65.93.

2. *Eligibility.* A person is eligible for the relief described in paragraph 1 of this SFAR if:

(a) The person served in a U.S. military or civilian capacity outside the United States in support of the U.S. Armed Forces' operation during some period of time from September 11, 2001, to termination of SFAR 100–2;

(b) The person's flight instructor certificate, airman written test report, or inspection authorization expired some time between September 11, 2001, and 6 calendar months after returning to the United States or termination of SFAR 100–2, whichever is earlier; and

(c) The person complies with §61.197 or §65.93 of this chapter, as appropriate, or completes the appropriate practical test within 6 calendar months after returning to the United States, or upon termination of SFAR 100–2, whichever is earlier.

3. *Required documents.* The person must send the Airman Certificate and/or Rating Application (FAA Form 8710–1) to the appropriate Flight Standards District Office. The person must include with the application one of the following documents, which must show the date of assignment outside the United States and the date of return to the United States:

(a) An official U.S. Government notification of personnel action, or equivalent document, showing the person was a civilian on official duty for the U.S. Government outside the United States and was assigned to a U.S. Armed Forces' operation some time between September 11, 2001, to termination of SFAR 100–2;

(b) Military orders showing the person was assigned to duty outside the United States and was assigned to a U.S. Armed Forces' operation some time between September 11, 2001, to termination of SFAR 100–2 ; or

(c) A letter from the person's military commander or civilian supervisor providing the dates during which the person served outside the United States and was assigned to a U.S. Armed Forces' operation some time between September 11, 2001, to termination of SFAR 100–2.

4. *Expiration date.* This Special Federal Aviation Regulation No. 100–2 is effective until further notice.

[Doc. No. FAA–2009–0923, 75 FR 9766, Mar. 4, 2010]

### SPECIAL FEDERAL AVIATION REGULATION NO. 108

NOTE: For the text of SFAR No. 108, see part 91 of this chapter.

## Subpart A—General

### §61.1 Applicability and definitions.

(a) This part prescribes:

(1) The requirements for issuing pilot, flight instructor, and ground instructor certificates and ratings; the conditions under which those certificates and ratings are necessary; and the privileges and limitations of those certificates and ratings.

(2) The requirements for issuing pilot, flight instructor, and ground instructor authorizations; the conditions under which those authorizations are

necessary; and the privileges and limitations of those authorizations.

(3) The requirements for issuing pilot, flight instructor, and ground instructor certificates and ratings for persons who have taken courses approved by the Administrator under other parts of this chapter.

(b) For the purpose of this part:

*Accredited* has the same meaning as defined by the Department of Education in 34 CFR 600.2.

*Aeronautical experience* means pilot time obtained in an aircraft, flight simulator, or flight training device for meeting the appropriate training and flight time requirements for an airman certificate, rating, flight review, or recency of flight experience requirements of this part.

*Authorized instructor* means—

(i) A person who holds a ground instructor certificate issued under part 61 of this chapter and is in compliance with §61.217, when conducting ground training in accordance with the privileges and limitations of his or her ground instructor certificate;

(ii) A person who holds a flight instructor certificate issued under part 61 of this chapter and is in compliance with §61.197, when conducting ground training or flight training in accordance with the privileges and limitations of his or her flight instructor certificate; or

(iii) A person authorized by the Administrator to provide ground training or flight training under part 61, 121, 135, or 142 of this chapter when conducting ground training or flight training in accordance with that authority.

*Complex airplane* means an airplane that has a retractable landing gear, flaps, and a controllable pitch propeller, including airplanes equipped with an engine control system consisting of a digital computer and associated accessories for controlling the engine and propeller, such as a full authority digital engine control; or, in the case of a seaplane, flaps and a controllable pitch propeller, including seaplanes equipped with an engine control system consisting of a digital computer and associated accessories for controlling the engine and propeller, such as a full authority digital engine control.

*Cross-country time* means—

(i) Except as provided in paragraphs (ii) through (vi) of this definition, time acquired during flight—

(A) Conducted by a person who holds a pilot certificate;

(B) Conducted in an aircraft;

(C) That includes a landing at a point other than the point of departure; and

(D) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point.

(ii) For the purpose of meeting the aeronautical experience requirements (except for a rotorcraft category rating), for a private pilot certificate (except for a powered parachute category rating), a commercial pilot certificate, or an instrument rating, or for the purpose of exercising recreational pilot privileges (except in a rotorcraft) under §61.101 (c), time acquired during a flight—

(A) Conducted in an appropriate aircraft;

(B) That includes a point of landing that was at least a straight-line distance of more than 50 nautical miles from the original point of departure; and

(C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point.

(iii) For the purpose of meeting the aeronautical experience requirements for a sport pilot certificate (except for powered parachute privileges), time acquired during a flight conducted in an appropriate aircraft that—

(A) Includes a point of landing at least a straight line distance of more than 25 nautical miles from the original point of departure; and

(B) Involves, as applicable, the use of dead reckoning; pilotage; electronic navigation aids; radio aids; or other navigation systems to navigate to the landing point.

(iv) For the purpose of meeting the aeronautical experience requirements for a sport pilot certificate with powered parachute privileges or a private pilot certificate with a powered parachute category rating, time acquired during a flight conducted in an appropriate aircraft that—

(A) Includes a point of landing at least a straight line distance of more than 15 nautical miles from the original point of departure; and

(B) Involves, as applicable, the use of dead reckoning; pilotage; electronic navigation aids; radio aids; or other navigation systems to navigate to the landing point.

(v) For the purpose of meeting the aeronautical experience requirements for any pilot certificate with a rotorcraft category rating or an instrument-helicopter rating, or for the purpose of exercising recreational pilot privileges, in a rotorcraft, under §61.101(c), time acquired during a flight—

(A) Conducted in an appropriate aircraft;

(B) That includes a point of landing that was at least a straight-line distance of more than 25 nautical miles from the original point of departure; and

(C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point.

(vi) For the purpose of meeting the aeronautical experience requirements for an airline transport pilot certificate (except with a rotorcraft category rating), time acquired during a flight—

(A) Conducted in an appropriate aircraft;

(B) That is at least a straight-line distance of more than 50 nautical miles from the original point of departure; and

(C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems.

(vii) For a military pilot who qualifies for a commercial pilot certificate (except with a rotorcraft category rating) under §61.73 of this part, time acquired during a flight—

(A) Conducted in an appropriate aircraft;

(B) That is at least a straight-line distance of more than 50 nautical miles from the original point of departure; and

(C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems.

*Examiner* means any person who is authorized by the Administrator to conduct a pilot proficiency test or a practical test for an airman certificate or rating issued under this part, or a person who is authorized to conduct a knowledge test under this part.

*Flight training* means that training, other than ground training, received from an authorized instructor in flight in an aircraft.

*Ground training* means that training, other than flight training, received from an authorized instructor.

*Institution of higher education* has the same meaning as defined by the Department of Education in 34 CFR 600.4.

*Instrument approach* means an approach procedure defined in part 97 of this chapter.

*Instrument training* means that time in which instrument training is received from an authorized instructor under actual or simulated instrument conditions.

*Knowledge test* means a test on the aeronautical knowledge areas required for an airman certificate or rating that can be administered in written form or by a computer.

*Nationally recognized accrediting agency* has the same meaning as defined by the Department of Education in 34 CFR 600.2.

*Night vision goggles* means an appliance worn by a pilot that enhances the pilot's ability to maintain visual surface reference at night.

*Night vision goggle operation* means the portion of a flight that occurs during the time period from 1 hour after sunset to 1 hour before sunrise where the pilot maintains visual surface reference using night vision goggles in an aircraft that is approved for such an operation.

*Pilot time* means that time in which a person—

(i) Serves as a required pilot flight crewmember;

(ii) Receives training from an authorized instructor in an aircraft, flight simulator, or flight training device; or

(iii) Gives training as an authorized instructor in an aircraft, flight simulator, or flight training device.

*Practical test* means a test on the areas of operations for an airman certificate, rating, or authorization that

is conducted by having the applicant respond to questions and demonstrate maneuvers in flight, in a flight simulator, or in a flight training device.

*Set of aircraft* means aircraft that share similar performance characteristics, such as similar airspeed and altitude operating envelopes, similar handling characteristics, and the same number and type of propulsion systems.

*Student pilot seeking a sport pilot certificate* means a person who has received an endorsement—

(i) To exercise student pilot privileges from a certificated flight instructor with a sport pilot rating; or

(ii) That includes a limitation for the operation of a light-sport aircraft specified in § 61.89(c) issued by a certificated flight instructor with other than a sport pilot rating.

*Training time* means training received—

(i) In flight from an authorized instructor;

(ii) On the ground from an authorized instructor; or

(iii) In a flight simulator or flight training device from an authorized instructor.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40893, July 30, 1997; Amdt. 61–110, 69 FR 44864, July 27, 2004; Amdt. 61–124, 74 FR 42546, Aug. 21, 2009; Amdt. 61–128, 76 FR 54105, Aug. 31, 2011; Amdt. 61–130, 78 FR 42372, July 15, 2013]

### § 61.2 Exercise of Privilege.

(a) *Validity*. No person may:

(1) Exercise privileges of a certificate, rating, endorsement, or authorization issued under this part if the certificate, rating or authorization is surrendered, suspended, revoked or expired.

(2) Exercise privileges of a flight instructor certificate if that flight instructor certificate is surrendered, suspended, revoked or expired.

(3) Exercise privileges of a foreign pilot certificate to operate an aircraft of foreign registry under § 61.3(b) if the certificate is surrendered, suspended, revoked or expired.

(4) Exercise privileges of a pilot certificate issued under § 61.75, or an authorization issued under § 61.77, if the foreign pilot certificate relied upon for the issuance of the U.S. pilot certificate or authorization is surrendered, suspended, revoked or expired.

(5) Exercise privileges of a medical certificate issued under part 67 to meet any requirements of part 61 if the medical certificate is surrendered, suspended, revoked or expired according to the duration standards set forth in § 61.23(d).

(6) Use an official government issued driver's license to meet any requirements of part 61 related to holding that driver's license, if the driver's license is surrendered, suspended, revoked or expired.

(b) *Currency*. No person may:

(1) Exercise privileges of an airman certificate, rating, endorsement, or authorization issued under this part unless that person meets the appropriate airman and medical recency requirements of this part, specific to the operation or activity.

(2) Exercise privileges of a foreign pilot license within the United States to conduct an operation described in § 61.3(b), unless that person meets the appropriate airman and medical recency requirements of the country that issued the license, specific to the operation.

[Doc. No. FAA–2006–26661, 74 FR 42546, Aug. 21, 2009]

### § 61.3 Requirement for certificates, ratings, and authorizations.

(a) *Required pilot certificate for operating a civil aircraft of the United States*. No person may serve as a required pilot flight crewmember of a civil aircraft of the United States, unless that person:

(1) Has in the person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization—

(i) A pilot certificate issued under this part and in accordance with § 61.19;

(ii) A special purpose pilot authorization issued under § 61.77;

(iii) A temporary certificate issued under § 61.17;

(iv) A document conveying temporary authority to exercise certificate privileges issued by the Airmen Certification Branch under § 61.29(e); or

(v) When operating an aircraft within a foreign country, a pilot license issued by that country may be used.

(2) Has a photo identification that is in that person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization. The photo identification must be a:

(i) Driver's license issued by a State, the District of Columbia, or territory or possession of the United States;

(ii) Government identification card issued by the Federal government, a State, the District of Columbia, or a territory or possession of the United States;

(iii) U.S. Armed Forces' identification card;

(iv) Official passport;

(v) Credential that authorizes unescorted access to a security identification display area at an airport regulated under 49 CFR part 1542; or

(vi) Other form of identification that the Administrator finds acceptable.

(b) *Required pilot certificate for operating a foreign-registered aircraft within the United States.* No person may serve as a required pilot flight crewmember of a civil aircraft of foreign registry within the United States, unless—

(1) That person's pilot certificate or document issued under §61.29(e) is in that person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate; and

(2) Has been issued in accordance with this part, or has been issued or validated by the country in which the aircraft is registered.

(c) *Medical certificate.* (1) A person may serve as a required pilot flight crewmember of an aircraft only if that person holds the appropriate medical certificate issued under part 67 of this chapter, or other documentation acceptable to the FAA, that is in that person's physical possession or readily accessible in the aircraft. Paragraph (c)(2) of this section provides certain exceptions to the requirement to hold a medical certificate.

(2) A person is not required to meet the requirements of paragraph (c)(1) of this section if that person—

(i) Is exercising the privileges of a student pilot certificate while seeking a pilot certificate with a glider category rating, a balloon class rating, or glider or balloon privileges;

(ii) Is exercising the privileges of a student pilot certificate while seeking a sport pilot certificate with other than glider or balloon privileges and holds a U.S. driver's license;

(iii) Is exercising the privileges of a student pilot certificate while seeking a pilot certificate with a weight-shift-control aircraft category rating or a powered parachute category rating and holds a U.S. driver's license;

(iv) Is exercising the privileges of a sport pilot certificate with glider or balloon privileges;

(v) Is exercising the privileges of a sport pilot certificate with other than glider or balloon privileges and holds a U.S. driver's license. A person who has applied for or held a medical certificate may exercise the privileges of a sport pilot certificate using a U.S. driver's license only if that person—

(A) Has been found eligible for the issuance of at least a third-class airman medical certificate at the time of his or her most recent application; and

(B) Has not had his or her most recently issued medical certificate suspended or revoked or most recent Authorization for a Special Issuance of a Medical Certificate withdrawn.

(vi) Is holding a pilot certificate with a balloon class rating and is piloting or providing training in a balloon as appropriate;

(vii) Is holding a pilot certificate or a flight instructor certificate with a glider category rating, and is piloting or providing training in a glider, as appropriate;

(viii) Except as provided in paragraph (c)(2)(vii) of this section, is exercising the privileges of a flight instructor certificate, provided the person is not acting as pilot in command or as a required pilot flight crewmember;

(ix) Is exercising the privileges of a ground instructor certificate;

(x) Is operating an aircraft within a foreign country using a pilot license issued by that country and possesses evidence of current medical qualification for that license; or

(xi) Is operating an aircraft with a U.S. pilot certificate, issued on the basis of a foreign pilot license, issued

under §61.75, and holds a medical certificate issued by the foreign country that issued the foreign pilot license, which is in that person's physical possession or readily accessible in the aircraft when exercising the privileges of that airman certificate.

(xii) Is a pilot of the U.S. Armed Forces, has an up-to-date U.S. military medical examination, and holds military pilot flight status.

(d) *Flight instructor certificate.* (1) A person who holds a flight instructor certificate issued under this part must have that certificate, or other documentation acceptable to the Administrator, in that person's physical possession or readily accessible in the aircraft when exercising the privileges of that flight instructor certificate.

(2) Except as provided in paragraph (d)(3) of this section, no person other than the holder of a flight instructor certificate issued under this part with the appropriate rating on that certificate may—

(i) Give training required to qualify a person for solo flight and solo cross-country flight;

(ii) Endorse an applicant for a—

(A) Pilot certificate or rating issued under this part;

(B) Flight instructor certificate or rating issued under this part; or

(C) Ground instructor certificate or rating issued under this part;

(iii) Endorse a pilot logbook to show training given; or

(iv) Endorse a student pilot certificate and logbook for solo operating privileges.

(3) A flight instructor certificate issued under this part is not necessary—

(i) Under paragraph (d)(2) of this section, if the training is given by the holder of a commercial pilot certificate with a lighter-than-air rating, provided the training is given in accordance with the privileges of the certificate in a lighter-than-air aircraft;

(ii) Under paragraph (d)(2) of this section, if the training is given by the holder of an airline transport pilot certificate with a rating appropriate to the aircraft in which the training is given, provided the training is given in accordance with the privileges of the certificate and conducted in accordance with an approved air carrier training program approved under part 121 or part 135 of this chapter;

(iii) Under paragraph (d)(2) of this section, if the training is given by a person who is qualified in accordance with subpart C of part 142 of this chapter, provided the training is conducted in accordance with an approved part 142 training program;

(iv) Under paragraphs (d)(2)(i), (d)(2)(ii)(C), and (d)(2)(iii) of this section, if the training is given by the holder of a ground instructor certificate in accordance with the privileges of the certificate; or

(v) Under paragraph (d)(2)(iii) of this section, if the training is given by an authorized flight instructor under §61.41 of this part.

(e) *Instrument rating.* No person may act as pilot in command of a civil aircraft under IFR or in weather conditions less than the minimums prescribed for VFR flight unless that person holds:

(1) The appropriate aircraft category, class, type (if required), and instrument rating on that person's pilot certificate for any airplane, helicopter, or powered-lift being flown;

(2) An airline transport pilot certificate with the appropriate aircraft category, class, and type rating (if required) for the aircraft being flown;

(3) For a glider, a pilot certificate with a glider category rating and an airplane instrument rating; or

(4) For an airship, a commercial pilot certificate with a lighter-than-air category rating and airship class rating.

(f) *Category II pilot authorization.* Except for a pilot conducting Category II operations under part 121 or part 135, a person may not:

(1) Act as pilot in command of a civil aircraft during Category II operations unless that person—

(i) Holds a Category II pilot authorization for that category or class of aircraft, and the type of aircraft, if applicable; or

(ii) In the case of a civil aircraft of foreign registry, is authorized by the country of registry to act as pilot in command of that aircraft in Category II operations.

(2) Act as second in command of a civil aircraft during Category II operations unless that person—

(i) Holds a pilot certificate with category and class ratings for that aircraft and an instrument rating for that category aircraft;

(ii) Holds an airline transport pilot certificate with category and class ratings for that aircraft; or

(iii) In the case of a civil aircraft of foreign registry, is authorized by the country of registry to act as second in command of that aircraft during Category II operations.

(g) *Category III pilot authorization.* Except for a pilot conducting Category III operations under part 121 or part 135, a person may not:

(1) Act as pilot in command of a civil aircraft during Category III operations unless that person—

(i) Holds a Category III pilot authorization for that category or class of aircraft, and the type of aircraft, if applicable; or

(ii) In the case of a civil aircraft of foreign registry, is authorized by the country of registry to act as pilot in command of that aircraft in Category III operations.

(2) Act as second in command of a civil aircraft during Category III operations unless that person—

(i) Holds a pilot certificate with category and class ratings for that aircraft and an instrument rating for that category aircraft;

(ii) Holds an airline transport pilot certificate with category and class ratings for that aircraft; or

(iii) In the case of a civil aircraft of foreign registry, is authorized by the country of registry to act as second in command of that aircraft during Category III operations.

(h) *Category A aircraft pilot authorization.* The Administrator may issue a certificate of authorization for a Category II or Category III operation to the pilot of a small aircraft that is a Category A aircraft, as identified in §97.3(b)(1) of this chapter if:

(1) The Administrator determines that the Category II or Category III operation can be performed safely by that pilot under the terms of the certificate of authorization; and

(2) The Category II or Category III operation does not involve the carriage of persons or property for compensation or hire.

(i) *Ground instructor certificate.* (1) Each person who holds a ground instructor certificate issued under this part must have that certificate or a temporary document issued under §61.29(e) in that person's physical possession or immediately accessible when exercising the privileges of that certificate.

(2) Except as provided in paragraph (i)(3) of this section, no person other than the holder of a ground instructor certificate, issued under this part or part 143, with the appropriate rating on that certificate may—

(i) Give ground training required to qualify a person for solo flight and solo cross-country flight;

(ii) Endorse an applicant for a knowledge test required for a pilot, flight instructor, or ground instructor certificate or rating issued under this part; or

(iii) Endorse a pilot logbook to show ground training given.

(3) A ground instructor certificate issued under this part is not necessary—

(i) Under paragraph (i)(2) of this section, if the training is given by the holder of a flight instructor certificate issued under this part in accordance with the privileges of that certificate;

(ii) Under paragraph (i)(2) of this section, if the training is given by the holder of a commercial pilot certificate with a lighter-than-air rating, provided the training is given in accordance with the privileges of the certificate in a lighter-than-air aircraft;

(iii) Under paragraph (i)(2) of this section, if the training is given by the holder of an airline transport pilot certificate with a rating appropriate to the aircraft in which the training is given, provided the training is given in accordance with the privileges of the certificate and conducted in accordance with an approved air carrier training program approved under part 121 or part 135 of this chapter;

(iv) Under paragraph (i)(2) of this section, if the training is given by a person who is qualified in accordance with subpart C of part 142 of this chapter, provided the training is conducted in

accordance with an approved part 142 training program; or

(v) Under paragraph (i)(2)(iii) of this section, if the training is given by an authorized flight instructor under § 61.41 of this part.

(j) *Age limitation for certain operations.* (1) *Age limitation.* No person who holds a pilot certificate issued under this part may serve as a pilot on a civil airplane of U.S. registry in the following operations if the person has reached his or her 60th birthday or, in the case of operations with more than one pilot, his or her 65th birthday:

(i) Scheduled international air services carrying passengers in turbojet-powered airplanes;

(ii) Scheduled international air services carrying passengers in airplanes having a passenger-seat configuration of more than nine passenger seats, excluding each crewmember seat;

(iii) Nonscheduled international air transportation for compensation or hire in airplanes having a passenger-seat configuration of more than 30 passenger seats, excluding each crewmember seat; or

(iv) Scheduled international air services, or nonscheduled international air transportation for compensation or hire, in airplanes having a payload capacity of more than 7,500 pounds.

(2) *Definitions.* (i) ''International air service,'' as used in this paragraph (j), means scheduled air service performed in airplanes for the public transport of passengers, mail, or cargo, in which the service passes through the airspace over the territory of more than one country.

(ii) ''International air transportation,'' as used in this paragraph (j), means air transportation performed in airplanes for the public transport of passengers, mail, or cargo, in which the service passes through the airspace over the territory of more than one country.

(k) *Special purpose pilot authorization.* Any person that is required to hold a special purpose pilot authorization, issued in accordance with § 61.77 of this part, must have that authorization and the person's foreign pilot license in that person's physical possession or have it readily accessible in the aircraft when exercising the privileges of that authorization.

(l) *Inspection of certificate.* Each person who holds an airman certificate, medical certificate, authorization, or license required by this part must present it and their photo identification as described in paragraph (a)(2) of this section for inspection upon a request from:

(1) The Administrator;

(2) An authorized representative of the National Transportation Safety Board;

(3) Any Federal, State, or local law enforcement officer; or

(4) An authorized representative of the Transportation Security Administration.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40894, July 30, 1997; Amdt. 61–111, 67 FR 65861, Oct. 28, 2002; Amdt. 61–110, 69 FR 44864, July 27, 2004; Amdt. 61–123, 74 FR 34234, July 15, 2009; Amdt. 61–124, 74 FR 42546, Aug. 21, 2009; Amdt. 61–124A, 74 FR 53644, Oct. 20, 2009; Amdt. 61–131, 78 FR 56828, Sept. 16, 2013; Amdt. 61–134, 80 FR 33400, June 12, 2015]

### § 61.4 Qualification and approval of flight simulators and flight training devices.

(a) Except as specified in paragraph (b) or (c) of this section, each flight simulator and flight training device used for training, and for which an airman is to receive credit to satisfy any training, testing, or checking requirement under this chapter, must be qualified and approved by the Administrator for—

(1) The training, testing, and checking for which it is used;

(2) Each particular maneuver, procedure, or crewmember function performed; and

(3) The representation of the specific category and class of aircraft, type of aircraft, particular variation within the type of aircraft, or set of aircraft for certain flight training devices.

(b) Any device used for flight training, testing, or checking that has been determined to be acceptable to or approved by the Administrator prior to August 1, 1996, which can be shown to function as originally designed, is considered to be a flight training device,

provided it is used for the same purposes for which it was originally accepted or approved and only to the extent of such acceptance or approval.

(c) The Administrator may approve a device other than a flight simulator or flight training device for specific purposes.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40895, July 30, 1997]

### § 61.5 Certificates and ratings issued under this part.

(a) The following certificates are issued under this part to an applicant who satisfactorily accomplishes the training and certification requirements for the certificate sought:

(1) Pilot certificates—

(i) Student pilot.

(ii) Sport pilot.

(iii) Recreational pilot.

(iv) Private pilot.

(v) Commercial pilot.

(vi) Airline transport pilot.

(2) Flight instructor certificates.

(3) Ground instructor certificates.

(b) The following ratings are placed on a pilot certificate (other than student pilot) when an applicant satisfactorily accomplishes the training and certification requirements for the rating sought:

(1) Aircraft category ratings—

(i) Airplane.

(ii) Rotorcraft.

(iii) Glider.

(iv) Lighter-than-air.

(v) Powered-lift.

(vi) Powered parachute.

(vii) Weight-shift-control aircraft.

(2) Airplane class ratings—

(i) Single-engine land.

(ii) Multiengine land.

(iii) Single-engine sea.

(iv) Multiengine sea.

(3) Rotorcraft class ratings—

(i) Helicopter.

(ii) Gyroplane.

(4) Lighter-than-air class ratings—

(i) Airship.

(ii) Balloon.

(5) Weight-shift-control aircraft class ratings—

(i) Weight-shift-control aircraft land.

(ii) Weight-shift-control aircraft sea.

(6) Powered parachute class ratings—

(i) Powered parachute land.

(ii) Powered parachute sea.

(7) Aircraft type ratings—

(i) Large aircraft other than lighter-than-air.

(ii) Turbojet-powered airplanes.

(iii) Other aircraft type ratings specified by the Administrator through the aircraft type certification procedures.

(iv) Second-in-command pilot type rating for aircraft that is certificated for operations with a minimum crew of at least two pilots.

(8) Instrument ratings (on private and commercial pilot certificates only)—

(i) Instrument—Airplane.

(ii) Instrument—Helicopter.

(iii) Instrument—Powered-lift.

(c) The following ratings are placed on a flight instructor certificate when an applicant satisfactorily accomplishes the training and certification requirements for the rating sought:

(1) Aircraft category ratings—

(i) Airplane.

(ii) Rotorcraft.

(iii) Glider.

(iv) Powered-lift.

(2) Airplane class ratings—

(i) Single-engine.

(ii) Multiengine.

(3) Rotorcraft class ratings—

(i) Helicopter.

(ii) Gyroplane.

(4) Instrument ratings—

(i) Instrument—Airplane.

(ii) Instrument—Helicopter.

(iii) Instrument—Powered-lift.

(5) Sport pilot rating.

(d) The following ratings are placed on a ground instructor certificate when an applicant satisfactorily accomplishes the training and certification requirements for the rating sought:

(1) Basic.

(2) Advanced.

(3) Instrument.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44864, July 27, 2004; Amdt. 61–113, 70 FR 45271, Aug. 4, 2005]

### § 61.7 Obsolete certificates and ratings.

(a) The holder of a free-balloon pilot certificate issued before November 1, 1973, may not exercise the privileges of that certificate.

(b) The holder of a pilot certificate that bears any of the following category ratings without an associated class rating may not exercise the privileges of that category rating:
(1) Rotorcraft.
(2) Lighter-than-air.
(3) Helicopter.
(4) Autogyro.

### § 61.9 [Reserved]

### § 61.11 Expired pilot certificates and re-issuance.

(a) No person who holds an expired pilot certificate or rating may act as pilot in command or as a required pilot flight crewmember of an aircraft of the same category or class that is listed on that expired pilot certificate or rating.
(b) The following pilot certificates and ratings have expired and will not be reissued:
(1) An airline transport pilot certificate issued before May 1, 1949, or an airline transport pilot certificate that contains a horsepower limitation.
(2) A private or commercial pilot certificate issued before July 1, 1945.
(3) A pilot certificate with a lighter-than-air or free-balloon rating issued before July 1, 1945.
(c) An airline transport pilot certificate that was issued after April 30, 1949, and that bears an expiration date but does not contain a horsepower limitation, may have that airline transport pilot certificate re-issued without an expiration date.
(d) A private or commercial pilot certificate that was issued after June 30, 1945, and that bears an expiration date, may have that pilot certificate reissued without an expiration date.
(e) A pilot certificate with a lighter-than-air or free-balloon rating that was issued after June 30, 1945, and that bears an expiration date, may have that pilot certificate reissued without an expiration date.

[Doc. No. FAA–2006–26661, 74 FR 42547, Aug. 21, 2009]

### § 61.13 Issuance of airman certificates, ratings, and authorizations.

(a) *Application.* (1) An applicant for an airman certificate, rating, or authorization under this part must make that application on a form and in a manner acceptable to the Administrator.
(2) An applicant must show evidence that the appropriate fee prescribed in appendix A to part 187 of this chapter has been paid when that person applies for airmen certification services administered outside the United States.
(3) An applicant who is neither a citizen of the United States nor a resident alien of the United States may be refused issuance of any U.S. airman certificate, rating or authorization by the Administrator.
(4) Except as provided in paragraph (a)(3) of this section, an applicant who satisfactorily accomplishes the training and certification requirements for the certificate, rating, or authorization sought is entitled to receive that airman certificate, rating, or authorization.
(b) *Limitations.* (1) An applicant who cannot comply with certain areas of operation required on the practical test because of physical limitations may be issued an airman certificate, rating, or authorization with the appropriate limitation placed on the applicant's airman certificate provided the—
(i) Applicant is able to meet all other certification requirements for the airman certificate, rating, or authorization sought;
(ii) Physical limitation has been recorded with the FAA on the applicant's medical records; and
(iii) Administrator determines that the applicant's inability to perform the particular area of operation will not adversely affect safety.
(2) A limitation placed on a person's airman certificate may be removed, provided that person demonstrates for an examiner satisfactory proficiency in the area of operation appropriate to the airman certificate, rating, or authorization sought.
(c) *Additional requirements for Category II and Category III pilot authorizations.* (1) A Category II or Category III pilot authorization is issued by a letter of authorization as part of an applicant's instrument rating or airline transport pilot certificate.
(2) Upon original issue, the authorization contains the following limitations:

(i) For Category II operations, the limitation is 1,600 feet RVR and a 150-foot decision height; and

(ii) For Category III operations, each initial limitation is specified in the authorization document.

(3) The limitations on a Category II or Category III pilot authorization may be removed as follows:

(i) In the case of Category II limitations, a limitation is removed when the holder shows that, since the beginning of the sixth preceding month, the holder has made three Category II ILS approaches with a 150-foot decision height to a landing under actual or simulated instrument conditions.

(ii) In the case of Category III limitations, a limitation is removed as specified in the authorization.

(4) To meet the experience requirements of paragraph (c)(3) of this section, and for the practical test required by this part for a Category II or a Category III pilot authorization, a flight simulator or flight training device may be used if it is approved by the Administrator for such use.

(d) *Application during suspension or revocation.* (1) Unless otherwise authorized by the Administrator, a person whose pilot, flight instructor, or ground instructor certificate has been suspended may not apply for any certificate, rating, or authorization during the period of suspension.

(2) Unless otherwise authorized by the Administrator, a person whose pilot, flight instructor, or ground instructor certificate has been revoked may not apply for any certificate, rating, or authorization for 1 year after the date of revocation.

[Doc. No. 25910, 62 FR 40895, July 30, 1997, as amended by Amdt. 61–116, 72 FR 18558, Apr. 12, 2007; Amdt. 61–132, 78 FR 77572, Dec. 24, 2013]

### §61.14 [Reserved]

### §61.15 Offenses involving alcohol or drugs.

(a) A conviction for the violation of any Federal or State statute relating to the growing, processing, manufacture, sale, disposition, possession, transportation, or importation of narcotic drugs, marijuana, or depressant or stimulant drugs or substances is grounds for:

(1) Denial of an application for any certificate, rating, or authorization issued under this part for a period of up to 1 year after the date of final conviction; or

(2) Suspension or revocation of any certificate, rating, or authorization issued under this part.

(b) Committing an act prohibited by §91.17(a) or §91.19(a) of this chapter is grounds for:

(1) Denial of an application for a certificate, rating, or authorization issued under this part for a period of up to 1 year after the date of that act; or

(2) Suspension or revocation of any certificate, rating, or authorization issued under this part.

(c) For the purposes of paragraphs (d), (e), and (f) of this section, a motor vehicle action means:

(1) A conviction after November 29, 1990, for the violation of any Federal or State statute relating to the operation of a motor vehicle while intoxicated by alcohol or a drug, while impaired by alcohol or a drug, or while under the influence of alcohol or a drug;

(2) The cancellation, suspension, or revocation of a license to operate a motor vehicle after November 29, 1990, for a cause related to the operation of a motor vehicle while intoxicated by alcohol or a drug, while impaired by alcohol or a drug, or while under the influence of alcohol or a drug; or

(3) The denial after November 29, 1990, of an application for a license to operate a motor vehicle for a cause related to the operation of a motor vehicle while intoxicated by alcohol or a drug, while impaired by alcohol or a drug, or while under the influence of alcohol or a drug.

(d) Except for a motor vehicle action that results from the same incident or arises out of the same factual circumstances, a motor vehicle action occurring within 3 years of a previous motor vehicle action is grounds for:

(1) Denial of an application for any certificate, rating, or authorization issued under this part for a period of up to 1 year after the date of the last motor vehicle action; or

(2) Suspension or revocation of any certificate, rating, or authorization issued under this part.

(e) Each person holding a certificate issued under this part shall provide a written report of each motor vehicle action to the FAA, Civil Aviation Security Division (AMC–700), P.O. Box 25810, Oklahoma City, OK 73125, not later than 60 days after the motor vehicle action. The report must include:

(1) The person's name, address, date of birth, and airman certificate number;

(2) The type of violation that resulted in the conviction or the administrative action;

(3) The date of the conviction or administrative action;

(4) The State that holds the record of conviction or administrative action; and

(5) A statement of whether the motor vehicle action resulted from the same incident or arose out of the same factual circumstances related to a previously reported motor vehicle action.

(f) Failure to comply with paragraph (e) of this section is grounds for:

(1) Denial of an application for any certificate, rating, or authorization issued under this part for a period of up to 1 year after the date of the motor vehicle action; or

(2) Suspension or revocation of any certificate, rating, or authorization issued under this part.

### § 61.16 Refusal to submit to an alcohol test or to furnish test results.

A refusal to submit to a test to indicate the percentage by weight of alcohol in the blood, when requested by a law enforcement officer in accordance with § 91.17(c) of this chapter, or a refusal to furnish or authorize the release of the test results requested by the Administrator in accordance with § 91.17(c) or (d) of this chapter, is grounds for:

(a) Denial of an application for any certificate, rating, or authorization issued under this part for a period of up to 1 year after the date of that refusal; or

(b) Suspension or revocation of any certificate, rating, or authorization issued under this part.

### § 61.17 Temporary certificate.

(a) A temporary pilot, flight instructor, or ground instructor certificate or rating is issued for up to 120 days, at which time a permanent certificate will be issued to a person whom the Administrator finds qualified under this part.

(b) A temporary pilot, flight instructor, or ground instructor certificate or rating expires:

(1) On the expiration date shown on the certificate;

(2) Upon receipt of the permanent certificate; or

(3) Upon receipt of a notice that the certificate or rating sought is denied or revoked.

### § 61.18 Security disqualification.

(a)*Eligibility standard.* No person is eligible to hold a certificate, rating, or authorization issued under this part when the Transportation Security Administration (TSA) has notified the FAA in writing that the person poses a security threat.

(b) *Effect of the issuance by the TSA of an Initial Notification of Threat Assessment.* (1) The FAA will hold in abeyance pending the outcome of the TSA's final threat assessment review an application for any certificate, rating, or authorization under this part by any person who has been issued an Initial Notification of Threat Assessment by the TSA.

(2) The FAA will suspend any certificate, rating, or authorization issued under this part after the TSA issues to the holder an Initial Notification of Threat Assessment.

(c) *Effect of the issuance by the TSA of a Final Notification of Threat Assessment.* (1) The FAA will deny an application for any certificate, rating, or authorization under this part to any person who has been issued a Final Notification of Threat Assessment.

(2) The FAA will revoke any certificate, rating, or authorization issued under this part after the TSA has issued to the holder a Final Notification of Threat Assessment.

[Doc. No. FAA–2003–14293, 68 FR 3774, Jan. 24, 2003]

### § 61.19 Duration of pilot and instructor certificates.

(a) *General.* The holder of a certificate with an expiration date may not, after that date, exercise the privileges of that certificate.

(b) *Student pilot certificate.*

(1) For student pilots who have not reached their 40th birthday, the student pilot certificate does not expire until 60 calendar months after the month of the date of examination shown on the medical certificate.

(2) For student pilots who have reached their 40th birthday, the student pilot certificate does not expire until 24 calendar months after the month of the date of examination shown on the medical certificate.

(3) For student pilots seeking a glider rating, balloon rating, or a sport pilot certificate, the student pilot certificate does not expire until 60 calendar months after the month of the date issued, regardless of the person's age.

(c) *Other pilot certificates.* A pilot certificate (other than a student pilot certificate) issued under this part is issued without a specific expiration date. The holder of a pilot certificate issued on the basis of a foreign pilot license may exercise the privileges of that certificate only while that person's foreign pilot license is effective.

(d) *Flight instructor certificate.* Except as specified in §61.197(b), a flight instructor certificate expires 24 calendar months from the month in which it was issued, renewed, or reinstated, as appropriate.

(e) *Ground instructor certificate.* A ground instructor certificate is issued without a specific expiration date.

(f) *Return of certificates.* The holder of any airman certificate that is issued under this part, and that has been suspended or revoked, must return that certificate to the FAA when requested to do so by the Administrator.

(g) *Duration of pilot certificates.* Except for a temporary certificate issued under §61.17 or a student pilot certificate issued under paragraph (b) of this section, the holder of a paper pilot certificate issued under this part may not exercise the privileges of that certificate after March 31, 2010.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–118, 73 FR 10668, Feb. 28, 2008; Amdt. 61–124, 74 FR 42547, Aug. 21, 2009; Amdt. 61–124A, 74 FR 53644, Oct. 20, 2009]

### § 61.21 Duration of a Category II and a Category III pilot authorization (for other than part 121 and part 135 use).

(a) A Category II pilot authorization or a Category III pilot authorization expires at the end of the sixth calendar month after the month in which it was issued or renewed.

(b) Upon passing a practical test for a Category II or Category III pilot authorization, the authorization may be renewed for each type of aircraft for which the authorization is held.

(c) A Category II or Category III pilot authorization for a specific type aircraft for which an authorization is held will not be renewed beyond 12 calendar months from the month the practical test was accomplished in that type aircraft.

(d) If the holder of a Category II or Category III pilot authorization passes the practical test for a renewal in the month before the authorization expires, the holder is considered to have passed it during the month the authorization expired.

### § 61.23 Medical certificates: Requirement and duration.

(a) *Operations requiring a medical certificate.* Except as provided in paragraphs (b) and (c) of this section, a person—

(1) Must hold a first-class medical certificate:

(i) When exercising the pilot-in-command privileges of an airline transport pilot certificate;

(ii) When exercising the second-in-command privileges of an airline transport pilot certificate in a flag or supplemental operation in part 121 of this chapter that requires three or more pilots; or

(iii) When serving as a required pilot flightcrew member in an operation conducted under part 121 of this chapter if the pilot has reached his or her 60th birthday.

(2) Must hold at least a second class medical certificate when exercising:

(i) Second-in-command privileges of an airline transport pilot certificate in part 121 of this chapter (other than operations specified in paragraph (a)(1)(ii) of this section); or

(ii) Privileges of a commercial pilot certificate; or

(3) Must hold at least a third-class medical certificate—

(i) When exercising the privileges of a private pilot certificate;

(ii) When exercising the privileges of a recreational pilot certificate;

(iii) When exercising the privileges of a student pilot certificate;

(iv) When exercising the privileges of a flight instructor certificate and acting as the pilot in command;

(v) When exercising the privileges of a flight instructor certificate and serving as a required pilot flight crewmember;

(vi) When taking a practical test in an aircraft for a recreational pilot, private pilot, commercial pilot, or airline transport pilot certificate, or for a flight instructor certificate; or

(vii) When performing the duties as an Examiner in an aircraft when administering a practical test or proficiency check for an airman certificate, rating, or authorization.

(b) *Operations not requiring a medical certificate.* A person is not required to hold a medical certificate—

(1) When exercising the privileges of a student pilot certificate while seeking—

(i) A sport pilot certificate with glider or balloon privileges; or

(ii) A pilot certificate with a glider category rating or balloon class rating;

(2) When exercising the privileges of a sport pilot certificate with privileges in a glider or balloon;

(3) When exercising the privileges of a pilot certificate with a glider category rating or balloon class rating in a glider or a balloon, as appropriate;

(4) When exercising the privileges of a flight instructor certificate with—

(i) A sport pilot rating in a glider or balloon; or

(ii) A glider category rating;

(5) When exercising the privileges of a flight instructor certificate if the person is not acting as pilot in command or serving as a required pilot flight crewmember;

(6) When exercising the privileges of a ground instructor certificate;

(7) When serving as an Examiner or check airman and administering a practical test or proficiency check for an airman certificate, rating, or authorization conducted in a glider, balloon, flight simulator, or flight training device;

(8) When taking a practical test or a proficiency check for a certificate, rating, authorization or operating privilege conducted in a glider, balloon, flight simulator, or flight training device; or

(9) When a military pilot of the U.S. Armed Forces can show evidence of an up-to-date medical examination authorizing pilot flight status issued by the U.S. Armed Forces and—

(i) The flight does not require higher than a third-class medical certificate; and

(ii) The flight conducted is a domestic flight operation within U.S. airspace.

(c) *Operations requiring either a medical certificate or U.S. driver's license.* (1) A person must hold and possess either a medical certificate issued under part 67 of this chapter or a U.S. driver's license when—

(i) Exercising the privileges of a student pilot certificate while seeking sport pilot privileges in a light-sport aircraft other than a glider or balloon;

(ii) Exercising the privileges of a sport pilot certificate in a light-sport aircraft other than a glider or balloon;

(iii) Exercising the privileges of a flight instructor certificate with a sport pilot rating while acting as pilot in command or serving as a required flight crewmember of a light-sport aircraft other than a glider or balloon; or

(iv) Serving as an Examiner and administering a practical test for the issuance of a sport pilot certificate in a light-sport aircraft other than a glider or balloon.

(2) A person using a U.S. driver's license to meet the requirements of this paragraph must—

(i) Comply with each restriction and limitation imposed by that person's U.S. driver's license and any judicial or

administrative order applying to the operation of a motor vehicle;

(ii) Have been found eligible for the issuance of at least a third-class airman medical certificate at the time of his or her most recent application (if the person has applied for a medical certificate);

(iii) Not have had his or her most recently issued medical certificate (if the person has held a medical certificate) suspended or revoked or most recent Authorization for a Special Issuance of a Medical Certificate withdrawn; and

(iv) Not know or have reason to know of any medical condition that would make that person unable to operate a light-sport aircraft in a safe manner.

(d) *Duration of a medical certificate.* Use the following table to determine duration for each class of medical certificate:

| If you hold | And on the date of examination for your most recent medical certificate you were | And you are conducting an operation requiring | Then your medical certificate expires, for that operation, at the end of the last day of the |
|---|---|---|---|
| (1) A first-class medical certificate. | (i) Under age 40. | an airline transport pilot certificate for pilot-in-command privileges, or for second-in-command privileges in a flag or supplemental operation in part 121 requiring three or more pilots. | 12th month after the month of the date of examination shown on the medical certificate. |
| | (ii) Age 40 or older. | an airline transport pilot certificate for pilot-in-command privileges, for second-in-command privileges in a flag or supplemental operation in part 121 requiring three or more pilots, or for a pilot flightcrew member in part 121 operations who has reached his or her 60th birthday.. | 6th month after the month of the date of examination shown on the medical certificate. |
| | (iii) Any age .. | a commercial pilot certificate or an air traffic control tower operator certificate. | 12th month after the month of the date of examination shown on the medical certificate. |
| | (iv) Under age 40. | a recreational pilot certificate, a private pilot certificate, a flight instructor certificate (when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon), a student pilot certificate, or a sport pilot certificate (when not using a U.S. driver's license as medical qualification). | 60th month after the month of the date of examination shown on the medical certificate. |
| | (v) Age 40 or older. | a recreational pilot certificate, a private pilot certificate, a flight instructor certificate (when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon), a student pilot certificate, or a sport pilot certificate (when not using a U.S. driver's license as medical qualification). | 24th month after the month of the date of examination shown on the medical certificate. |
| (2) A second-class medical certificate. | (i) Any age ... | an airline transport pilot certificate for second-in-command privileges (other than the operations specified in paragraph (d)(1) of this section), a commercial pilot certificate, or an air traffic control tower operator certificate. | 12th month after the month of the date of examination shown on the medical certificate. |
| | (ii) Under age 40. | a recreational pilot certificate, a private pilot certificate, a flight instructor certificate (when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon), a student pilot certificate, or a sport pilot certificate (when not using a U.S. driver's license as medical qualification). | 60th month after the month of the date of examination shown on the medical certificate. |

| If you hold | And on the date of examination for your most recent medical certificate you were | And you are conducting an operation requiring | Then your medical certificate expires, for that operation, at the end of the last day of the |
|---|---|---|---|
| | (iii) Age 40 or older. | a recreational pilot certificate, a private pilot certificate, a flight instructor certificate (when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon), a student pilot certificate, or a sport pilot certificate (when not using a U.S. driver's license as medical qualification). | 24th month after the month of the date of examination shown on the medical certificate. |
| (3) A third-class medical certificate. | (i) Under age 40. | a recreational pilot certificate, a private pilot certificate, a flight instructor certificate (when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon), a student pilot certificate, or a sport pilot certificate (when not using a U.S. driver's license as medical qualification). | 60th month after the month of the date of examination shown on the medical certificate. |
| | (ii) Age 40 or older. | a recreational pilot certificate, a private pilot certificate, a flight instructor certificate (when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon), a student pilot certificate, or a sport pilot certificate (when not using a U.S. driver's license as medical qualification). | 24th month after the month of the date of examination shown on the medical certificate. |

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40895, July 30, 1997; Amdt. 61–110, 69 FR 44864, July 27, 2004, as amended by Amdt. 61–121, 73 FR 43064, July 24, 2008; Amdt. 61–121, 73 FR 48125, Aug. 18, 2008; Amdt. 61–123, 74 FR 34234, July 15, 2009; Amdt. 61–124, 74 FR 42547, Aug. 21, 2009; Amdt. 61–129, 76 FR 78143, Dec. 16, 2011; Amdt. 61–129A, 77 FR 61721, Oct. 11, 2012; Amdt. 61–130, 78 FR 42372, July 15, 2013]

### § 61.25 Change of name.

(a) An application to change the name on a certificate issued under this part must be accompanied by the applicant's:

(1) Airman certificate; and

(2) A copy of the marriage license, court order, or other document verifying the name change.

(b) The documents in paragraph (a) of this section will be returned to the applicant after inspection.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–124, 74 FR 42548, Aug. 21, 2009]

### § 61.27 Voluntary surrender or exchange of certificate.

(a) The holder of a certificate issued under this part may voluntarily surrender it for:

(1) Cancellation;

(2) Issuance of a lower grade certificate; or

(3) Another certificate with specific ratings deleted.

(b) Any request made under paragraph (a) of this section must include the following signed statement or its equivalent: ''This request is made for my own reasons, with full knowledge that my (insert name of certificate or rating, as appropriate) may not be reissued to me unless I again pass the tests prescribed for its issuance.''

### § 61.29 Replacement of a lost or destroyed airman or medical certificate or knowledge test report.

(a) A request for the replacement of a lost or destroyed airman certificate issued under this part must be made:

(1) By letter to the Department of Transportation, FAA, Airmen Certification Branch, P.O. Box 25082, Oklahoma City, OK 73125, and must be accompanied by a check or money order for the appropriate fee payable to the FAA; or

(2) In any other manner and form approved by the Administrator including a request online to Airmen Services at *http://www.faa.gov*, and must be accompanied by acceptable form of payment for the appropriate fee.

(b) A request for the replacement of a lost or destroyed medical certificate must be made:

(1) By letter to the Department of Transportation, FAA, Aerospace Medical Certification Division, P.O. Box 26200, Oklahoma City, OK 73125, and must be accompanied by a check or money order for the appropriate fee payable to the FAA; or

(2) In any other manner and form approved by the Administrator and must be accompanied by acceptable form of payment for the appropriate fee.

(c) A request for the replacement of a lost or destroyed knowledge test report must be made:

(1) By letter to the Department of Transportation, FAA, Airmen Certification Branch, P.O. Box 25082, Oklahoma City, OK 73125, and must be accompanied by a check or money order for the appropriate fee payable to the FAA; or

(2) In any other manner and form approved by the Administrator and must be accompanied by acceptable form of payment for the appropriate fee.

(d) The letter requesting replacement of a lost or destroyed airman certificate, medical certificate, or knowledge test report must state:

(1) The name of the person;

(2) The permanent mailing address (including ZIP code), or if the permanent mailing address includes a post office box number, then the person's current residential address;

(3) The certificate holder's date and place of birth; and

(4) Any information regarding the—

(i) Grade, number, and date of issuance of the airman certificate and ratings, if appropriate;

(ii) Class of medical certificate, the place and date of the medical exam, name of the Airman Medical Examiner (AME), and the circumstances concerning the loss of the original medical certificate, as appropriate; and

(iii) Date the knowledge test was taken, if appropriate.

(e) A person who has lost an airman certificate, medical certificate, or knowledge test report may obtain, in a form or manner approved by the Administrator, a document conveying temporary authority to exercise certificate privileges from the FAA Aeromedical Certification Branch or the Airman Certification Branch, as appropriate, and the:

(1) Document may be carried as an airman certificate, medical certificate, or knowledge test report, as appropriate, for up to 60 days pending the person's receipt of a duplicate under paragraph (a), (b), or (c) of this section, unless the person has been notified that the certificate has been suspended or revoked.

(2) Request for such a document must include the date on which a duplicate certificate or knowledge test report was previously requested.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40896, July 30, 1997; Amdt. 61–121, 73 FR 43065, July 24, 2008; Amdt. 61–124, 74 FR 42548, Aug. 21, 2009; Amdt. 61–131, 78 FR 56828, Sept. 16, 2013]

### §61.31 Type rating requirements, additional training, and authorization requirements.

(a) *Type ratings required.* A person who acts as a pilot in command of any of the following aircraft must hold a type rating for that aircraft:

(1) Large aircraft (except lighter-than-air).

(2) Turbojet-powered airplanes.

(3) Other aircraft specified by the Administrator through aircraft type certificate procedures.

(b) *Authorization in lieu of a type rating.* A person may be authorized to operate without a type rating for up to 60 days an aircraft requiring a type rating, provided—

(1) The Administrator has authorized the flight or series of flights;

(2) The Administrator has determined that an equivalent level of safety can be achieved through the operating limitations on the authorization;

(3) The person shows that compliance with paragraph (a) of this section is impracticable for the flight or series of flights; and

(4) The flight—

(i) Involves only a ferry flight, training flight, test flight, or practical test for a pilot certificate or rating;

(ii) Is within the United States;

(iii) Does not involve operations for compensation or hire unless the compensation or hire involves payment for the use of the aircraft for training or taking a practical test; and

(iv) Involves only the carriage of flight crewmembers considered essential for the flight.

(5) If the flight or series of flights cannot be accomplished within the time limit of the authorization, the Administrator may authorize an additional period of up to 60 days to accomplish the flight or series of flights.

(c) *Aircraft category, class, and type ratings: Limitations on the carriage of persons, or operating for compensation or hire.* Unless a person holds a category, class, and type rating (if a class and type rating is required) that applies to the aircraft, that person may not act as pilot in command of an aircraft that is carrying another person, or is operated for compensation or hire. That person also may not act as pilot in command of that aircraft for compensation or hire.

(d) *Aircraft category, class, and type ratings: Limitations on operating an aircraft as the pilot in command.* To serve as the pilot in command of an aircraft, a person must—

(1) Hold the appropriate category, class, and type rating (if a class or type rating is required) for the aircraft to be flown; or

(2) Have received training required by this part that is appropriate to the pilot certification level, aircraft category, class, and type rating (if a class or type rating is required) for the aircraft to be flown, and have received an endorsement for solo flight in that aircraft from an authorized instructor.

(e) *Additional training required for operating complex airplanes.* (1) Except as provided in paragraph (e)(2) of this section, no person may act as pilot in command of a complex airplane, unless the person has—

(i) Received and logged ground and flight training from an authorized instructor in a complex airplane, or in a flight simulator or flight training device that is representative of a complex airplane, and has been found proficient in the operation and systems of the airplane; and

(ii) Received a one-time endorsement in the pilot's logbook from an authorized instructor who certifies the person is proficient to operate a complex airplane.

(2) The training and endorsement required by paragraph (e)(1) of this section is not required if the person has logged flight time as pilot in command of a complex airplane, or in a flight simulator or flight training device that is representative of a complex airplane prior to August 4, 1997.

(f) *Additional training required for operating high-performance airplanes.* (1) Except as provided in paragraph (f)(2) of this section, no person may act as pilot in command of a high-performance airplane (an airplane with an engine of more than 200 horsepower), unless the person has—

(i) Received and logged ground and flight training from an authorized instructor in a high-performance airplane, or in a flight simulator or flight training device that is representative of a high-performance airplane, and has been found proficient in the operation and systems of the airplane; and

(ii) Received a one-time endorsement in the pilot's logbook from an authorized instructor who certifies the person is proficient to operate a high-performance airplane.

(2) The training and endorsement required by paragraph (f)(1) of this section is not required if the person has logged flight time as pilot in command of a high-performance airplane, or in a flight simulator or flight training device that is representative of a high-performance airplane prior to August 4, 1997.

(g) *Additional training required for operating pressurized aircraft capable of operating at high altitudes.* (1) Except as provided in paragraph (g)(3) of this section, no person may act as pilot in command of a pressurized aircraft (an aircraft that has a service ceiling or maximum operating altitude, whichever is lower, above 25,000 feet MSL), unless that person has received and logged ground training from an authorized instructor and obtained an endorsement in the person's logbook or

training record from an authorized instructor who certifies the person has satisfactorily accomplished the ground training. The ground training must include at least the following subjects:

(i) High-altitude aerodynamics and meteorology;

(ii) Respiration;

(iii) Effects, symptoms, and causes of hypoxia and any other high-altitude sickness;

(iv) Duration of consciousness without supplemental oxygen;

(v) Effects of prolonged usage of supplemental oxygen;

(vi) Causes and effects of gas expansion and gas bubble formation;

(vii) Preventive measures for eliminating gas expansion, gas bubble formation, and high-altitude sickness;

(viii) Physical phenomena and incidents of decompression; and

(ix) Any other physiological aspects of high-altitude flight.

(2) Except as provided in paragraph (g)(3) of this section, no person may act as pilot in command of a pressurized aircraft unless that person has received and logged training from an authorized instructor in a pressurized aircraft, or in a flight simulator or flight training device that is representative of a pressurized aircraft, and obtained an endorsement in the person's logbook or training record from an authorized instructor who found the person proficient in the operation of a pressurized aircraft. The flight training must include at least the following subjects:

(i) Normal cruise flight operations while operating above 25,000 feet MSL;

(ii) Proper emergency procedures for simulated rapid decompression without actually depressurizing the aircraft; and

(iii) Emergency descent procedures.

(3) The training and endorsement required by paragraphs (g)(1) and (g)(2) of this section are not required if that person can document satisfactory accomplishment of any of the following in a pressurized aircraft, or in a flight simulator or flight training device that is representative of a pressurized aircraft:

(i) Serving as pilot in command before April 15, 1991;

(ii) Completing a pilot proficiency check for a pilot certificate or rating before April 15, 1991;

(iii) Completing an official pilot-in-command check conducted by the military services of the United States; or

(iv) Completing a pilot-in-command proficiency check under part 121, 125, or 135 of this chapter conducted by the Administrator or by an approved pilot check airman.

(h) *Additional aircraft type-specific training.* No person may serve as pilot in command of an aircraft that the Administrator has determined requires aircraft type-specific training unless that person has—

(1) Received and logged type-specific training in the aircraft, or in a flight simulator or flight training device that is representative of that type of aircraft; and

(2) Received a logbook endorsement from an authorized instructor who has found the person proficient in the operation of the aircraft and its systems.

(i) *Additional training required for operating tailwheel airplanes.* (1) Except as provided in paragraph (i)(2) of this section, no person may act as pilot in command of a tailwheel airplane unless that person has received and logged flight training from an authorized instructor in a tailwheel airplane and received an endorsement in the person's logbook from an authorized instructor who found the person proficient in the operation of a tailwheel airplane. The flight training must include at least the following maneuvers and procedures:

(i) Normal and crosswind takeoffs and landings;

(ii) Wheel landings (unless the manufacturer has recommended against such landings); and

(iii) Go-around procedures.

(2) The training and endorsement required by paragraph (i)(1) of this section is not required if the person logged pilot-in-command time in a tailwheel airplane before April 15, 1991.

(j) *Additional training required for operating a glider.* (1) No person may act as pilot in command of a glider—

(i) Using ground-tow procedures, unless that person has satisfactorily accomplished ground and flight training

on ground-tow procedures and operations, and has received an endorsement from an authorized instructor who certifies in that pilot's logbook that the pilot has been found proficient in ground-tow procedures and operations;

(ii) Using aerotow procedures, unless that person has satisfactorily accomplished ground and flight training on aerotow procedures and operations, and has received an endorsement from an authorized instructor who certifies in that pilot's logbook that the pilot has been found proficient in aerotow procedures and operations; or

(iii) Using self-launch procedures, unless that person has satisfactorily accomplished ground and flight training on self-launch procedures and operations, and has received an endorsement from an authorized instructor who certifies in that pilot's logbook that the pilot has been found proficient in self-launch procedures and operations.

(2) The holder of a glider rating issued prior to August 4, 1997, is considered to be in compliance with the training and logbook endorsement requirements of this paragraph for the specific operating privilege for which the holder is already qualified.

(k) *Additional training required for night vision goggle operations.* (1) Except as provided under paragraph (k)(3) of this section, a person may act as pilot in command of an aircraft using night vision goggles only if that person receives and logs ground training from an authorized instructor and obtains a logbook or training record endorsement from an authorized instructor who certifies the person completed the ground training. The ground training must include the following subjects:

(i) Applicable portions of this chapter that relate to night vision goggle limitations and flight operations;

(ii) Aeromedical factors related to the use of night vision goggles, including how to protect night vision, how the eyes adapt to night, self-imposed stresses that affect night vision, effects of lighting on night vision, cues used to estimate distance and depth perception at night, and visual illusions;

(iii) Normal, abnormal, and emergency operations of night vision goggle equipment;

(iv) Night vision goggle performance and scene interpretation; and

(v) Night vision goggle operation flight planning, including night terrain interpretation and factors affecting terrain interpretation.

(2) Except as provided under paragraph (k)(3) of this section, a person may act as pilot in command of an aircraft using night vision goggles only if that person receives and logs flight training from an authorized instructor and obtains a logbook or training record endorsement from an authorized instructor who found the person proficient in the use of night vision goggles. The flight training must include the following tasks:

(i) Preflight and use of internal and external aircraft lighting systems for night vision goggle operations;

(ii) Preflight preparation of night vision goggles for night vision goggle operations;

(iii) Proper piloting techniques when using night vision goggles during the takeoff, climb, enroute, descent, and landing phases of flight; and

(iv) Normal, abnormal, and emergency flight operations using night vision goggles.

(3) The requirements under paragraphs (k)(1) and (2) of this section do not apply if a person can document satisfactory completion of any of the following pilot proficiency checks using night vision goggles in an aircraft:

(i) A pilot proficiency check on night vision goggle operations conducted by the U.S. Armed Forces.

(ii) A pilot proficiency check on night vision goggle operations under part 135 of this chapter conducted by an Examiner or Check Airman.

(iii) A pilot proficiency check on night vision goggle operations conducted by a night vision goggle manufacturer or authorized instructor, when the pilot—

(A) Is employed by a Federal, State, county, or municipal law enforcement agency; and

(B) Has logged at least 20 hours as pilot in command in night vision goggle operations.

(l) *Exceptions.* (1) This section does not require a category and class rating for aircraft not type-certificated as airplanes, rotorcraft, gliders, lighter-than-air aircraft, powered-lifts, powered parachutes, or weight-shift-control aircraft.

(2) The rating limitations of this section do not apply to—

(i) An applicant when taking a practical test given by an examiner;

(ii) The holder of a student pilot certificate;

(iii) The holder of a pilot certificate when operating an aircraft under the authority of—

(A) A provisional type certificate; or

(B) An experimental certificate, unless the operation involves carrying a passenger;

(iv) The holder of a pilot certificate with a lighter-than-air category rating when operating a balloon;

(v) The holder of a recreational pilot certificate operating under the provisions of § 61.101(h); or

(vi) The holder of a sport pilot certificate when operating a light-sport aircraft.

[Doc. No. 25910, 62 FR 40896, July 30, 1997, as amended by Amdt. 61–104, 63 FR 20286, Apr. 23, 1998; Amdt. 61–110, 69 FR 44865, July 27, 2004; Amdt. 61–124, 74 FR 42548, Aug. 21, 2009; Amdt. 61–128, 76 FR 54105, Aug. 31, 2011]

### § 61.33 Tests: General procedure.

Tests prescribed by or under this part are given at times and places, and by persons designated by the Administrator.

### § 61.35 Knowledge test: Prerequisites and passing grades.

(a) An applicant for a knowledge test must have:

(1) Received an endorsement, if required by this part, from an authorized instructor certifying that the applicant accomplished the appropriate ground-training or a home-study course required by this part for the certificate or rating sought and is prepared for the knowledge test;

(2) After July 31, 2014, for the knowledge test for an airline transport pilot certificate with an airplane category multiengine class rating, a graduation certificate for the airline transport pilot certification training program specified in § 61.156; and

(3) Proper identification at the time of application that contains the applicant's—

(i) Photograph;

(ii) Signature;

(iii) Date of birth, which shows:

(A) For issuance of certificates other than the ATP certificate with an airplane category multiengine class rating, the applicant meets or will meet the age requirements of this part for the certificate sought before the expiration date of the airman knowledge test report;

(B) Prior to August 1, 2014, for issuance of an ATP certificate with an airplane category multiengine class rating under the aeronautical experience requirements of §§ 61.159 or 61.160, the applicant is at least 21 years of age at the time of the knowledge test; and

(C) After July 31, 2014, for issuance of an ATP certificate with an airplane category multiengine class rating obtained under the aeronautical experience requirements of §§ 61.159 or 61.160, the applicant is at least 18 years of age at the time of the knowledge test;

(iv) If the permanent mailing address is a post office box number, then the applicant must provide a current residential address.

(b) The Administrator shall specify the minimum passing grade for the knowledge test.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–104, 63 FR 20286, Apr. 23, 1998; Amdt. 61–124, 74 FR 42548, Aug. 21, 2009; Amdt. 61–130, 78 FR 42373, July 15, 2013; Amdt. 61–130B, 78 FR 77573, Dec. 24, 2013]

### § 61.37 Knowledge tests: Cheating or other unauthorized conduct.

(a) An applicant for a knowledge test may not:

(1) Copy or intentionally remove any knowledge test;

(2) Give to another applicant or receive from another applicant any part or copy of a knowledge test;

(3) Give assistance on, or receive assistance on, a knowledge test during the period that test is being given;

(4) Take any part of a knowledge test on behalf of another person;

(5) Be represented by, or represent, another person for a knowledge test;

(6) Use any material or aid during the period that the test is being given, unless specifically authorized to do so by the Administrator; and

(7) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) An applicant who the Administrator finds has committed an act prohibited by paragraph (a) of this section is prohibited, for 1 year after the date of committing that act, from:

(1) Applying for any certificate, rating, or authorization issued under this chapter; and

(2) Applying for and taking any test under this chapter.

(c) Any certificate or rating held by an applicant may be suspended or revoked if the Administrator finds that person has committed an act prohibited by paragraph (a) of this section.

### § 61.39 Prerequisites for practical tests.

(a) Except as provided in paragraphs (b), (c), and (e) of this section, to be eligible for a practical test for a certificate or rating issued under this part, an applicant must:

(1) Pass the required knowledge test:

(i) Within the 24-calendar-month period preceding the month the applicant completes the practical test, if a knowledge test is required; or

(ii) Within the 60-calendar month period preceding the month the applicant completes the practical test for those applicants who complete the airline transport pilot certification training program in § 61.156 and pass the knowledge test for an airline transport pilot certificate with a multiengine class rating after July 31, 2014;

(2) Present the knowledge test report at the time of application for the practical test, if a knowledge test is required;

(3) Have satisfactorily accomplished the required training and obtained the aeronautical experience prescribed by this part for the certificate or rating sought;

(4) Hold at least a third-class medical certificate, if a medical certificate is required;

(5) Meet the prescribed age requirement of this part for the issuance of the certificate or rating sought;

(6) Have an endorsement, if required by this part, in the applicant's logbook or training record that has been signed by an authorized instructor who certifies that the applicant—

(i) Has received and logged training time within 2 calendar months preceding the month of application in preparation for the practical test;

(ii) Is prepared for the required practical test; and

(iii) Has demonstrated satisfactory knowledge of the subject areas in which the applicant was deficient on the airman knowledge test; and

(7) Have a completed and signed application form.

(b) An applicant for an airline transport pilot certificate with an airplane category multiengine class rating or an airline transport pilot certificate with an airplane type rating may take the practical test with an expired knowledge test only if the applicant passed the knowledge test after July 31, 2014, and is employed:

(1) As a flightcrew member by a part 119 certificate holder conducting operations under parts 125 or 135 of this chapter at the time of the practical test and has satisfactorily accomplished that operator's approved pilot-in-command training or checking program; or

(2) As a flightcrew member by a part 119 certificate holder conducting operations under part 121 of this chapter at the time of the practical test and has satisfactorily accomplished that operator's approved initial training program; or

(3) By the U.S. Armed Forces as a flight crewmember in U.S. military air transport operations at the time of the practical test and has completed the pilot in command aircraft qualification training program that is appropriate to the pilot certificate and rating sought.

(c) An applicant for an airline transport pilot certificate with a rating other than those ratings set forth in paragraph (b) of this section may take the practical test for that certificate or rating with an expired knowledge test report, provided that the applicant is employed:

(1) As a flightcrew member by a part 119 certificate holder conducting operations under parts 125 or 135 of this

chapter at the time of the practical test and has satisfactorily accomplished that operator's approved pilot-in-command training or checking program; or

(2) By the U.S. Armed Forces as a flight crewmember in U.S. military air transport operations at the time of the practical test and has completed the pilot in command aircraft qualification training program that is appropriate to the pilot certificate and rating sought.

(d) In addition to the requirements in paragraph (a) of this section, to be eligible for a practical test for an airline transport pilot certificate with an airplane category multiengine class rating or airline transport pilot certificate obtained concurrently with an airplane type rating, an applicant must:

(1) If the applicant passed the knowledge test after July 31, 2014, present the graduation certificate for the airline transport pilot certification training program in § 61.156, at the time of application for the practical test;

(2) If applying for the practical test under the aeronautical experience requirements of § 61.160(a), the applicant must present the documents required by that section to substantiate eligibility; and

(3) If applying for the practical test under the aeronautical experience requirements of § 61.160(b), (c), or (d), the applicant must present an official transcript and certifying document from an institution of higher education that holds a letter of authorization from the Administrator under § 61.169.

(e) A person is not required to comply with the provisions of paragraph (a)(6) of this section if that person:

(1) Holds a foreign pilot license issued by a contracting State to the Convention on International Civil Aviation that authorizes at least the privileges of the pilot certificate sought;

(2) Is only applying for a type rating; or

(3) Is applying for an airline transport pilot certificate or an additional rating to an airline transport pilot certificate in an aircraft that does not require an aircraft type rating practical test.

(f) If all increments of the practical test for a certificate or rating are not completed on the same date, then all the remaining increments of the test must be completed within 2 calendar months after the month the applicant began the test.

(g) If all increments of the practical test for a certificate or rating are not completed within 2 calendar months after the month the applicant began the test, the applicant must retake the entire practical test.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40897, July 30, 1997, as amended by Amdt. 61–104, 63 FR 20286, Apr. 23, 1998; Amdt. 61–124, 74 FR 42548, Aug. 21, 2009; Amdt. 61–130, 78 FR 42373, July 15, 2013; Amdt. 61–130B, 78 FR 77573, Dec. 24, 2013]

### § 61.41 Flight training received from flight instructors not certificated by the FAA.

(a) A person may credit flight training toward the requirements of a pilot certificate or rating issued under this part, if that person received the training from:

(1) A flight instructor of an Armed Force in a program for training military pilots of either—

(i) The United States; or

(ii) A foreign contracting State to the Convention on International Civil Aviation.

(2) A flight instructor who is authorized to give such training by the licensing authority of a foreign contracting State to the Convention on International Civil Aviation, and the flight training is given outside the United States.

(b) A flight instructor described in paragraph (a) of this section is only authorized to give endorsements to show training given.

### § 61.43 Practical tests: General procedures.

(a) Completion of the practical test for a certificate or rating consists of—

(1) Performing the tasks specified in the areas of operation for the airman certificate or rating sought within the approved practical test standards;

(2) Demonstrating mastery of the aircraft by performing each task successfully;

(3) Demonstrating proficiency and competency within the approved standards; and

(4) Demonstrating sound judgment.

(b) The pilot flight crew complement required during the practical test is based on one of the following requirements that applies to the aircraft being used on the practical test:

(1) If the aircraft's FAA-approved flight manual requires the pilot flight crew complement be a single pilot, then the applicant must demonstrate single pilot proficiency on the practical test.

(2) If the aircraft's type certification data sheet requires the pilot flight crew complement be a single pilot, then the applicant must demonstrate single pilot proficiency on the practical test.

(3) If the FAA Flight Standardization Board report, FAA-approved aircraft flight manual, or aircraft type certification data sheet allows the pilot flight crew complement to be either a single pilot, or a pilot and a copilot, then the applicant may demonstrate single pilot proficiency or have a copilot on the practical test. If the applicant performs the practical test with a copilot, the limitation of ''Second in Command Required'' will be placed on the applicant's pilot certificate. The limitation may be removed if the applicant passes the practical test by demonstrating single-pilot proficiency in the aircraft in which single-pilot privileges are sought.

(c) If an applicant fails any area of operation, that applicant fails the practical test.

(d) An applicant is not eligible for a certificate or rating sought until all the areas of operation are passed.

(e) The examiner or the applicant may discontinue a practical test at any time:

(1) When the applicant fails one or more of the areas of operation; or

(2) Due to inclement weather conditions, aircraft airworthiness, or any other safety-of-flight concern.

(f) If a practical test is discontinued, the applicant is entitled credit for those areas of operation that were passed, but only if the applicant:

(1) Passes the remainder of the practical test within the 60-day period after the date the practical test was discontinued;

(2) Presents to the examiner for the retest the original notice of disapproval form or the letter of discontinuance form, as appropriate;

(3) Satisfactorily accomplishes any additional training needed and obtains the appropriate instructor endorsements, if additional training is required; and

(4) Presents to the examiner for the retest a properly completed and signed application.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–124, 74 FR 42549, Aug. 21, 2009]

### § 61.45 Practical tests: Required aircraft and equipment.

(a) *General.* Except as provided in paragraph (a)(2) of this section or when permitted to accomplish the entire flight increment of the practical test in a flight simulator or a flight training device, an applicant for a certificate or rating issued under this part must furnish:

(1) An aircraft of U.S. registry for each required test that—

(i) Is of the category, class, and type, if applicable, for which the applicant is applying for a certificate or rating; and

(ii) Has a standard airworthiness certificate or special airworthiness certificate in the limited, primary, or light-sport category.

(2) At the discretion of the examiner who administers the practical test, the applicant may furnish—

(i) An aircraft that has an airworthiness certificate other than a standard airworthiness certificate or special airworthiness certificate in the limited, primary, or light-sport category, but that otherwise meets the requirements of paragraph (a)(1) of this section;

(ii) An aircraft of the same category, class, and type, if applicable, of foreign registry that is properly certificated by the country of registry; or

(iii) A military aircraft of the same category, class, and type, if aircraft class and type are appropriate, for which the applicant is applying for a certificate or rating, and provided—

(A) The aircraft is under the direct operational control of the U.S. Armed Forces;

(B) The aircraft is airworthy under the maintenance standards of the U.S. Armed Forces; and

(C) The applicant has a letter from his or her commanding officer authorizing the use of the aircraft for the practical test.

(b) *Required equipment (other than controls).* (1) Except as provided in paragraph (b)(2) of this section, an aircraft used for a practical test must have—

(i) The equipment for each area of operation required for the practical test;

(ii) No prescribed operating limitations that prohibit its use in any of the areas of operation required for the practical test;

(iii) Except as provided in paragraphs (e) and (f) of this section, at least two pilot stations with adequate visibility for each person to operate the aircraft safely; and

(iv) Cockpit and outside visibility adequate to evaluate the performance of the applicant when an additional jump seat is provided for the examiner.

(2) An applicant for a certificate or rating may use an aircraft with operating characteristics that preclude the applicant from performing all of the tasks required for the practical test. However, the applicant's certificate or rating, as appropriate, will be issued with an appropriate limitation.

(c) *Required controls.* Except for lighter-than-air aircraft, and a glider without an engine, an aircraft used for a practical test must have engine power controls and flight controls that are easily reached and operable in a conventional manner by both pilots, unless the Examiner determines that the practical test can be conducted safely in the aircraft without the controls easily reached by the Examiner.

(d) *Simulated instrument flight equipment.* An applicant for a practical test that involves maneuvering an aircraft solely by reference to instruments must furnish:

(1) Equipment on board the aircraft that permits the applicant to pass the areas of operation that apply to the rating sought; and

(2) A device that prevents the applicant from having visual reference outside the aircraft, but does not prevent the examiner from having visual reference outside the aircraft, and is otherwise acceptable to the Administrator.

(e) *Aircraft with single controls.* A practical test may be conducted in an aircraft having a single set of controls, provided the:

(1) Examiner agrees to conduct the test;

(2) Test does not involve a demonstration of instrument skills; and

(3) Proficiency of the applicant can be observed by an examiner who is in a position to observe the applicant.

(f) *Light-sport aircraft with a single seat.* A practical test for a sport pilot certificate may be conducted in a light-sport aircraft having a single seat provided that the—

(1) Examiner agrees to conduct the test;

(2) Examiner is in a position to observe the operation of the aircraft and evaluate the proficiency of the applicant; and

(3) Pilot certificate of an applicant successfully passing the test is issued a pilot certificate with a limitation ''No passenger carriage and flight in a single-seat light-sport aircraft only.''

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40897, July 30, 1997; Amdt. 61–104, 63 FR 20286, Apr. 23, 1998; Amdt. 61–110, 69 FR 44865, July 27, 2004; Amdt. 61–124, 74 FR 42549, Aug. 21, 2009]

### § 61.47 Status of an examiner who is authorized by the Administrator to conduct practical tests.

(a) An examiner represents the Administrator for the purpose of conducting practical tests for certificates and ratings issued under this part and to observe an applicant's ability to perform the areas of operation on the practical test.

(b) The examiner is not the pilot in command of the aircraft during the practical test unless the examiner agrees to act in that capacity for the flight or for a portion of the flight by prior arrangement with:

(1) The applicant; or

(2) A person who would otherwise act as pilot in command of the flight or for a portion of the flight.

(c) Notwithstanding the type of aircraft used during the practical test, the applicant and the examiner (and any other occupants authorized to be on board by the examiner) are not subject to the requirements or limitations for

the carriage of passengers that are specified in this chapter.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40897, July 30, 1997]

### § 61.49 Retesting after failure.

(a) An applicant for a knowledge or practical test who fails that test may reapply for the test only after the applicant has received:

(1) The necessary training from an authorized instructor who has determined that the applicant is proficient to pass the test; and

(2) An endorsement from an authorized instructor who gave the applicant the additional training.

(b) An applicant for a flight instructor certificate with an airplane category rating or, for a flight instructor certificate with a glider category rating, who has failed the practical test due to deficiencies in instructional proficiency on stall awareness, spin entry, spins, or spin recovery must:

(1) Comply with the requirements of paragraph (a) of this section before being retested;

(2) Bring an aircraft to the retest that is of the appropriate aircraft category for the rating sought and is certificated for spins; and

(3) Demonstrate satisfactory instructional proficiency on stall awareness, spin entry, spins, and spin recovery to an examiner during the retest.

### § 61.51 Pilot logbooks.

(a) *Training time and aeronautical experience.* Each person must document and record the following time in a manner acceptable to the Administrator:

(1) Training and aeronautical experience used to meet the requirements for a certificate, rating, or flight review of this part.

(2) The aeronautical experience required for meeting the recent flight experience requirements of this part.

(b) *Logbook entries.* For the purposes of meeting the requirements of paragraph (a) of this section, each person must enter the following information for each flight or lesson logged:

(1) General—

(i) Date.

(ii) Total flight time or lesson time.

(iii) Location where the aircraft departed and arrived, or for lessons in a flight simulator or flight training device, the location where the lesson occurred.

(iv) Type and identification of aircraft, flight simulator, flight training device, or aviation training device, as appropriate.

(v) The name of a safety pilot, if required by §91.109 of this chapter.

(2) Type of pilot experience or training—

(i) Solo.

(ii) Pilot in command.

(iii) Second in command.

(iv) Flight and ground training received from an authorized instructor.

(v) Training received in a flight simulator, flight training device, or aviation training device from an authorized instructor.

(3) Conditions of flight—

(i) Day or night.

(ii) Actual instrument.

(iii) Simulated instrument conditions in flight, a flight simulator, flight training device, or aviation training device.

(iv) Use of night vision goggles in an aircraft in flight, in a flight simulator, or in a flight training device.

(c) *Logging of pilot time.* The pilot time described in this section may be used to:

(1) Apply for a certificate or rating issued under this part or a privilege authorized under this part; or

(2) Satisfy the recent flight experience requirements of this part.

(d) *Logging of solo flight time.* Except for a student pilot performing the duties of pilot in command of an airship requiring more than one pilot flight crewmember, a pilot may log as solo flight time only that flight time when the pilot is the sole occupant of the aircraft.

(e) *Logging pilot-in-command flight time.* (1) A sport, recreational, private, commercial, or airline transport pilot may log pilot in command flight time for flights-

(i) When the pilot is the sole manipulator of the controls of an aircraft for which the pilot is rated, or has sport pilot privileges for that category and class of aircraft, if the aircraft class rating is appropriate;

(ii) When the pilot is the sole occupant in the aircraft;

(iii) When the pilot, except for a holder of a sport or recreational pilot certificate, acts as pilot in command of an aircraft for which more than one pilot is required under the type certification of the aircraft or the regulations under which the flight is conducted; or

(iv) When the pilot performs the duties of pilot in command while under the supervision of a qualified pilot in command provided—

(A) The pilot performing the duties of pilot in command holds a commercial or airline transport pilot certificate and aircraft rating that is appropriate to the category and class of aircraft being flown, if a class rating is appropriate;

(B) The pilot performing the duties of pilot in command is undergoing an approved pilot in command training program that includes ground and flight training on the following areas of operation—

(*1*) Preflight preparation;

(*2*) Preflight procedures;

(*3*) Takeoff and departure;

(*4*) In-flight maneuvers;

(*5*) Instrument procedures;

(*6*) Landings and approaches to landings;

(*7*) Normal and abnormal procedures;

(*8*) Emergency procedures; and

(*9*) Postflight procedures;

(C) The supervising pilot in command holds—

(*1*) A commercial pilot certificate and flight instructor certificate, and aircraft rating that is appropriate to the category, class, and type of aircraft being flown, if a class or type rating is required; or

(*2*) An airline transport pilot certificate and aircraft rating that is appropriate to the category, class, and type of aircraft being flown, if a class or type rating is required; and

(D) The supervising pilot in command logs the pilot in command training in the pilot's logbook, certifies the pilot in command training in the pilot's logbook and attests to that certification with his or her signature, and flight instructor certificate number.

(2) If rated to act as pilot in command of the aircraft, an airline transport pilot may log all flight time while acting as pilot in command of an operation requiring an airline transport pilot certificate.

(3) A certificated flight instructor may log pilot in command flight time for all flight time while serving as the authorized instructor in an operation if the instructor is rated to act as pilot in command of that aircraft.

(4) A student pilot may log pilot-in-command time only when the student pilot—

(i) Is the sole occupant of the aircraft or is performing the duties of pilot of command of an airship requiring more than one pilot flight crewmember;

(ii) Has a solo flight endorsement as required under §61.87 of this part; and

(iii) Is undergoing training for a pilot certificate or rating.

(f) *Logging second-in-command flight time.* A person may log second-in-command time only for that flight time during which that person:

(1) Is qualified in accordance with the second-in-command requirements of §61.55 of this part, and occupies a crewmember station in an aircraft that requires more than one pilot by the aircraft's type certificate; or

(2) Holds the appropriate category, class, and instrument rating (if an instrument rating is required for the flight) for the aircraft being flown, and more than one pilot is required under the type certification of the aircraft or the regulations under which the flight is being conducted.

(g) *Logging instrument time.* (1) A person may log instrument time only for that flight time when the person operates the aircraft solely by reference to instruments under actual or simulated instrument flight conditions.

(2) An authorized instructor may log instrument time when conducting instrument flight instruction in actual instrument flight conditions.

(3) For the purposes of logging instrument time to meet the recent instrument experience requirements of §61.57(c) of this part, the following information must be recorded in the person's logbook—

(i) The location and type of each instrument approach accomplished; and

(ii) The name of the safety pilot, if required.

(4) A person can use time in a flight simulator, flight training device, or aviation training device for acquiring instrument aeronautical experience for a pilot certificate, rating, or instrument recency experience, provided an authorized instructor is present to observe that time and signs the person's logbook or training record to verify the time and the content of the training session.

(h) *Logging training time.* (1) A person may log training time when that person receives training from an authorized instructor in an aircraft, flight simulator, or flight training device.

(2) The training time must be logged in a logbook and must:

(i) Be endorsed in a legible manner by the authorized instructor; and

(ii) Include a description of the training given, the length of the training lesson, and the authorized instructor's signature, certificate number, and certificate expiration date.

(i) *Presentation of required documents.* (1) Persons must present their pilot certificate, medical certificate, logbook, or any other record required by this part for inspection upon a reasonable request by—

(i) The Administrator;

(ii) An authorized representative from the National Transportation Safety Board; or

(iii) Any Federal, State, or local law enforcement officer.

(2) A student pilot must carry the following items in the aircraft on all solo cross-country flights as evidence of the required authorized instructor clearances and endorsements—

(i) Pilot logbook;

(ii) Student pilot certificate; and

(iii) Any other record required by this section.

(3) A sport pilot must carry his or her logbook or other evidence of required authorized instructor endorsements on all flights.

(4) A recreational pilot must carry his or her logbook with the required authorized instructor endorsements on all solo flights—

(i) That exceed 50 nautical miles from the airport at which training was received;

(ii) Within airspace that requires communication with air traffic control;

(iii) Conducted between sunset and sunrise; or

(iv) In an aircraft for which the pilot does not hold an appropriate category or class rating.

(5) A flight instructor with a sport pilot rating must carry his or her logbook or other evidence of required authorized instructor endorsements on all flights when providing flight training.

(j) *Aircraft requirements for logging flight time.* For a person to log flight time, the time must be acquired in an aircraft that is identified as an aircraft under § 61.5(b), and is—

(1) An aircraft of U.S. registry with either a standard or special airworthiness certificate;

(2) An aircraft of foreign registry with an airworthiness certificate that is approved by the aviation authority of a foreign country that is a Member State to the Convention on International Civil Aviation Organization;

(3) A military aircraft under the direct operational control of the U.S. Armed Forces; or

(4) A public aircraft under the direct operational control of a Federal, State, county, or municipal law enforcement agency, if the flight time was acquired by the pilot while engaged on an official law enforcement flight for a Federal, State, County, or Municipal law enforcement agency.

(k) *Logging night vision goggle time.* (1) A person may log night vision goggle time only for the time the person uses night vision goggles as the primary visual reference of the surface and operates:

(i) An aircraft during a night vision goggle operation; or

(ii) A flight simulator or flight training device with the lighting system adjusted to represent the period beginning 1 hour after sunset and ending 1 hour before sunrise.

(2) An authorized instructor may log night vision goggle time when that person conducts training using night vision goggles as the primary visual reference of the surface and operates:

(i) An aircraft during a night goggle operation; or

(ii) A flight simulator or flight training device with the lighting system adjusted to represent the period beginning 1 hour after sunset and ending 1 hour before sunrise.

(3) To log night vision goggle time to meet the recent night vision goggle experience requirements under § 61.57(f), a person must log the information required under § 61.51(b).

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40897, July 30, 1997; Amdt. 61–104, 63 FR 20286, Apr. 23, 1998; Amdt. 61–110, 69 FR 44865, July 27, 2004; Amdt. 61–124, 74 FR 42549, Aug. 21, 2009; Amdt. 61–128, 76 FR 54105, Aug. 31, 2011]

### § 61.52 Use of aeronautical experience obtained in ultralight vehicles.

(a) Before January 31, 2012, a person may use aeronautical experience obtained in an ultralight vehicle to meet the requirements for the following certificates and ratings issued under this part:

(1) A sport pilot certificate.

(2) A flight instructor certificate with a sport pilot rating;

(3) A private pilot certificate with a weight-shift-control or powered parachute category rating.

(b) Before January 31, 2012, a person may use aeronautical experience obtained in an ultralight vehicle to meet the provisions of § 61.69.

(c) A person using aeronautical experience obtained in an ultralight vehicle to meet the requirements for a certificate or rating specified in paragraph (a) of this section or the requirements of paragraph (b) of this section must—

(1) Have been a registered ultralight pilot with an FAA-recognized ultralight organization when that aeronautical experience was obtained;

(2) Document and log that aeronautical experience in accordance with the provisions for logging aeronautical experience specified by an FAA-recognized ultralight organization and in accordance with the provisions for logging pilot time in aircraft as specified in § 61.51;

(3) Obtain the aeronautical experience in a category and class of vehicle corresponding to the rating or privilege sought; and

(4) Provide the FAA with a certified copy of his or her ultralight pilot records from an FAA-recognized ultralight organization, that —

(i) Document that he or she is a registered ultralight pilot with that FAA-recognized ultralight organization; and

(ii) Indicate that he or she is recognized to operate the category and class of aircraft for which sport pilot privileges are sought.

[Doc. No. FAA–2001–11133, 69 FR 44865, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5220, Feb. 1, 2010]

### § 61.53 Prohibition on operations during medical deficiency.

(a) *Operations that require a medical certificate.* Except as provided for in paragraph (b) of this section, no person who holds a medical certificate issued under part 67 of this chapter may act as pilot in command, or in any other capacity as a required pilot flight crewmember, while that person:

(1) Knows or has reason to know of any medical condition that would make the person unable to meet the requirements for the medical certificate necessary for the pilot operation; or

(2) Is taking medication or receiving other treatment for a medical condition that results in the person being unable to meet the requirements for the medical certificate necessary for the pilot operation.

(b) *Operations that do not require a medical certificate.* For operations provided for in § 61.23(b) of this part, a person shall not act as pilot in command, or in any other capacity as a required pilot flight crewmember, while that person knows or has reason to know of any medical condition that would make the person unable to operate the aircraft in a safe manner.

(c) *Operations requiring a medical certificate or a U.S. driver's license.* For operations provided for in § 61.23(c), a person must meet the provisions of—

(1) Paragraph (a) of this section if that person holds a medical certificate issued under part 67 of this chapter and does not hold a U.S. driver's license.

(2) Paragraph (b) of this section if that person holds a U.S. driver's license.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44866, July 27, 2004; Amdt. 61–124, 74 FR 42550, Aug. 21, 2009]

### § 61.55 Second-in-command qualifications.

(a) A person may serve as a second-in-command of an aircraft type certificated for more than one required pilot flight crewmember or in operations requiring a second-in-command pilot flight crewmember only if that person holds:

(1) At least a private pilot certificate with the appropriate category and class rating; and

(2) An instrument rating or privilege that applies to the aircraft being flown if the flight is under IFR; and

(3) At least a pilot type rating for the aircraft being flown unless the flight will be conducted as domestic flight operations within the United States airspace.

(b) Except as provided in paragraph (e) of this section, no person may serve as a second-in-command of an aircraft type certificated for more than one required pilot flight crewmember or in operations requiring a second-in-command unless that person has within the previous 12 calendar months:

(1) Become familiar with the following information for the specific type aircraft for which second-in-command privileges are requested—

(i) Operational procedures applicable to the powerplant, equipment, and systems.

(ii) Performance specifications and limitations.

(iii) Normal, abnormal, and emergency operating procedures.

(iv) Flight manual.

(v) Placards and markings.

(2) Except as provided in paragraph (g) of this section, performed and logged pilot time in the type of aircraft or in a flight simulator that represents the type of aircraft for which second-in-command privileges are requested, which includes—

(i) Three takeoffs and three landings to a full stop as the sole manipulator of the flight controls;

(ii) Engine-out procedures and maneuvering with an engine out while executing the duties of pilot in command; and

(iii) Crew resource management training.

(c) If a person complies with the requirements in paragraph (b) of this section in the calendar month before or the calendar month after the month in which compliance with this section is required, then that person is considered to have accomplished the training and practice in the month it is due.

(d) A person may receive a second-in-command pilot type rating for an aircraft after satisfactorily completing the second-in-command familiarization training requirements under paragraph (b) of this section in that type of aircraft provided the training was completed within the 12 calendar months before the month of application for the SIC pilot type rating. The person must comply with the following application and pilot certification procedures:

(1) The person who provided the training must sign the applicant's logbook or training record after each lesson in accordance with § 61.51(h)(2) of this part. In lieu of the trainer, it is permissible for a qualified management official within the organization to sign the applicant's training records or logbook and make the required endorsement. The qualified management official must hold the position of Chief Pilot, Director of Training, Director of Operations, or another comparable management position within the organization that provided the training and must be in a position to verify the applicant's training records and that the training was given.

(2) The trainer or qualified management official must make an endorsement in the applicant's logbook that states ''[Applicant's Name and Pilot Certificate Number] has demonstrated the skill and knowledge required for the safe operation of the [Type of Aircraft], relevant to the duties and responsibilities of a second in command.''

(3) If the applicant's flight experience and/or training records are in an electronic form, the applicant must present a paper copy of those records containing the signature of the trainer or qualified management official to an FAA Flight Standards District Office or Examiner.

(4) The applicant must complete and sign an Airman Certificate and/or Rating Application, FAA Form 8710–1, and present the application to an FAA

Flight Standards District Office or to an Examiner.

(5) The person who provided the ground and flight training to the applicant must sign the ''Instructor's Recommendation'' section of the Airman Certificate and/or Rating Application, FAA Form 8710–1. In lieu of the trainer, it is permissible for a qualified management official within the organization to sign the applicant's FAA Form 8710–1.

(6) The applicant must appear in person at a FAA Flight Standards District Office or to an Examiner with his or her logbook/training records and with the completed and signed FAA Form 8710–1.

(7) There is no practical test required for the issuance of the ''SIC Privileges Only'' pilot type rating.

(e) A person may receive a second-in-command pilot type rating for the type of aircraft after satisfactorily completing an approved second-in-command training program, proficiency check, or competency check under subpart K of part 91, part 125, or part 135, as appropriate, in that type of aircraft provided the training was completed within the 12 calendar months before the month of application for the SIC pilot type rating. The person must comply with the following application and pilot certification procedures:

(1) The person who provided the training must sign the applicant's logbook or training record after each lesson in accordance with §61.51(h)(2) of this part. In lieu of the trainer, it is permissible for a qualified management official within the organization to sign the applicant's training records or logbook and make the required endorsement. The qualified management official must hold the position of Chief Pilot, Director of Training, Director of Operations, or another comparable management position within the organization that provided the training and must be in a position to verify the applicant's training records and that the training was given.

(2) The trainer or qualified management official must make an endorsement in the applicant's logbook that states ''[Applicant's Name and Pilot Certificate Number] has demonstrated the skill and knowledge required for the safe operation of the [Type of Aircraft], relevant to the duties and responsibilities of a second in command.''

(3) If the applicant's flight experience and/or training records are in an electronic form, the applicant must provide a paper copy of those records containing the signature of the trainer or qualified management official to an FAA Flight Standards District Office, an Examiner, or an Aircrew Program Designee.

(4) The applicant must complete and sign an Airman Certificate and/or Rating Application, FAA Form 8710–1, and present the application to an FAA Flight Standards District Office or to an Examiner or to an authorized Aircrew Program Designee.

(5) The person who provided the ground and flight training to the applicant must sign the ''Instructor's Recommendation'' section of the Airman Certificate and/or Rating Application, FAA Form 8710–1. In lieu of the trainer, it is permissible for a qualified management official within the organization to sign the applicant's FAA Form 8710–1.

(6) The applicant must appear in person at an FAA Flight Standards District Office or to an Examiner or to an authorized Aircrew Program Designee with his or her logbook/training records and with the completed and signed FAA Form 8710–1.

(7) There is no practical test required for the issuance of the ''SIC Privileges Only'' pilot type rating.

(f) The familiarization training requirements of paragraph (b) of this section do not apply to a person who is:

(1) Designated and qualified as pilot in command under subpart K of part 91, part 121, 125, or 135 of this chapter in that specific type of aircraft;

(2) Designated as the second in command under subpart K of part 91, part 121, 125, or 135 of this chapter in that specific type of aircraft;

(3) Designated as the second in command in that specific type of aircraft for the purpose of receiving flight training required by this section, and no passengers or cargo are carried on the aircraft; or

(4) Designated as a safety pilot for purposes required by §91.109 of this chapter.

(g) The holder of a commercial or airline transport pilot certificate with the appropriate category and class rating is not required to meet the requirements of paragraph (b)(2) of this section, provided the pilot:

(1) Is conducting a ferry flight, aircraft flight test, or evaluation flight of an aircraft's equipment; and

(2) Is not carrying any person or property on board the aircraft, other than necessary for conduct of the flight.

(h) For the purpose of meeting the requirements of paragraph (b) of this section, a person may serve as second in command in that specific type aircraft, provided:

(1) The flight is conducted under day VFR or day IFR; and

(2) No person or property is carried on board the aircraft, other than necessary for conduct of the flight.

(i) The training under paragraphs (b) and (d) of this section and the training, proficiency check, and competency check under paragraph (e) of this section may be accomplished in a flight simulator that is used in accordance with an approved training course conducted by a training center certificated under part 142 of this chapter or under subpart K of part 91, part 121 or part 135 of this chapter.

(j) When an applicant for an initial second-in-command qualification for a particular type of aircraft receives all the training in a flight simulator, that applicant must satisfactorily complete one takeoff and one landing in an aircraft of the same type for which the qualification is sought. This requirement does not apply to an applicant who completes a proficiency check under part 121 or competency check under subpart K, part 91, part 125, or part 135 for the particular type of aircraft.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40898, July 30, 1997; Amdt. 61–109, 68 FR 54559, Sept. 17, 2003; Amdt. 61–113, 70 FR 45271, Aug. 4, 2005; Amdt. 61–109, 70 FR 61890, Oct. 27, 2005; Amdt. 61–124, 74 FR 42550, Aug. 21, 2009; Amdt. 61–128, 76 FR 54105, Aug. 31, 2011; Amdt. 61–130, 78 FR 42374, July 15, 2013]

### § 61.56 Flight review.

(a) Except as provided in paragraphs (b) and (f) of this section, a flight review consists of a minimum of 1 hour of flight training and 1 hour of ground training. The review must include:

(1) A review of the current general operating and flight rules of part 91 of this chapter; and

(2) A review of those maneuvers and procedures that, at the discretion of the person giving the review, are necessary for the pilot to demonstrate the safe exercise of the privileges of the pilot certificate.

(b) Glider pilots may substitute a minimum of three instructional flights in a glider, each of which includes a flight to traffic pattern altitude, in lieu of the 1 hour of flight training required in paragraph (a) of this section.

(c) Except as provided in paragraphs (d), (e), and (g) of this section, no person may act as pilot in command of an aircraft unless, since the beginning of the 24th calendar month before the month in which that pilot acts as pilot in command, that person has—

(1) Accomplished a flight review given in an aircraft for which that pilot is rated by an authorized instructor and

(2) A logbook endorsed from an authorized instructor who gave the review certifying that the person has satisfactorily completed the review.

(d) A person who has, within the period specified in paragraph (c) of this section, passed any of the following need not accomplish the flight review required by this section:

(1) A pilot proficiency check or practical test conducted by an examiner, an approved pilot check airman, or a U.S. Armed Force, for a pilot certificate, rating, or operating privilege.

(2) A practical test conducted by an examiner for the issuance of a flight instructor certificate, an additional rating on a flight instructor certificate, renewal of a flight instructor certificate, or reinstatement of a flight instructor certificate.

(e) A person who has, within the period specified in paragraph (c) of this section, satisfactorily accomplished one or more phases of an FAA-sponsored pilot proficiency award program

need not accomplish the flight review required by this section.

(f) A person who holds a flight instructor certificate and who has, within the period specified in paragraph (c) of this section, satisfactorily completed a renewal of a flight instructor certificate under the provisions in § 61.197 need not accomplish the one hour of ground training specified in paragraph (a) of this section.

(g) A student pilot need not accomplish the flight review required by this section provided the student pilot is undergoing training for a certificate and has a current solo flight endorsement as required under § 61.87 of this part.

(h) The requirements of this section may be accomplished in combination with the requirements of § 61.57 and other applicable recent experience requirements at the discretion of the authorized instructor conducting the flight review.

(i) A flight simulator or flight training device may be used to meet the flight review requirements of this section subject to the following conditions:

(1) The flight simulator or flight training device must be used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(2) Unless the flight review is undertaken in a flight simulator that is approved for landings, the applicant must meet the takeoff and landing requirements of § 61.57(a) or § 61.57(b) of this part.

(3) The flight simulator or flight training device used must represent an aircraft or set of aircraft for which the pilot is rated.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40898, July 30, 1997; Amdt. 61–104, 63 FR 20287, Apr. 23, 1998; Amdt. 61–124, 74 FR 42550, Aug. 21, 2009; Amdt. 61–131, 78 FR 56828, Sept. 16, 2013]

### § 61.57 Recent flight experience: Pilot in command.

(a) *General experience.* (1) Except as provided in paragraph (e) of this section, no person may act as a pilot in command of an aircraft carrying passengers or of an aircraft certificated for more than one pilot flight crewmember unless that person has made at least three takeoffs and three landings within the preceding 90 days, and—

(i) The person acted as the sole manipulator of the flight controls; and

(ii) The required takeoffs and landings were performed in an aircraft of the same category, class, and type (if a type rating is required), and, if the aircraft to be flown is an airplane with a tailwheel, the takeoffs and landings must have been made to a full stop in an airplane with a tailwheel.

(2) For the purpose of meeting the requirements of paragraph (a)(1) of this section, a person may act as a pilot in command of an aircraft under day VFR or day IFR, provided no persons or property are carried on board the aircraft, other than those necessary for the conduct of the flight.

(3) The takeoffs and landings required by paragraph (a)(1) of this section may be accomplished in a flight simulator or flight training device that is—

(i) Approved by the Administrator for landings; and

(ii) Used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(b) *Night takeoff and landing experience.* (1) Except as provided in paragraph (e) of this section, no person may act as pilot in command of an aircraft carrying passengers during the period beginning 1 hour after sunset and ending 1 hour before sunrise, unless within the preceding 90 days that person has made at least three takeoffs and three landings to a full stop during the period beginning 1 hour after sunset and ending 1 hour before sunrise, and—

(i) That person acted as sole manipulator of the flight controls; and

(ii) The required takeoffs and landings were performed in an aircraft of the same category, class, and type (if a type rating is required).

(2) The takeoffs and landings required by paragraph (b)(1) of this section may be accomplished in a flight simulator that is—

(i) Approved by the Administrator for takeoffs and landings, if the visual system is adjusted to represent the period described in paragraph (b)(1) of this section; and

(ii) Used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(c) *Instrument experience.* Except as provided in paragraph (e) of this section, a person may act as pilot in command under IFR or weather conditions less than the minimums prescribed for VFR only if:

(1) *Use of an airplane, powered-lift, helicopter, or airship for maintaining instrument experience.* Within the 6 calendar months preceding the month of the flight, that person performed and logged at least the following tasks and iterations in an airplane, powered-lift, helicopter, or airship, as appropriate, for the instrument rating privileges to be maintained in actual weather conditions, or under simulated conditions using a view-limiting device that involves having performed the following—

(i) Six instrument approaches.

(ii) Holding procedures and tasks.

(iii) Intercepting and tracking courses through the use of navigational electronic systems.

(2) *Use of a flight simulator or flight training device for maintaining instrument experience.* Within the 6 calendar months preceding the month of the flight, that person performed and logged at least the following tasks and iterations in a flight simulator or flight training device, provided the flight simulator or flight training device represents the category of aircraft for the instrument rating privileges to be maintained and involves having performed the following—

(i) Six instrument approaches.

(ii) Holding procedures and tasks.

(iii) Intercepting and tracking courses through the use of navigational electronic systems.

(3) *Use of an aviation training device for maintaining instrument experience.* Within the 2 calendar months preceding the month of the flight, that person performed and logged at least the following tasks, iterations, and time in an aviation training device and has performed the following—

(i) Three hours of instrument experience.

(ii) Holding procedures and tasks.

(iii) Six instrument approaches.

(iv) Two unusual attitude recoveries while in a descending, $V_{ne}$ airspeed condition and two unusual attitude recoveries while in an ascending, stall speed condition.

(v) Interception and tracking courses through the use of navigational electronic systems.

(4) *Combination of completing instrument experience in an aircraft and a flight simulator, flight training device, and aviation training device.* A person who elects to complete the instrument experience with a combination of an aircraft, flight simulator or flight training device, and aviation training device must have performed and logged the following within the 6 calendar months preceding the month of the flight—

(i) Instrument experience in an airplane, powered-lift, helicopter, or airship, as appropriate, for the instrument rating privileges to be maintained, performed in actual weather conditions, or under simulated weather conditions while using a view-limiting device, on the following instrument currency tasks:

(A) Instrument approaches.

(B) Holding procedures and tasks.

(C) Interception and tracking courses through the use of navigational electronic systems.

(ii) Instrument experience in a flight simulator or flight training device that represents the category of aircraft for the instrument rating privileges to be maintained and involves performing at least the following tasks—

(A) Instrument approaches.

(B) Holding procedures and tasks.

(C) Interception and tracking courses through the use of navigational electronic systems.

(iii) Instrument experience in an aviation training device that represents the category of aircraft for the instrument rating privileges to be maintained and involves performing at least the following tasks—

(A) Six instrument approaches.

(B) Holding procedures and tasks.

(C) Interception and tracking courses through the use of navigational electronic systems.

(5) *Combination of completing instrument experience in a flight simulator or flight training device, and an aviation*

*training device*. A person who elects to complete the instrument experience with a combination of a flight simulator, flight training device, and aviation training device must have performed the following within the 6 calendar months preceding the month of the flight—

(i) Instrument recency experience in a flight simulator or flight training device that represents the category of aircraft for the instrument rating privileges to be maintained and involves having performed the following tasks:

(A) Six instrument approaches.

(B) Holding procedures and tasks.

(C) Interception and tracking courses through the use of navigational electronic systems.

(ii) Three hours of instrument experience in an aviation training device that represents the category of aircraft for the instrument rating privileges to be maintained and involves performing at least the following tasks—

(A) Six instrument approaches.

(B) Holding procedures and tasks.

(C) Interception and tracking courses through the use of navigational electronic systems.

(D) Two unusual attitude recoveries while in a descending, $V_{ne}$ airspeed condition and two unusual attitude recoveries while in an ascending, stall speed condition.

(6) Maintaining instrument recent experience in a glider.

(i) Within the 6 calendar months preceding the month of the flight, that person must have performed and logged at least the following instrument currency tasks, iterations, and flight time, and the instrument currency must have been performed in actual weather conditions or under simulated weather conditions—

(A) One hour of instrument flight time in a glider or in a single engine airplane using a view-limiting device while performing interception and tracking courses through the use of navigation electronic systems.

(B) Two hours of instrument flight time in a glider or a single engine airplane with the use of a view-limiting device while performing straight glides, turns to specific headings, steep turns, flight at various airspeeds, navigation, and slow flight and stalls.

(ii) Before a pilot is allowed to carry a passenger in a glider under IFR or in weather conditions less than the minimums prescribed for VFR, that pilot must—

(A) Have logged and performed 2 hours of instrument flight time in a glider within the 6 calendar months preceding the month of the flight.

(B) Use a view-limiting-device while practicing performance maneuvers, performance airspeeds, navigation, slow flight, and stalls.

(d) *Instrument proficiency check*. Except as provided in paragraph (e) of this section, a person who has failed to meet the instrument experience requirements of paragraph (c) for more than six calendar months may reestablish instrument currency only by completing an instrument proficiency check. The instrument proficiency check must consist of the areas of operation and instrument tasks required in the instrument rating practical test standards.

(1) The instrument proficiency check must be—

(i) In an aircraft that is appropriate to the aircraft category;

(ii) For other than a glider, in a flight simulator or flight training device that is representative of the aircraft category; or

(iii) For a glider, in a single-engine airplane or a glider.

(2) The instrument proficiency check must be given by—

(i) An examiner;

(ii) A person authorized by the U.S. Armed Forces to conduct instrument flight tests, provided the person being tested is a member of the U.S. Armed Forces;

(iii) A company check pilot who is authorized to conduct instrument flight tests under part 121, 125, or 135 of this chapter or subpart K of part 91 of this chapter, and provided that both the check pilot and the pilot being tested are employees of that operator or fractional ownership program manager, as applicable;

(iv) An authorized instructor; or

(v) A person approved by the Administrator to conduct instrument practical tests.

(e) *Exceptions.* (1) Paragraphs (a) and (b) of this section do not apply to a pilot in command who is employed by a part 119 certificate holder authorized to conduct operations under part 125 when the pilot is engaged in a flight operation for that certificate holder if the pilot in command is in compliance with §§ 125.281 and 125.285 of this chapter.

(2) This section does not apply to a pilot in command who is employed by a part 119 certificate holder authorized to conduct operations under part 121 when the pilot is engaged in a flight operation under parts 91 and 121 for that certificate holder if the pilot in command is in compliance with §§ 121.435 or 121.436, as applicable, and § 121.439 of this chapter.

(3) This section does not apply to a pilot in command who is employed by a part 119 certificate holder authorized to conduct operations under part 135 when the pilot is engaged in a flight operation under parts 91 and 135 for that certificate holder if the pilot in command is in compliance with §§ 135.243 and 135.247 of this chapter.

(4) Paragraph (b) of this section does not apply to a pilot in command of a turbine-powered airplane that is type certificated for more than one pilot crewmember, provided that pilot has complied with the requirements of paragraph (e)(4)(i) or (ii) of this section:

(i) The pilot in command must hold at least a commercial pilot certificate with the appropriate category, class, and type rating for each airplane that is type certificated for more than one pilot crewmember that the pilot seeks to operate under this alternative, and:

(A) That pilot must have logged at least 1,500 hours of aeronautical experience as a pilot;

(B) In each airplane that is type certificated for more than one pilot crewmember that the pilot seeks to operate under this alternative, that pilot must have accomplished and logged the daytime takeoff and landing recent flight experience of paragraph (a) of this section, as the sole manipulator of the flight controls;

(C) Within the preceding 90 days prior to the operation of that airplane that is type certificated for more than one pilot crewmember, the pilot must have accomplished and logged at least 15 hours of flight time in the type of airplane that the pilot seeks to operate under this alternative; and

(D) That pilot has accomplished and logged at least 3 takeoffs and 3 landings to a full stop, as the sole manipulator of the flight controls, in a turbine-powered airplane that requires more than one pilot crewmember. The pilot must have performed the takeoffs and landings during the period beginning 1 hour after sunset and ending 1 hour before sunrise within the preceding 6 months prior to the month of the flight.

(ii) The pilot in command must hold at least a commercial pilot certificate with the appropriate category, class, and type rating for each airplane that is type certificated for more than one pilot crewmember that the pilot seeks to operate under this alternative, and:

(A) That pilot must have logged at least 1,500 hours of aeronautical experience as a pilot;

(B) In each airplane that is type certificated for more than one pilot crewmember that the pilot seeks to operate under this alternative, that pilot must have accomplished and logged the daytime takeoff and landing recent flight experience of paragraph (a) of this section, as the sole manipulator of the flight controls;

(C) Within the preceding 90 days prior to the operation of that airplane that is type certificated for more than one pilot crewmember, the pilot must have accomplished and logged at least 15 hours of flight time in the type of airplane that the pilot seeks to operate under this alternative; and

(D) Within the preceding 12 months prior to the month of the flight, the pilot must have completed a training program that is approved under part 142 of this chapter. The approved training program must have required and the pilot must have performed, at least 6 takeoffs and 6 landings to a full stop as the sole manipulator of the controls in a flight simulator that is representative of a turbine-powered airplane that requires more than one pilot crewmember. The flight simulator's visual system must have been adjusted to represent the period beginning 1 hour

after sunset and ending 1 hour before sunrise.

(f) *Night vision goggle operating experience.* (1) A person may act as pilot in command in a night vision goggle operation with passengers on board only if, within 2 calendar months preceding the month of the flight, that person performs and logs the following tasks as the sole manipulator of the controls on a flight during a night vision goggle operation—

(i) Three takeoffs and three landings, with each takeoff and landing including a climbout, cruise, descent, and approach phase of flight (only required if the pilot wants to use night vision goggles during the takeoff and landing phases of the flight).

(ii) Three hovering tasks (only required if the pilot wants to use night vision goggles when operating helicopters or powered-lifts during the hovering phase of flight).

(iii) Three area departure and area arrival tasks.

(iv) Three tasks of transitioning from aided night flight (*aided night flight* means that the pilot uses night vision goggles to maintain visual surface reference) to unaided night flight (*unaided night flight* means that the pilot does not use night vision goggles) and back to aided night flight.

(v) Three night vision goggle operations, or when operating helicopters or powered-lifts, six night vision goggle operations.

(2) A person may act as pilot in command using night vision goggles only if, within the 4 calendar months preceding the month of the flight, that person performs and logs the tasks listed in paragraph (f)(1)(i) through (v) of this section as the sole manipulator of the controls during a night vision goggle operation.

(g) *Night vision goggle proficiency check.* A person must either meet the night vision goggle experience requirements of paragraphs (f)(1) or (f)(2) of this section or pass a night vision goggle proficiency check to act as pilot in command using night vision goggles. The proficiency check must be performed in the category of aircraft that is appropriate to the night vision goggle operation for which the person is seeking the night vision goggle privilege or in a flight simulator or flight training device that is representative of that category of aircraft. The check must consist of the tasks listed in §61.31(k), and the check must be performed by:

(1) An Examiner who is qualified to perform night vision goggle operations in that same aircraft category and class;

(2) A person who is authorized by the U.S. Armed Forces to perform night vision goggle proficiency checks, provided the person being administered the check is also a member of the U.S. Armed Forces;

(3) A company check pilot who is authorized to perform night vision goggle proficiency checks under parts 121, 125, or 135 of this chapter, provided that both the check pilot and the pilot being tested are employees of that operator;

(4) An authorized flight instructor who is qualified to perform night vision goggle operations in that same aircraft category and class;

(5) A person who is qualified as pilot in command for night vision goggle operations in accordance with paragraph (f) of this section; or

(6) A person approved by the FAA to perform night vision goggle proficiency checks.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40898, July 30, 1997; Amdt. 61–106, 64 FR 23529, Apr. 30, 1999; Amdt. 61–109, 68 FR 54559, Sept. 17, 2003; Amdt. 61–124, 74 FR 42550, Aug. 21, 2009; Amdt. 61–127, 76 FR 19267, Apr. 7, 2011; Amdt. 61–129, 76 FR 78143, Dec. 16, 2011; Amdt. 61–130, 78 FR 42374, July 15, 2013; Amdt. 61–131, 78 FR 56828, Sept. 16, 2013]

### § 61.58 Pilot-in-command proficiency check: Operation of an aircraft that requires more than one pilot flight crewmember or is turbojet-powered.

(a) Except as otherwise provided in this section, to serve as pilot in command of an aircraft that is type certificated for more than one required pilot flight crewmember or is turbojet-powered, a person must—

(1) Within the preceding 12 calendar months, complete a pilot-in-command proficiency check in an aircraft that is

type certificated for more than one required pilot flight crewmember or is turbojet-powered; and

(2) Within the preceding 24 calendar months, complete a pilot-in-command proficiency check in the particular type of aircraft in which that person will serve as pilot in command, that is type certificated for more than one required pilot flight crewmember or is turbojet-powered.

(b) This section does not apply to persons conducting operations under subpart K of part 91, part 121, 125, 133, 135, or 137 of this chapter, or persons maintaining continuing qualification under an Advanced Qualification program approved under subpart Y of part 121 of this chapter.

(c) The pilot-in-command proficiency check given in accordance with the provisions of subpart K of part 91, part 121, 125, or 135 of this chapter may be used to satisfy the requirements of this section.

(d) The pilot-in-command proficiency check required by paragraph (a) of this section may be accomplished by satisfactory completion of one of the following:

(1) A pilot-in-command proficiency check conducted by a person authorized by the Administrator, consisting of the aeronautical knowledge areas, areas of operations, and tasks required for a type rating, in an aircraft that is type certificated for more than one pilot flight crewmember or is turbojet-powered;

(2) The practical test required for a type rating, in an aircraft that is type certificated for more than one required pilot flight crewmember or is turbojet-powered;

(3) The initial or periodic practical test required for the issuance of a pilot examiner or check airman designation, in an aircraft that is type certificated for more than one required pilot flight crewmember or is turbojet-powered;

(4) A pilot proficiency check administered by a U.S. Armed Force that qualifies the military pilot for pilot-in-command designation with instrument privileges, and was performed in a military aircraft that the military requires to be operated by more than one pilot flight crewmember or is turbojet-powered;

(5) For a pilot authorized by the Administrator to operate an experimental turbojet-powered aircraft that possesses, by original design or through modification, more than a single seat, the required proficiency check for all of the experimental turbojet-powered aircraft for which the pilot holds an authorization may be accomplished by completing any one of the following:

(i) A single proficiency check, conducted by an examiner authorized by the Administrator, in any one of the experimental turbojet-powered aircraft for which the airman holds an authorization to operate if conducted within the prior 12 months;

(ii) A single proficiency check, conducted by an examiner authorized by the Administrator, in any experimental turbojet-powered aircraft (*e.g.*, if a pilot acquires a new authorization to operate an additional experimental turbojet-powered aircraft, the check for that new authorization will meet the intent), if conducted within the prior 12 months;

(iii) Current qualification under an Advanced Qualification Program (AQP) under subpart Y of part 121 of this chapter;

(iv) Any proficiency check conducted under subpart K of part 91, part 121, or part 135 of this chapter within the prior 12 months if conducted in a turbojet-powered aircraft; or

(v) Any other § 61.58 proficiency check conducted within the prior 12 months if conducted in a turbojet-powered aircraft.

(e) The pilot of a multi-seat experimental turbojet-powered aircraft who has not received a proficiency check within the prior 12 months in accordance with this section may continue to operate such aircraft in accordance with the pilot's authorizations. However, the pilot is prohibited from carriage of any persons in any experimental turbojet-powered aircraft with the exception of those individuals authorized by the Administrator to conduct training, conduct flight checks, or perform pilot certification functions in such aircraft, and only during flights specifically related to training, flight checks, or certification in such aircraft.

(f) This section will not apply to a pilot authorized by the Administrator to serve as pilot in command in experimental turbojet-powered aircraft that possesses, by original design, a single seat, when operating such single-seat aircraft.

(g) A check or test described in paragraphs (d)(1) through (5) of this section may be accomplished in a flight simulator under part 142 of this chapter, subject to the following:

(1) Except as provided for in paragraphs (g)(2) and (3) of this section, if an otherwise qualified and approved flight simulator used for a pilot-in-command proficiency check is not qualified and approved for a specific required maneuver—

(i) The training center must annotate, in the applicant's training record, the maneuver or maneuvers omitted; and

(ii) Prior to acting as pilot in command, the pilot must demonstrate proficiency in each omitted maneuver in an aircraft or flight simulator qualified and approved for each omitted maneuver.

(2) If the flight simulator used pursuant to paragraph (g) of this section is not qualified and approved for circling approaches—

(i) The applicant's record must include the statement, ''Proficiency in circling approaches not demonstrated''; and

(ii) The applicant may not perform circling approaches as pilot in command when weather conditions are less than the basic VFR conditions described in §91.155 of this chapter, until proficiency in circling approaches has been successfully demonstrated in a flight simulator qualified and approved for circling approaches or in an aircraft to a person authorized by the Administrator to conduct the check required by this section.

(3) If the flight simulator used pursuant to paragraph (g) of this section is not qualified and approved for landings, the applicant must—

(i) Hold a type rating in the airplane represented by the simulator; and

(ii) Have completed within the preceding 90 days at least three takeoffs and three landings (one to a full stop) as the sole manipulator of the flight controls in the type airplane for which the pilot-in-command proficiency check is sought.

(h) For the purpose of meeting the pilot-in-command proficiency check requirements of paragraph (a) of this section, a person may act as pilot in command of a flight under day VFR conditions or day IFR conditions if no person or property is carried, other than as necessary to demonstrate compliance with this part.

(i) If a pilot takes the pilot-in-command proficiency check required by this section in the calendar month before or the calendar month after the month in which it is due, the pilot is considered to have taken it in the month in which it was due for the purpose of computing when the next pilot-in-command proficiency check is due.

(j) A pilot-in-command of a turbojet powered aircraft that is type certificated for one pilot does not have to comply with the pilot-in-command proficiency check requirements in paragraphs (a)(1) and (a)(2) of this section until October 31, 2012.

(k) Unless required by the aircraft's operating limitations, a pilot-in-command of an experimental turbojet-powered aircraft does not have to comply with the pilot-in-command proficiency check requirements in paragraphs (a)(1) and (a)(2) of this section until October 31, 2012.

[Doc. No. 25910, 62 FR 40899, July 30, 1997, as amended by Amdt. 61–109, 68 FR 54559, Sept. 17, 2003; Amdt. 61–112, 70 FR 54814, Sept. 16, 2005; Amdt. 61–128, 76 FR 54106, Aug. 31, 2011; 76 FR 63184, Oct. 12, 2011]

### § 61.59 Falsification, reproduction, or alteration of applications, certificates, logbooks, reports, or records.

(a) No person may make or cause to be made:

(1) Any fraudulent or intentionally false statement on any application for a certificate, rating, authorization, or duplicate thereof, issued under this part;

(2) Any fraudulent or intentionally false entry in any logbook, record, or report that is required to be kept, made, or used to show compliance with

any requirement for the issuance or exercise of the privileges of any certificate, rating, or authorization under this part;

(3) Any reproduction for fraudulent purpose of any certificate, rating, or authorization, under this part; or

(4) Any alteration of any certificate, rating, or authorization under this part.

(b) The commission of an act prohibited under paragraph (a) of this section is a basis for suspending or revoking any airman certificate, rating, or authorization held by that person.

### § 61.60 Change of address.

The holder of a pilot, flight instructor, or ground instructor certificate who has made a change in permanent mailing address may not, after 30 days from that date, exercise the privileges of the certificate unless the holder has notified in writing the FAA, Airman Certification Branch, P.O. Box 25082, Oklahoma City, OK 73125, of the new permanent mailing address, or if the permanent mailing address includes a post office box number, then the holder's current residential address.

## Subpart B—Aircraft Ratings and Pilot Authorizations

### § 61.61 Applicability.

This subpart prescribes the requirements for the issuance of additional aircraft ratings after a pilot certificate is issued, issuance of a type rating concurrently with a pilot certificate, and the requirements for and limitations of pilot authorizations issued by the Administrator.

[Doc. No. FAA–2006–26661, 76 FR 78143, Dec. 16, 2011]

### § 61.63 Additional aircraft ratings (other than for ratings at the airline transport pilot certification level).

(a) *General.* For an additional aircraft rating on a pilot certificate, other than for an airline transport pilot certificate, a person must meet the requirements of this section appropriate to the additional aircraft rating sought.

(b) *Additional aircraft category rating.* A person who applies to add a category rating to a pilot certificate:

(1) Must complete the training and have the applicable aeronautical experience.

(2) Must have a logbook or training record endorsement from an authorized instructor attesting that the person was found competent in the appropriate aeronautical knowledge areas and proficient in the appropriate areas of operation.

(3) Must pass the practical test.

(4) Need not take an additional knowledge test, provided the applicant holds an airplane, rotorcraft, powered-lift, weight-shift-control aircraft, powered parachute, or airship rating at that pilot certificate level.

(c) *Additional aircraft class rating.* A person who applies for an additional class rating on a pilot certificate:

(1) Must have a logbook or training record endorsement from an authorized instructor attesting that the person was found competent in the appropriate aeronautical knowledge areas and proficient in the appropriate areas of operation.

(2) Must pass the practical test.

(3) Need not meet the specified training time requirements prescribed by this part that apply to the pilot certificate for the aircraft class rating sought; unless, the person only holds a lighter-than-air category rating with a balloon class rating and is seeking an airship class rating, then that person must receive the specified training time requirements and possess the appropriate aeronautical experience.

(4) Need not take an additional knowledge test, provided the applicant holds an airplane, rotorcraft, powered-lift, weight-shift-control aircraft, powered parachute, or airship rating at that pilot certificate level.

(d) *Additional aircraft type rating.* Except as provided under paragraph (d)(6) of this section, a person who applies for an aircraft type rating or an aircraft type rating to be completed concurrently with an aircraft category or class rating—

(1) Must hold or concurrently obtain an appropriate instrument rating, except as provided in paragraph (e) of this section.

(2) Must have a logbook or training record endorsement from an authorized instructor attesting that the person is

competent in the appropriate aeronautical knowledge areas and proficient in the appropriate areas of operation at the airline transport pilot certification level.

(3) Must pass the practical test at the airline transport pilot certification level.

(4) Must perform the practical test in actual or simulated instrument conditions, except as provided in paragraph (e) of this section.

(5) Need not take an additional knowledge test if the applicant holds an airplane, rotorcraft, powered-lift, or airship rating on the pilot certificate.

(6) In the case of a pilot employee of a part 121 or part 135 certificate holder or of a fractional ownership program manager under subpart K of part 91 of this chapter, the pilot must—

(i) Meet the appropriate requirements under paragraphs (d)(1), (d)(3), and (d)(4) of this section; and

(ii) Receive a flight training record endorsement from the certificate holder attesting that the person completed the certificate holder's approved ground and flight training program.

(e) *Aircraft not capable of instrument maneuvers and procedures.* (1) An applicant for a type rating or a type rating in addition to an aircraft category and/or class rating who provides an aircraft that is not capable of the instrument maneuvers and procedures required on the practical test:

(i) May apply for the type rating, but the rating will be limited to ''VFR only.''

(ii) May have the ''VFR only'' limitation removed for that aircraft type after the applicant:

(A) Passes a practical test in that type of aircraft in actual or simulated instrument conditions;

(B) Passes a practical test in that type of aircraft on the appropriate instrument maneuvers and procedures in § 61.157; or

(C) Becomes qualified under § 61.73(d) for that type of aircraft.

(2) When an instrument rating is issued to a person who holds one or more type ratings, the amended pilot certificate must bear the ''VFR only'' limitation for each aircraft type rating that the person did not demonstrate instrument competency.

(f) *Multiengine airplane with a single-pilot station.* An applicant for a type rating, at other than the ATP certification level, in a multiengine airplane with a single-pilot station must perform the practical test in the multi-seat version of that airplane, or the practical test may be performed in the single-seat version of that airplane if the Examiner is in a position to observe the applicant during the practical test and there is no multi-seat version of that multiengine airplane.

(g) *Single engine airplane with a single-pilot station.* An applicant for a type rating, at other than the ATP certification level, in a single engine airplane with a single-pilot station must perform the practical test in the multi-seat version of that single engine airplane, or the practical test may be performed in the single-seat version of that airplane if the Examiner is in a position to observe the applicant during the practical test and there is no multi-seat version of that single engine airplane.

(h) *Aircraft category and class rating for the operation of aircraft with an experimental certificate.* A person holding a recreational, private, or commercial pilot certificate may apply for a category and class rating limited to a specific make and model of experimental aircraft, provided—

(1) The person logged 5 hours flight time while acting as pilot in command in the same category, class, make, and model of aircraft.

(2) The person received a logbook endorsement from an authorized instructor who determined the pilot's proficiency to act as pilot in command of the same category, class, make, and model of aircraft.

(3) The flight time specified under paragraph (h)(1) of this section was logged between September 1, 2004 and August 31, 2005.

(i) *Waiver authority.* An Examiner who conducts a practical test may waive any task for which the FAA has provided waiver authority.

[Doc. No. FAA–2006–26661, 74 FR 42552, Aug. 21, 2009, as amended by Amdt. 61–125, 75 FR 5220, Feb. 1, 2010]

### § 61.64 Use of a flight simulator and flight training device.

(a) *Use of a flight simulator or flight training device.* If an applicant for a certificate or rating uses a flight simulator or flight training device for training or any portion of the practical test, the flight simulator and flight training device—

(1) Must represent the category, class, and type (if a type rating is applicable) for the rating sought; and

(2) Must be qualified and approved by the Administrator and used in accordance with an approved course of training under part 141 or part 142 of this chapter; or under part 121 or part 135 of this chapter, provided the applicant is a pilot employee of that air carrier operator.

(b) Except as provided in paragraph (f) of this section, if an airplane is not used during the practical test for a type rating for a turbojet airplane (except for preflight inspection), an applicant must accomplish the entire practical test in a Level C or higher flight simulator and the applicant must—

(1) Hold a type rating in a turbojet airplane of the same class of airplane for which the type rating is sought, and that type rating may not contain a supervised operating experience limitation;

(2) Have 1,000 hours of flight time in two different turbojet airplanes of the same class of airplane for which the type rating is sought;

(3) Have been appointed by the U.S. Armed Forces as pilot in command in a turbojet airplane of the same class of airplane for which the type rating is sought;

(4) Have 500 hours of flight time in the same type of airplane for which the type rating is sought; or

(5) Have logged at least 2,000 hours of flight time, of which 500 hours were in turbine-powered airplanes of the same class of airplane for which the type rating is sought.

(c) Except as provided in paragraph (f) of this section, if an airplane is not used during the practical test for a type rating for a turbo-propeller airplane (except for preflight inspection), an applicant must accomplish the entire practical test in a Level C or higher flight simulator and the applicant must—

(1) Hold a type rating in a turbo-propeller airplane of the same class of airplane for which the type rating is sought, and that type rating may not contain a supervised operating experience limitation;

(2) Have 1,000 hours of flight time in two different turbo-propeller airplanes of the same class of airplane for which the type rating is sought;

(3) Have been appointed by the U.S. Armed Forces as pilot in command in a turbo-propeller airplane of the same class of airplane for which the type rating is sought;

(4) Have 500 hours of flight time in the same type of airplane for which the type rating is sought; or

(5) Have logged at least 2,000 hours of flight time, of which 500 hours were in turbine-powered airplanes of the same class of airplane for which the type rating is sought.

(d) Except as provided in paragraph (f) of this section, if a helicopter is not used during the practical test for a type rating in a helicopter (except for preflight inspection), an applicant must accomplish the entire practical test in a Level C or higher flight simulator and the applicant must meet one of the following requirements—

(1) Hold a type rating in a helicopter and that type rating may not contain the supervised operating experience limitation;

(2) Have been appointed by the U.S. Armed Forces as pilot in command of a helicopter;

(3) Have 500 hours of flight time in the type of helicopter; or

(4) Have 1,000 hours of flight time in two different types of helicopters.

(e) Except as provided in paragraph (f) of this section, if a powered-lift is not used during the practical test for a type rating in a powered-lift (except for preflight inspection), an applicant must accomplish the entire practical test in a Level C or higher flight simulator and the applicant must meet one of the following requirements—

(1) Hold a type rating in a powered-lift without a supervised operating experience limitation;

(2) Have been appointed by the U.S. Armed Forces as pilot in command of a powered-lift;

(3) Have 500 hours of flight time in the type of powered-lift for which the rating is sought; or

(4) Have 1,000 hours of flight time in two different types of powered-lifts.

(f) If the applicant does not meet one of the experience requirements of paragraphs (b)(1) through (5), (c)(1) through (5), (d)(1) through (4) or (e)(1) through (4) of this section, as appropriate to the type rating sought, then—

(1) The applicant must complete the following tasks on the practical test in an aircraft appropriate to category, class, and type for the rating sought: Preflight inspection, normal takeoff, normal instrument landing system approach, missed approach, and normal landing; or

(2) The applicant's pilot certificate will be issued with a limitation that states: ''The [name of the additional type rating] is subject to pilot in command limitations,'' and the applicant is restricted from serving as pilot in command in an aircraft of that type.

(g) The limitation described under paragraph (f)(2) of this section may be removed from the pilot certificate if the applicant complies with the following—

(1) Performs 25 hours of flight time in an aircraft of the category, class, and type for which the limitation applies under the direct observation of the pilot in command who holds a category, class, and type rating, without limitations, for the aircraft;

(2) Logs each flight and the pilot in command who observed the flight attests in writing to each flight;

(3) Obtains the flight time while performing the duties of pilot in command; and

(4) Presents evidence of the supervised operating experience to any Examiner or FAA Flight Standards District Office to have the limitation removed.

[Doc. No. FAA–2006–26661, 76 FR 78143, Dec. 16, 2011]

### § 61.65 Instrument rating requirements.

(a) *General.* A person who applies for an instrument rating must:

(1) Hold at least a current private pilot certificate, or be concurrently applying for a private pilot certificate, with an airplane, helicopter, or powered-lift rating appropriate to the instrument rating sought;

(2) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet any of these requirements due to a medical condition, the Administrator may place such operating limitations on the applicant's pilot certificate as are necessary for the safe operation of the aircraft;

(3) Receive and log ground training from an authorized instructor or accomplish a home-study course of training on the aeronautical knowledge areas of paragraph (b) of this section that apply to the instrument rating sought;

(4) Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required knowledge test;

(5) Receive and log training on the areas of operation of paragraph (c) of this section from an authorized instructor in an aircraft, flight simulator, or flight training device that represents an airplane, helicopter, or powered-lift appropriate to the instrument rating sought;

(6) Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required practical test;

(7) Pass the required knowledge test on the aeronautical knowledge areas of paragraph (b) of this section; however, an applicant is not required to take another knowledge test when that person already holds an instrument rating; and

(8) Pass the required practical test on the areas of operation in paragraph (c) of this section in—

(i) An airplane, helicopter, or powered-lift appropriate to the rating sought; or

(ii) A flight simulator or a flight training device appropriate to the rating sought and for the specific maneuver or instrument approach procedure performed. If an approved flight training device is used for the practical test,

the instrument approach procedures conducted in that flight training device are limited to one precision and one nonprecision approach, provided the flight training device is approved for the procedure performed.

(b) *Aeronautical knowledge.* A person who applies for an instrument rating must have received and logged ground training from an authorized instructor or accomplished a home-study course on the following aeronautical knowledge areas that apply to the instrument rating sought:

(1) Federal Aviation Regulations of this chapter that apply to flight operations under IFR;

(2) Appropriate information that applies to flight operations under IFR in the ''Aeronautical Information Manual;''

(3) Air traffic control system and procedures for instrument flight operations;

(4) IFR navigation and approaches by use of navigation systems;

(5) Use of IFR en route and instrument approach procedure charts;

(6) Procurement and use of aviation weather reports and forecasts and the elements of forecasting weather trends based on that information and personal observation of weather conditions;

(7) Safe and efficient operation of aircraft under instrument flight rules and conditions;

(8) Recognition of critical weather situations and windshear avoidance;

(9) Aeronautical decision making and judgment; and

(10) Crew resource management, including crew communication and coordination.

(c) *Flight proficiency.* A person who applies for an instrument rating must receive and log training from an authorized instructor in an aircraft, or in a flight simulator or flight training device, in accordance with paragraph (g) of this section, that includes the following areas of operation:

(1) Preflight preparation;

(2) Preflight procedures;

(3) Air traffic control clearances and procedures;

(4) Flight by reference to instruments;

(5) Navigation systems;

(6) Instrument approach procedures;

(7) Emergency operations; and

(8) Postflight procedures.

(d) *Aeronautical experience for the instrument-airplane rating.* A person who applies for an instrument-airplane rating must have logged:

(1) Except as provided in paragraph (g) of this section, 50 hours of cross-country flight time as pilot in command, of which 10 hours must have been in an airplane; and

(2) Forty hours of actual or simulated instrument time in the areas of operation listed in paragraph (c) of this section, of which 15 hours must have been received from an authorized instructor who holds an instrument-airplane rating, and the instrument time includes:

(i) Three hours of instrument flight training from an authorized instructor in an airplane that is appropriate to the instrument-airplane rating within 2 calendar months before the date of the practical test; and

(ii) Instrument flight training on cross country flight procedures, including one cross country flight in an airplane with an authorized instructor, that is performed under instrument flight rules, when a flight plan has been filed with an air traffic control facility, and that involves—

(A) A flight of 250 nautical miles along airways or by directed routing from an air traffic control facility;

(B) An instrument approach at each airport; and

(C) Three different kinds of approaches with the use of navigation systems.

(e) *Aeronautical experience for the instrument-helicopter rating.* A person who applies for an instrument-helicopter rating must have logged:

(1) Except as provided in paragraph (g) of this section, 50 hours of cross-country flight time as pilot in command, of which 10 hours must have been in a helicopter; and

(2) Forty hours of actual or simulated instrument time in the areas of operation listed under paragraph (c) of this section, of which 15 hours must have been with an authorized instructor who holds an instrument-helicopter rating, and the instrument time includes:

(i) Three hours of instrument flight training from an authorized instructor in a helicopter that is appropriate to the instrument-helicopter rating within 2 calendar months before the date of the practical test; and

(ii) Instrument flight training on cross country flight procedures, including one cross country flight in a helicopter with an authorized instructor that is performed under instrument flight rules and a flight plan has been filed with an air traffic control facility, and involves—

(A) A flight of 100 nautical miles along airways or by directed routing from an air traffic control facility;

(B) An instrument approach at each airport; and

(C) Three different kinds of approaches with the use of navigation systems.

(f) *Aeronautical experience for the instrument-powered-lift rating.* A person who applies for an instrument-powered-lift rating must have logged:

(1) Except as provided in paragraph (g) of this section, 50 hours of cross-country flight time as pilot in command, of which 10 hours must have been in a powered-lift; and

(2) Forty hours of actual or simulated instrument time in the areas of operation listed under paragraph (c) of this section, of which 15 hours must have been received from an authorized instructor who holds an instrument-powered-lift rating, and the instrument time includes:

(i) Three hours of instrument flight training from an authorized instructor in a powered-lift that is appropriate to the instrument-powered-lift rating within 2 calendar months before the date of the practical test; and

(ii) Instrument flight training on cross country flight procedures, including one cross country flight in a powered-lift with an authorized instructor that is performed under instrument flight rules, when a flight plan has been filed with an air traffic control facility, that involves—

(A) A flight of 250 nautical miles along airways or by directed routing from an air traffic control facility;

(B) An instrument approach at each airport; and

(C) Three different kinds of approaches with the use of navigation systems.

(g) An applicant for a combined private pilot certificate with an instrument rating may satisfy the cross-country flight time requirements of this section by crediting:

(1) For an instrument-airplane rating or an instrument-powered-lift rating, up to 45 hours of cross-country flight time performing the duties of pilot in command with an authorized instructor; or

(2) For an instrument-helicopter rating, up to 47 hours of cross-country flight time performing the duties of pilot in command with an authorized instructor.

(h) *Use of flight simulators or flight training devices.* If the instrument time was provided by an authorized instructor in a flight simulator or flight training device—

(1) A maximum of 30 hours may be performed in that flight simulator or flight training device if the instrument time was completed in accordance with part 142 of this chapter; or

(2) A maximum of 20 hours may be performed in that flight simulator or flight training device if the instrument time was not completed in accordance with part 142 of this chapter.

(i) *Use of an aviation training device.* A maximum of 10 hours of instrument time received in an aviation training device may be credited for the instrument time requirements of this section if—

(1) The device is approved and authorized by the FAA;

(2) An authorized instructor provides the instrument time in the device;

(3) No more than 10 hours of instrument time in a flight simulator or flight training device was credited for the instrument time requirements of this section;

(4) A view-limiting device was worn by the applicant when logging instrument time in the device; and

(5) The FAA approved the instrument training and instrument tasks performed in the device.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40900, July 30, 1997; Amdt. 61–124, 74 FR 42554, Aug. 21, 2009; Amdt. 61–127, 76 FR 19267, Apr. 7, 2011; Amdt. 61–128, 76 FR 54106, Aug. 31, 2011]

### § 61.67 Category II pilot authorization requirements.

(a) *General.* A person who applies for a Category II pilot authorization must hold:

(1) At least a private or commercial pilot certificate with an instrument rating or an airline transport pilot certificate;

(2) A type rating for the aircraft for which the authorization is sought if that aircraft requires a type rating; and

(3) A category and class rating for the aircraft for which the authorization is sought.

(b) *Experience requirements.* An applicant for a Category II pilot authorization must have at least—

(1) 50 hours of night flight time as pilot in command.

(2) 75 hours of instrument time under actual or simulated instrument conditions that may include not more than—

(i) A combination of 25 hours of simulated instrument flight time in a flight simulator or flight training device; or

(ii) 40 hours of simulated instrument flight time if accomplished in an approved course conducted by an appropriately rated training center certificated under part 142 of this chapter.

(3) 250 hours of cross-country flight time as pilot in command.

(c) *Practical test requirements.* (1) A practical test must be passed by a person who applies for—

(i) Issuance or renewal of a Category II pilot authorization; and

(ii) The addition of another type aircraft to the applicant's Category II pilot authorization.

(2) To be eligible for the practical test for an authorization under this section, an applicant must—

(i) Meet the requirements of paragraphs (a) and (b) of this section; and

(ii) If the applicant has not passed a practical test for this authorization during the 12 calendar months preceding the month of the test, then that person must—

(A) Meet the requirements of §61.57(c); and

(B) Have performed at least six ILS approaches during the 6 calendar months preceding the month of the test, of which at least three of the approaches must have been conducted without the use of an approach coupler.

(3) The approaches specified in paragraph (c)(2)(ii)(B) of this section—

(i) Must be conducted under actual or simulated instrument flight conditions;

(ii) Must be conducted to the decision height for the ILS approach in the type aircraft in which the practical test is to be conducted;

(iii) Need not be conducted to the decision height authorized for Category II operations;

(iv) Must be conducted to the decision height authorized for Category II operations only if conducted in a flight simulator or flight training device; and

(v) Must be accomplished in an aircraft of the same category and class, and type, as applicable, as the aircraft in which the practical test is to be conducted or in a flight simulator that—

(A) Represents an aircraft of the same category and class, and type, as applicable, as the aircraft in which the authorization is sought; and

(B) Is used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(4) The flight time acquired in meeting the requirements of paragraph (c)(2)(ii)(B) of this section may be used to meet the requirements of paragraph (c)(2)(ii)(A) of this section.

(d) *Practical test procedures.* The practical test consists of an oral increment and a flight increment.

(1) *Oral increment.* In the oral increment of the practical test an applicant must demonstrate knowledge of the following:

(i) Required landing distance;

(ii) Recognition of the decision height;

(iii) Missed approach procedures and techniques using computed or fixed attitude guidance displays;

(iv) Use and limitations of RVR;

(v) Use of visual clues, their availability or limitations, and altitude at which they are normally discernible at reduced RVR readings;

(vi) Procedures and techniques related to transition from nonvisual to visual flight during a final approach under reduced RVR;

(vii) Effects of vertical and horizontal windshear;

(viii) Characteristics and limitations of the ILS and runway lighting system;

(ix) Characteristics and limitations of the flight director system, auto approach coupler (including split axis type if equipped), auto throttle system (if equipped), and other required Category II equipment;

(x) Assigned duties of the second in command during Category II approaches, unless the aircraft for which authorization is sought does not require a second in command; and

(xi) Instrument and equipment failure warning systems.

(2) *Flight increment.* The following requirements apply to the flight increment of the practical test:

(i) The flight increment must be conducted in an aircraft of the same category, class, and type, as applicable, as the aircraft in which the authorization is sought or in a flight simulator that—

(A) Represents an aircraft of the same category and class, and type, as applicable, as the aircraft in which the authorization is sought; and

(B) Is used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(ii) The flight increment must consist of at least two ILS approaches to 100 feet AGL including at least one landing and one missed approach.

(iii) All approaches performed during the flight increment must be made with the use of an approved flight control guidance system, except if an approved auto approach coupler is installed, at least one approach must be hand flown using flight director commands.

(iv) If a multiengine airplane with the performance capability to execute a missed approach with one engine inoperative is used for the practical test, the flight increment must include the performance of one missed approach with an engine, which shall be the most critical engine, if applicable, set at idle or zero thrust before reaching the middle marker.

(v) If a multiengine flight simulator or multiengine flight training device is used for the practical test, the applicant must execute a missed approach with the most critical engine, if applicable, failed.

(vi) For an authorization for an aircraft that requires a type rating, the practical test must be performed in coordination with a second in command who holds a type rating in the aircraft in which the authorization is sought.

(vii) Oral questioning may be conducted at any time during a practical test.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40900, July 30, 1997]

### § 61.68 Category III pilot authorization requirements.

(a) *General.* A person who applies for a Category III pilot authorization must hold:

(1) At least a private pilot certificate or commercial pilot certificate with an instrument rating or an airline transport pilot certificate;

(2) A type rating for the aircraft for which the authorization is sought if that aircraft requires a type rating; and

(3) A category and class rating for the aircraft for which the authorization is sought.

(b) *Experience requirements.* An applicant for a Category III pilot authorization must have at least—

(1) 50 hours of night flight time as pilot in command.

(2) 75 hours of instrument flight time during actual or simulated instrument conditions that may include not more than—

(i) A combination of 25 hours of simulated instrument flight time in a flight simulator or flight training device; or

(ii) 40 hours of simulated instrument flight time if accomplished in an approved course conducted by an appropriately rated training center certificated under part 142 of this chapter.

(3) 250 hours of cross-country flight time as pilot in command.

(c) *Practical test requirements.* (1) A practical test must be passed by a person who applies for—

(i) Issuance or renewal of a Category III pilot authorization; and

(ii) The addition of another type of aircraft to the applicant's Category III pilot authorization.

(2) To be eligible for the practical test for an authorization under this section, an applicant must—

(i) Meet the requirements of paragraphs (a) and (b) of this section; and

(ii) If the applicant has not passed a practical test for this authorization during the 12 calendar months preceding the month of the test, then that person must—

(A) Meet the requirements of § 61.57(c); and

(B) Have performed at least six ILS approaches during the 6 calendar months preceding the month of the test, of which at least three of the approaches must have been conducted without the use of an approach coupler.

(3) The approaches specified in paragraph (c)(2)(ii)(B) of this section—

(i) Must be conducted under actual or simulated instrument flight conditions;

(ii) Must be conducted to the alert height or decision height for the ILS approach in the type aircraft in which the practical test is to be conducted;

(iii) Need not be conducted to the decision height authorized for Category III operations;

(iv) Must be conducted to the alert height or decision height, as applicable, authorized for Category III operations only if conducted in a flight simulator or flight training device; and

(v) Must be accomplished in an aircraft of the same category and class, and type, as applicable, as the aircraft in which the practical test is to be conducted or in a flight simulator that—

(A) Represents an aircraft of the same category and class, and type, as applicable, as the aircraft for which the authorization is sought; and

(B) Is used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(4) The flight time acquired in meeting the requirements of paragraph (c)(2)(ii)(B) of this section may be used to meet the requirements of paragraph (c)(2)(ii)(A) of this section.

(d) *Practical test procedures.* The practical test consists of an oral increment and a flight increment.

(1) *Oral increment.* In the oral increment of the practical test an applicant must demonstrate knowledge of the following:

(i) Required landing distance;

(ii) Determination and recognition of the alert height or decision height, as applicable, including use of a radar altimeter;

(iii) Recognition of and proper reaction to significant failures encountered prior to and after reaching the alert height or decision height, as applicable;

(iv) Missed approach procedures and techniques using computed or fixed attitude guidance displays and expected height loss as they relate to manual go-around or automatic go-around, and initiation altitude, as applicable;

(v) Use and limitations of RVR, including determination of controlling RVR and required transmissometers;

(vi) Use, availability, or limitations of visual cues and the altitude at which they are normally discernible at reduced RVR readings including—

(A) Unexpected deterioration of conditions to less than minimum RVR during approach, flare, and rollout;

(B) Demonstration of expected visual references with weather at minimum conditions;

(C) The expected sequence of visual cues during an approach in which visibility is at or above landing minima; and

(D) Procedures and techniques for making a transition from instrument reference flight to visual flight during a final approach under reduced RVR.

(vii) Effects of vertical and horizontal windshear;

(viii) Characteristics and limitations of the ILS and runway lighting system;

(ix) Characteristics and limitations of the flight director system auto approach coupler (including split axis type if equipped), auto throttle system (if equipped), and other Category III equipment;

(x) Assigned duties of the second in command during Category III operations, unless the aircraft for which

authorization is sought does not require a second in command;

(xi) Recognition of the limits of acceptable aircraft position and flight path tracking during approach, flare, and, if applicable, rollout; and

(xii) Recognition of, and reaction to, airborne or ground system faults or abnormalities, particularly after passing alert height or decision height, as applicable.

(2) *Flight increment.* The following requirements apply to the flight increment of the practical test—

(i) The flight increment may be conducted in an aircraft of the same category and class, and type, as applicable, as the aircraft for which the authorization is sought, or in a flight simulator that—

(A) Represents an aircraft of the same category and class, and type, as applicable, as the aircraft in which the authorization is sought; and

(B) Is used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.

(ii) The flight increment must consist of at least two ILS approaches to 100 feet AGL, including one landing and one missed approach initiated from a very low altitude that may result in a touchdown during the go-around maneuver;

(iii) All approaches performed during the flight increment must be made with the approved automatic landing system or an equivalent landing system approved by the Administrator;

(iv) If a multiengine aircraft with the performance capability to execute a missed approach with one engine inoperative is used for the practical test, the flight increment must include the performance of one missed approach with the most critical engine, if applicable, set at idle or zero thrust before reaching the middle or outer marker;

(v) If a multiengine flight simulator or multiengine flight training device is used, a missed approach must be executed with an engine, which shall be the most critical engine, if applicable, failed;

(vi) For an authorization for an aircraft that requires a type rating, the practical test must be performed in coordination with a second in command who holds a type rating in the aircraft in which the authorization is sought;

(vii) Oral questioning may be conducted at any time during the practical test;

(viii) Subject to the limitations of this paragraph, for Category IIIb operations predicated on the use of a fail-passive rollout control system, at least one manual rollout using visual reference or a combination of visual and instrument references must be executed. The maneuver required by this paragraph shall be initiated by a fail-passive disconnect of the rollout control system—

(A) After main gear touchdown;

(B) Prior to nose gear touchdown;

(C) In conditions representative of the most adverse lateral touchdown displacement allowing a safe landing on the runway; and

(D) In weather conditions anticipated in Category IIIb operations.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40900, July 30, 1997]

### §61.69 Glider and unpowered ultralight vehicle towing: Experience and training requirements.

(a) No person may act as pilot in command for towing a glider or unpowered ultralight vehicle unless that person—

(1) Holds a private, commercial or airline transport pilot certificate with a category rating for powered aircraft;

(2) Has logged at least 100 hours of pilot-in-command time in the aircraft category, class and type, if required, that the pilot is using to tow a glider or unpowered ultralight vehicle;

(3) Has a logbook endorsement from an authorized instructor who certifies that the person has received ground and flight training in gliders or unpowered ultralight vehicles and is proficient in—

(i) The techniques and procedures essential to the safe towing of gliders or unpowered ultralight vehicles, including airspeed limitations;

(ii) Emergency procedures;

(iii) Signals used; and

(iv) Maximum angles of bank.

(4) Except as provided in paragraph (b) of this section, has logged at least three flights as the sole manipulator of the controls of an aircraft while towing

a glider or unpowered ultralight vehicle, or has simulated towing flight procedures in an aircraft while accompanied by a pilot who meets the requirements of paragraphs (c) and (d) of this section.

(5) Except as provided in paragraph (b) of this section, has received a logbook endorsement from the pilot, described in paragraph (a)(4) of this section, certifying that the person has accomplished at least 3 flights in an aircraft while towing a glider or unpowered ultralight vehicle, or while simulating towing flight procedures; and

(6) Within 24 calendar months before the flight has—

(i) Made at least three actual or simulated tows of a glider or unpowered ultralight vehicle while accompanied by a qualified pilot who meets the requirements of this section; or

(ii) Made at least three flights as pilot in command of a glider or unpowered ultralight vehicle towed by an aircraft.

(b) Any person who, before May 17, 1967, has made and logged 10 or more flights as pilot in command of an aircraft towing a glider or unpowered ultralight vehicle in accordance with a certificate of waiver need not comply with paragraphs (a)(4) and (a)(5) of this section.

(c) The pilot, described in paragraph (a)(4) of this section, who endorses the logbook of a person seeking towing privileges must have—

(1) Met the requirements of this section prior to endorsing the logbook of the person seeking towing privileges; and

(2) Logged at least 10 flights as pilot in command of an aircraft while towing a glider or unpowered ultralight vehicle.

(d) If the pilot described in paragraph (a)(4) of this section holds only a private pilot certificate, then that pilot must have—

(1) Logged at least 100 hours of pilot-in-command time in airplanes, or 200 hours of pilot-in-command time in a combination of powered and other-than-powered aircraft; and

(2) Performed and logged at least three flights within the 12 calendar months preceding the month that pilot accompanies or endorses the logbook of a person seeking towing privileges—

(i) In an aircraft while towing a glider or unpowered ultralight vehicle accompanied by another pilot who meets the requirements of this section; or

(ii) As pilot in command of a glider or unpowered ultralight vehicle being towed by another aircraft.

[Doc. No. FAA–2001–11133, 69 FR 44866, July 27, 2004, as amended by Amdt. 61–124, 74 FR 42555, Aug. 21, 2009]

### § 61.71 Graduates of an approved training program other than under this part: Special rules.

(a) A person who graduates from an approved training program under part 141 or part 142 of this chapter is considered to have met the applicable aeronautical experience, aeronautical knowledge, and areas of operation requirements of this part if that person presents the graduation certificate and passes the required practical test within the 60-day period after the date of graduation.

(b) A person may apply for an airline transport pilot certificate, type rating, or both under this part, and will be considered to have met the applicable requirements under § 61.157, except for the airline transport pilot certification training program required by § 61.156, for that certificate and rating, if that person has:

(1) Satisfactorily accomplished an approved training program and a proficiency check for that airplane type that includes all the tasks and maneuvers required to serve as pilot in command in accordance with the requirements of subparts N and O of part 121 of this chapter; and

(2) Applied for an airline transport pilot certificate, type rating, or both within the 60-day period from the date the person satisfactorily accomplished the requirements of paragraph (b)(1) for that airplane type.

(c) A person who holds a foreign pilot license and is applying for an equivalent U.S. pilot certificate on the basis of a Bilateral Aviation Safety Agreement and associated Implementation Procedures for Licensing may be considered to have met the applicable aeronautical experience, aeronautical

knowledge, and areas of operation requirements of this part.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40901, July 30, 1997; Amdt. 61–128, 76 FR 54107, Aug. 31, 2011; Amdt. 61–130, 78 FR 42374, July 15, 2013]

### § 61.73 Military pilots or former military pilots: Special rules.

(a) *General.* Except for a person who has been removed from flying status for lack of proficiency or because of a disciplinary action involving aircraft operations, a U.S. military pilot or former military pilot who meets the requirements of this section may apply, on the basis of his or her military pilot qualifications, for:

(1) A commercial pilot certificate with the appropriate aircraft category and class rating.

(2) An instrument rating with the appropriate aircraft rating.

(3) A type rating.

(b) *Military pilots and former military pilots in the U.S. Armed Forces.* A person who qualifies as a military pilot or former military pilot in the U.S. Armed Forces may apply for a pilot certificate and ratings under paragraph (a) of this section if that person—

(1) Presents evidentiary documents described under paragraphs (h)(1), (2), and (3) of this section that show the person's status in the U.S. Armed Forces.

(2) Has passed the military competency aeronautical knowledge test on the appropriate parts of this chapter for commercial pilot privileges and limitations, air traffic and general operating rules, and accident reporting rules.

(3) Presents official U.S. military records that show compliance with one of the following requirements—

(i) Before the date of the application, passing an official U.S. military pilot and instrument proficiency check in a military aircraft of the kind of aircraft category, class, and type, if class or type of aircraft is applicable, for the ratings sought; or

(ii) Before the date of application, logging 10 hours of pilot time as a military pilot in a U.S. military aircraft in the kind of aircraft category, class, and type, if a class rating or type rating is applicable, for the aircraft rating sought.

(c) *A military pilot in the Armed Forces of a foreign contracting State to the Convention on International Civil Aviation.* A person who is a military pilot in the Armed Forces of a foreign contracting State to the Convention on International Civil Aviation and is assigned to pilot duties in the U.S. Armed Forces, for purposes other than receiving flight training, may apply for a commercial pilot certificate and ratings under paragraph (a) of this section, provided that person—

(1) Presents evidentiary documents described under paragraph (h)(4) of this section that show the person is a military pilot in the Armed Forces of a foreign contracting State to the Convention on International Civil Aviation, and is assigned to pilot duties in the U.S. Armed Forces, for purposes other than receiving flight training.

(2) Has passed the military competency aeronautical knowledge test on the appropriate parts of this chapter for commercial pilot privileges and limitations, air traffic and general operating rules, and accident reporting rules.

(3) Presents official U.S. military records that show compliance with one of the following requirements:

(i) Before the date of the application, passed an official U.S. military pilot and instrument proficiency check in a military aircraft of the kind of aircraft category, class, or type, if class or type of aircraft is applicable, for the ratings; or

(ii) Before the date of the application, logged 10 hours of pilot time as a military pilot in a U.S. military aircraft of the kind of category, class, and type of aircraft, if a class rating or type rating is applicable, for the aircraft rating.

(d) *Instrument rating.* A person who is qualified as a U.S. military pilot or former military pilot may apply for an instrument rating to be added to a pilot certificate if that person—

(1) Has passed an instrument proficiency check in the U.S. Armed Forces in the aircraft category for the instrument rating sought; and

(2) Has an official U.S. Armed Forces record that shows the person is instrument pilot qualified by the U.S. Armed Forces to conduct instrument flying on Federal airways in that aircraft category and class for the instrument rating sought.

(e) *Aircraft type rating.* An aircraft type rating may only be issued for a type of aircraft that has a comparable civilian type designation by the Administrator.

(f) *Aircraft type rating placed on an airline transport pilot certificate.* A person who is a military pilot or former military pilot of the U.S. Armed Forces and requests an aircraft type rating to be placed on an existing U.S. airline transport pilot certificate may be issued the rating at the airline transport pilot certification level, provided that person:

(1) Holds a category and class rating for that type of aircraft at the airline transport pilot certification level; and

(2) Has passed an official U.S. military pilot check and instrument proficiency check in that type of aircraft.

(g) *Flight instructor certificate and ratings.* A person who can show official U.S. military documentation of being a U.S. military instructor pilot or U.S. military pilot examiner, or a former instructor pilot or pilot examiner may apply for and be issued a flight instructor certificate with the appropriate ratings if that person:

(1) Holds a commercial or airline transport pilot certificate with the appropriate aircraft category and class rating, if a class rating is appropriate, for the flight instructor rating sought;

(2) Holds an instrument rating, or has instrument privileges, on the pilot certificate that is appropriate to the flight instructor rating sought; and

(3) Presents the following documents:

(i) A knowledge test report that shows the person passed a knowledge test on the aeronautical knowledge areas listed under §61.185(a) appropriate to the flight instructor rating sought and the knowledge test was passed within the preceding 24 calendar months prior to the month of application. If the U.S. military instructor pilot or pilot examiner already holds a flight instructor certificate, holding of a flight instructor certificate suffices for the knowledge test report.

(ii) An official U.S. Armed Forces record or order that shows the person is or was qualified as a U.S. Armed Forces military instructor pilot or pilot examiner for the flight instructor rating sought.

(iii) An official U.S. Armed Forces record or order that shows the person completed a U.S. Armed Forces' instructor pilot or pilot examiner training course and received an aircraft rating qualification as a military instructor pilot or pilot examiner that is appropriate to the flight instructor rating sought.

(iv) An official U.S. Armed Forces record or order that shows the person passed a U.S. Armed Forces instructor pilot or pilot examiner proficiency check in an aircraft as a military instructor pilot or pilot examiner that is appropriate to the flight instructor rating sought.

(h) *Documents for qualifying for a pilot certificate and rating.* The following documents are required for a person to apply for a pilot certificate and rating:

(1) An official U.S. Armed Forces record that shows the person is or was a military pilot.

(2) An official U.S. Armed Forces record that shows the person graduated from a U.S. Armed Forces undergraduate pilot training school and received a rating qualification as a military pilot.

(3) An official U.S. Armed Forces record that shows the pilot passed a pilot proficiency check and instrument proficiency check in an aircraft as a military pilot.

(4) If a person is a military pilot in the Armed Forces from a foreign contracting State to the Convention on International Civil Aviation and is applying for a pilot certificate and rating, that person must present the following:

(i) An official U.S. Armed Forces record that shows the person is a military pilot in the U.S. Armed Forces;

(ii) An official U.S. Armed Forces record that shows the person is assigned as a military pilot in the U.S. Armed Forces for purposes other than receiving flight training;

(iii) An official record that shows the person graduated from a military undergraduate pilot training school from the Armed Forces from a foreign contracting State to the Convention on International Civil Aviation or from the U.S. Armed Forces, and received a qualification as a military pilot; and

(iv) An official U.S. Armed Forces record that shows that the person passed a pilot proficiency check and instrument proficiency check in an aircraft as a military pilot in the U.S. Armed Forces.

[Doc. No. FAA–2006–26661, 74 FR 42555, Aug. 21, 2009]

### § 61.75 Private pilot certificate issued on the basis of a foreign pilot license.

(a) *General.* A person who holds a foreign pilot license at the private pilot level or higher that was issued by a contracting State to the Convention on International Civil Aviation may apply for and be issued a U.S. private pilot certificate with the appropriate ratings if the foreign pilot license meets the requirements of this section.

(b) *Certificate issued.* A U.S. private pilot certificate issued under this section must specify the person's foreign license number and country of issuance. A person who holds a foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may be issued a U.S. private pilot certificate based on the foreign pilot license without any further showing of proficiency, provided the applicant:

(1) Meets the requirements of this section;

(2) Holds a foreign pilot license, at the private pilot license level or higher, that does not contain a limitation stating that the applicant has not met all of the standards of ICAO for that license;

(3) Does not hold a U.S. pilot certificate other than a U.S. student pilot certificate;

(4) Holds a medical certificate issued under part 67 of this chapter or a medical license issued by the country that issued the person's foreign pilot license; and

(5) Is able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(c) *Aircraft ratings issued.* Aircraft ratings listed on a person's foreign pilot license, in addition to any issued after testing under the provisions of this part, may be placed on that person's U.S. pilot certificate for private pilot privileges only.

(d) *Instrument ratings issued.* A person who holds an instrument rating on the foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may be issued an instrument rating on a U.S. pilot certificate provided:

(1) The person's foreign pilot license authorizes instrument privileges;

(2) Within 24 months preceding the month in which the person applies for the instrument rating, the person passes the appropriate knowledge test; and

(3) The person is able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(e) *Operating privileges and limitations.* A person who receives a U.S. private pilot certificate that has been issued under the provisions of this section:

(1) May act as pilot in command of a civil aircraft of the United States in accordance with the pilot privileges authorized by this part and the limitations placed on that U.S. pilot certificate;

(2) Is limited to the privileges placed on the certificate by the Administrator;

(3) Is subject to the limitations and restrictions on the person's U.S. certificate and foreign pilot license when exercising the privileges of that U.S. pilot certificate in an aircraft of U.S. registry operating within or outside the United States; and

(f) *Limitation on licenses used as the basis for a U.S. certificate.* A person may

use only one foreign pilot license as a basis for the issuance of a U.S. pilot certificate. The foreign pilot license and medical certification used as a basis for issuing a U.S. pilot certificate under this section must be written in English or accompanied by an English transcription that has been signed by an official or representative of the foreign aviation authority that issued the foreign pilot license.

(g) *Limitation placed on a U.S. pilot certificate.* A U.S. pilot certificate issued under this section can only be exercised when the pilot has the foreign pilot license, upon which the issuance of the U.S. pilot certificate was based, in the holder's possession or readily accessible in the aircraft.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–124, 74 FR 42556, Aug. 21, 2009]

### § 61.77 Special purpose pilot authorization: Operation of a civil aircraft of the United States and leased by a non-U.S. citizen.

(a) *General.* The holder of a foreign pilot license issued by a contracting State to the Convention on International Civil Aviation who meets the requirements of this section may be issued a special purpose pilot authorization by the Administrator for the purpose of performing pilot duties—

(1) On a civil aircraft of U.S. registry that is leased to a person who is not a citizen of the United States, and

(2) For carrying persons or property for compensation or hire for operations in—

(i) Scheduled international air services in turbojet-powered airplanes of U.S. registry;

(ii) Scheduled international air services in airplanes of U.S. registry having a configuration of more than nine passenger seats, excluding crewmember seats;

(iii) Nonscheduled international air transportation in airplanes of U.S. registry having a configuration of more than 30 passenger seats, excluding crewmember seats; or

(iv) Scheduled international air services, or nonscheduled international air transportation, in airplanes of U.S. registry having a payload capacity of more than 7,500 pounds.

(b) *Eligibility.* To be eligible for the issuance or renewal of a special purpose pilot authorization, an applicant must present the following to an FAA Flight Standards District Office:

(1) A foreign pilot license issued by the aeronautical authority of a contracting State to the Convention on International Civil Aviation that contains the appropriate aircraft category, class, type rating, if appropriate, and instrument rating for the aircraft to be flown;

(2) A certification by the lessee of the aircraft—

(i) Stating that the applicant is employed by the lessee;

(ii) Specifying the aircraft type on which the applicant will perform pilot duties; and

(iii) Stating that the applicant has received ground and flight instruction that qualifies the applicant to perform the duties to be assigned on the aircraft.

(3) Documentation showing when the applicant will reach the age of 65 years (an official copy of the applicant's birth certificate or other official documentation);

(4) Documentation the applicant meets the medical standards for the issuance of the foreign pilot license from the aeronautical authority of that contracting State to the Convention on International Civil Aviation; and

(5) A statement that the applicant does not already hold a special purpose pilot authorization; however, if the applicant already holds a special purpose pilot authorization, then that special purpose pilot authorization must be surrendered to either the FAA Flight Standards District Office that issued it, or the FAA Flight Standards District Office processing the application for the authorization, prior to being issued another special purpose pilot authorization.

(c) *Privileges.* A person issued a special purpose pilot authorization under this section—

(1) May exercise the privileges prescribed on the special purpose pilot authorization; and

(2) Must comply with the limitations specified in this section and any additional limitations specified on the special purpose pilot authorization.

(d) *General limitations.* A special purpose pilot authorization may be used only—

(1) For flights between foreign countries or for flights in foreign air commerce within the time period allotted on the authorization.

(2) If the foreign pilot license required by paragraph (b)(1) of this section, the medical documentation required by paragraph (b)(4) of this section, and the special purpose pilot authorization issued under this section are in the holder's physical possession or immediately accessible in the aircraft.

(3) While the holder is employed by the person to whom the aircraft described in the certification required by paragraph (b)(2) of this section is leased.

(4) While the holder is performing pilot duties on the U.S.-registered aircraft described in the certification required by paragraph (b)(2) of this section.

(5) If the holder has only one special purpose pilot authorization as provided in paragraph (b)(5) of this section.

(e) *Age limitation.* No person who holds a special purpose pilot authorization issued under this part may serve as a pilot on a civil airplane of U.S. registry in the following operations if the person has reached his or her 60th birthday or, in the case of operations with more than one pilot, his or her 65th birthday:

(1) Scheduled international air services carrying passengers in turbojet-powered airplanes;

(2) Scheduled international air services carrying passengers in airplanes having a passenger-seat configuration of more than nine passenger seats, excluding each crewmember seat;

(3) Nonscheduled international air transportation for compensation or hire in airplanes having a passenger-seat configuration of more than 30 passenger seats, excluding each crewmember seat; or

(4) Scheduled international air services, or nonscheduled international air transportation for compensation or hire, in airplanes having a payload capacity of more than 7,500 pounds.

(f) *Definitions.* (1) *International air service,* as used in paragraph (e) of this section, means scheduled air service performed in airplanes for the public transport of passengers, mail, or cargo, in which the service passes through the air space over the territory of more than one country.

(2) *International air transportation,* as used in paragraph (e) of this section, means air transportation performed in airplanes for the public transport of passengers, mail, or cargo, in which service passes through the air space over the territory of more than one country.

(g) *Expiration date.* Each special purpose pilot authorization issued under this section expires—

(1) 60 calendar months from the month it was issued, unless sooner suspended or revoked;

(2) When the lease agreement for the aircraft expires or the lessee terminates the employment of the person who holds the special purpose pilot authorization;

(3) Whenever the person's foreign pilot license has been suspended, revoked, or is no longer valid; or

(4) When the person no longer meets the medical standards for the issuance of the foreign pilot license.

(h) *Renewal.* A person exercising the privileges of a special purpose pilot authorization may apply for a 60-calendar-month extension of that authorization, provided the person—

(1) Continues to meet the requirements of this section; and

(2) Surrenders the expired special purpose pilot authorization upon receipt of the new authorization.

(i) *Surrender.* The holder of a special purpose pilot authorization must surrender the authorization to the Administrator within 7 days after the date the authorization terminates.

[Doc. No. 25910, 62 FR 40901, July 30, 1997, as amended by Amdt. 61–123, 74 FR 34234, July 15, 2009; Amdt. 61–124, 74 FR 42557, Aug. 21, 2009; Amdt. 61–134, 80 FR 33401, June 12, 2015]

## Subpart C—Student Pilots

### § 61.81 Applicability.

This subpart prescribes the requirements for the issuance of student pilot certificates, the conditions under which those certificates are necessary, and the general operating rules and limitations for the holders of those certificates.

### § 61.83 Eligibility requirements for student pilots.

To be eligible for a student pilot certificate, an applicant must:

(a) Be at least 16 years of age for other than the operation of a glider or balloon.

(b) Be at least 14 years of age for the operation of a glider or balloon.

(c) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

### § 61.85 Application.

An application for a student pilot certificate is made on a form and in a manner provided by the Administrator and is submitted to:

(a) A designated aviation medical examiner if applying for an FAA medical certificate under part 67 of this chapter;

(b) An examiner; or

(c) A Flight Standards District Office.

### § 61.87 Solo requirements for student pilots.

(a) *General.* A student pilot may not operate an aircraft in solo flight unless that student has met the requirements of this section. The term ''solo flight'' as used in this subpart means that flight time during which a student pilot is the sole occupant of the aircraft or that flight time during which the student performs the duties of a pilot in command of a gas balloon or an airship requiring more than one pilot flight crewmember.

(b) *Aeronautical knowledge.* A student pilot must demonstrate satisfactory aeronautical knowledge on a knowledge test that meets the requirements of this paragraph:

(1) The test must address the student pilot's knowledge of—

(i) Applicable sections of parts 61 and 91 of this chapter;

(ii) Airspace rules and procedures for the airport where the solo flight will be performed; and

(iii) Flight characteristics and operational limitations for the make and model of aircraft to be flown.

(2) The student's authorized instructor must—

(i) Administer the test; and

(ii) At the conclusion of the test, review all incorrect answers with the student before authorizing that student to conduct a solo flight.

(c) *Pre-solo flight training.* Prior to conducting a solo flight, a student pilot must have:

(1) Received and logged flight training for the maneuvers and procedures of this section that are appropriate to the make and model of aircraft to be flown; and

(2) Demonstrated satisfactory proficiency and safety, as judged by an authorized instructor, on the maneuvers and procedures required by this section in the make and model of aircraft or similar make and model of aircraft to be flown.

(d) *Maneuvers and procedures for pre-solo flight training in a single-engine airplane.* A student pilot who is receiving training for a single-engine airplane rating or privileges must receive and log flight training for the following maneuvers and procedures:

(1) Proper flight preparation procedures, including preflight planning and preparation, powerplant operation, and aircraft systems;

(2) Taxiing or surface operations, including runups;

(3) Takeoffs and landings, including normal and crosswind;

(4) Straight and level flight, and turns in both directions;

(5) Climbs and climbing turns;

(6) Airport traffic patterns, including entry and departure procedures;

(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance;

(8) Descents, with and without turns, using high and low drag configurations;
(9) Flight at various airspeeds from cruise to slow flight;
(10) Stall entries from various flight attitudes and power combinations with recovery initiated at the first indication of a stall, and recovery from a full stall;
(11) Emergency procedures and equipment malfunctions;
(12) Ground reference maneuvers;
(13) Approaches to a landing area with simulated engine malfunctions;
(14) Slips to a landing; and
(15) Go-arounds.

(e) *Maneuvers and procedures for presolo flight training in a multiengine airplane.* A student pilot who is receiving training for a multiengine airplane rating must receive and log flight training for the following maneuvers and procedures:
(1) Proper flight preparation procedures, including preflight planning and preparation, powerplant operation, and aircraft systems;
(2) Taxiing or surface operations, including runups;
(3) Takeoffs and landings, including normal and crosswind;
(4) Straight and level flight, and turns in both directions;
(5) Climbs and climbing turns;
(6) Airport traffic patterns, including entry and departure procedures;
(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance;
(8) Descents, with and without turns, using high and low drag configurations;
(9) Flight at various airspeeds from cruise to slow flight;
(10) Stall entries from various flight attitudes and power combinations with recovery initiated at the first indication of a stall, and recovery from a full stall;
(11) Emergency procedures and equipment malfunctions;
(12) Ground reference maneuvers;
(13) Approaches to a landing area with simulated engine malfunctions; and
(14) Go-arounds.

(f) *Maneuvers and procedures for presolo flight training in a helicopter.* A student pilot who is receiving training for a helicopter rating must receive and log flight training for the following maneuvers and procedures:
(1) Proper flight preparation procedures, including preflight planning and preparation, powerplant operation, and aircraft systems;
(2) Taxiing or surface operations, including runups;
(3) Takeoffs and landings, including normal and crosswind;
(4) Straight and level flight, and turns in both directions;
(5) Climbs and climbing turns;
(6) Airport traffic patterns, including entry and departure procedures;
(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance;
(8) Descents with and without turns;
(9) Flight at various airspeeds;
(10) Emergency procedures and equipment malfunctions;
(11) Ground reference maneuvers;
(12) Approaches to the landing area;
(13) Hovering and hovering turns;
(14) Go-arounds;
(15) Simulated emergency procedures, including autorotational descents with a power recovery and power recovery to a hover;
(16) Rapid decelerations; and
(17) Simulated one-engine-inoperative approaches and landings for multiengine helicopters.

(g) *Maneuvers and procedures for presolo flight training in a gyroplane.* A student pilot who is receiving training for a gyroplane rating or privileges must receive and log flight training for the following maneuvers and procedures:
(1) Proper flight preparation procedures, including preflight planning and preparation, powerplant operation, and aircraft systems;
(2) Taxiing or surface operations, including runups;
(3) Takeoffs and landings, including normal and crosswind;
(4) Straight and level flight, and turns in both directions;
(5) Climbs and climbing turns;
(6) Airport traffic patterns, including entry and departure procedures;
(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance;
(8) Descents with and without turns;
(9) Flight at various airspeeds;

(10) Emergency procedures and equipment malfunctions;

(11) Ground reference maneuvers;

(12) Approaches to the landing area;

(13) High rates of descent with power on and with simulated power off, and recovery from those flight configurations;

(14) Go-arounds; and

(15) Simulated emergency procedures, including simulated power-off landings and simulated power failure during departures.

(h) *Maneuvers and procedures for presolo flight training in a powered-lift.* A student pilot who is receiving training for a powered-lift rating must receive and log flight training in the following maneuvers and procedures:

(1) Proper flight preparation procedures, including preflight planning and preparation, powerplant operation, and aircraft systems;

(2) Taxiing or surface operations, including runups;

(3) Takeoffs and landings, including normal and crosswind;

(4) Straight and level flight, and turns in both directions;

(5) Climbs and climbing turns;

(6) Airport traffic patterns, including entry and departure procedures;

(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance;

(8) Descents with and without turns;

(9) Flight at various airspeeds from cruise to slow flight;

(10) Stall entries from various flight attitudes and power combinations with recovery initiated at the first indication of a stall, and recovery from a full stall;

(11) Emergency procedures and equipment malfunctions;

(12) Ground reference maneuvers;

(13) Approaches to a landing with simulated engine malfunctions;

(14) Go-arounds;

(15) Approaches to the landing area;

(16) Hovering and hovering turns; and

(17) For multiengine powered-lifts, simulated one-engine-inoperative approaches and landings.

(i) *Maneuvers and procedures for presolo flight training in a glider.* A student pilot who is receiving training for a glider rating or privileges must receive and log flight training for the following maneuvers and procedures:

(1) Proper flight preparation procedures, including preflight planning, preparation, aircraft systems, and, if appropriate, powerplant operations;

(2) Taxiing or surface operations, including runups, if applicable;

(3) Launches, including normal and crosswind;

(4) Straight and level flight, and turns in both directions, if applicable;

(5) Airport traffic patterns, including entry procedures;

(6) Collision avoidance, windshear avoidance, and wake turbulence avoidance;

(7) Descents with and without turns using high and low drag configurations;

(8) Flight at various airspeeds;

(9) Emergency procedures and equipment malfunctions;

(10) Ground reference maneuvers, if applicable;

(11) Inspection of towline rigging and review of signals and release procedures, if applicable;

(12) Aerotow, ground tow, or self-launch procedures;

(13) Procedures for disassembly and assembly of the glider;

(14) Stall entry, stall, and stall recovery;

(15) Straight glides, turns, and spirals;

(16) Landings, including normal and crosswind;

(17) Slips to a landing;

(18) Procedures and techniques for thermalling; and

(19) Emergency operations, including towline break procedures.

(j) *Maneuvers and procedures for presolo flight training in an airship.* A student pilot who is receiving training for an airship rating or privileges must receive and log flight training for the following maneuvers and procedures:

(1) Proper flight preparation procedures, including preflight planning and preparation, powerplant operation, and aircraft systems;

(2) Taxiing or surface operations, including runups;

(3) Takeoffs and landings, including normal and crosswind;

(4) Straight and level flight, and turns in both directions;

(5) Climbs and climbing turns;

(6) Airport traffic patterns, including entry and departure procedures;
(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance;
(8) Descents with and without turns;
(9) Flight at various airspeeds from cruise to slow flight;
(10) Emergency procedures and equipment malfunctions;
(11) Ground reference maneuvers;
(12) Rigging, ballasting, and controlling pressure in the ballonets, and superheating; and
(13) Landings with positive and with negative static trim.

(k) *Maneuvers and procedures for presolo flight training in a balloon.* A student pilot who is receiving training in a balloon must receive and log flight training for the following maneuvers and procedures:
(1) Layout and assembly procedures;
(2) Proper flight preparation procedures, including preflight planning and preparation, and aircraft systems;
(3) Ascents and descents;
(4) Landing and recovery procedures;
(5) Emergency procedures and equipment malfunctions;
(6) Operation of hot air or gas source, ballast, valves, vents, and rip panels, as appropriate;
(7) Use of deflation valves or rip panels for simulating an emergency;
(8) The effects of wind on climb and approach angles; and
(9) Obstruction detection and avoidance techniques.

(l) *Maneuvers and procedures for presolo flight training in a powered parachute.* A student pilot who is receiving training for a powered parachute rating or privileges must receive and log flight training for the following maneuvers and procedures:
(1) Proper flight preparation procedures, including preflight planning and preparation, preflight assembly and rigging, aircraft systems, and powerplant operations.
(2) Taxiing or surface operations, including run-ups.
(3) Takeoffs and landings, including normal and crosswind.
(4) Straight and level flight, and turns in both directions.
(5) Climbs, and climbing turns in both directions.
(6) Airport traffic patterns, including entry and departure procedures.
(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance.
(8) Descents, and descending turns in both directions.
(9) Emergency procedures and equipment malfunctions.
(10) Ground reference maneuvers.
(11) Straight glides, and gliding turns in both directions.
(12) Go-arounds.
(13) Approaches to landing areas with a simulated engine malfunction.
(14) Procedures for canopy packing and aircraft disassembly.

(m) *Maneuvers and procedures for presolo flight training in a weight-shift-control aircraft.* A student pilot who is receiving training for a weight-shift-control aircraft rating or privileges must receive and log flight training for the following maneuvers and procedures:
(1) Proper flight preparation procedures, including preflight planning and preparation, preflight assembly and rigging, aircraft systems, and powerplant operations.
(2) Taxiing or surface operations, including run-ups.
(3) Takeoffs and landings, including normal and crosswind.
(4) Straight and level flight, and turns in both directions.
(5) Climbs, and climbing turns in both directions.
(6) Airport traffic patterns, including entry and departure procedures.
(7) Collision avoidance, windshear avoidance, and wake turbulence avoidance.
(8) Descents, and descending turns in both directions.
(9) Flight at various airspeeds from maximum cruise to slow flight.
(10) Emergency procedures and equipment malfunctions.
(11) Ground reference maneuvers.
(12) Stall entry, stall, and stall recovery.
(13) Straight glides, and gliding turns in both directions.
(14) Go-arounds.
(15) Approaches to landing areas with a simulated engine malfunction.
(16) Procedures for disassembly.

(n) *Limitations on student pilots operating an aircraft in solo flight.* A student

pilot may not operate an aircraft in solo flight unless that student pilot has received:

(1) An endorsement from an authorized instructor on his or her student pilot certificate for the specific make and model aircraft to be flown; and

(2) An endorsement in the student's logbook for the specific make and model aircraft to be flown by an authorized instructor, who gave the training within the 90 days preceding the date of the flight.

(o) *Limitations on student pilots operating an aircraft in solo flight at night.* A student pilot may not operate an aircraft in solo flight at night unless that student pilot has received:

(1) Flight training at night on night flying procedures that includes takeoffs, approaches, landings, and goarounds at night at the airport where the solo flight will be conducted;

(2) Navigation training at night in the vicinity of the airport where the solo flight will be conducted; and

(3) An endorsement in the student's logbook for the specific make and model aircraft to be flown for night solo flight by an authorized instructor who gave the training within the 90-day period preceding the date of the flight.

(p) *Limitations on flight instructors authorizing solo flight.* No instructor may authorize a student pilot to perform a solo flight unless that instructor has—

(1) Given that student pilot training in the make and model of aircraft or a similar make and model of aircraft in which the solo flight is to be flown;

(2) Determined the student pilot is proficient in the maneuvers and procedures prescribed in this section;

(3) Determined the student pilot is proficient in the make and model of aircraft to be flown;

(4) Ensured that the student pilot's certificate has been endorsed by an instructor authorized to provide flight training for the specific make and model aircraft to be flown; and

(5) Endorsed the student pilot's logbook for the specific make and model aircraft to be flown, and that endorsement remains current for solo flight privileges, provided an authorized instructor updates the student's logbook every 90 days thereafter.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997; Amdt. 61–104, 63 FR 20287, Apr. 23, 1998; Amdt. 61–110, 69 FR 44866, July 27, 2004; Amdt. 61–124, 74 FR 42557, Aug. 21, 2009]

### § 61.89 General limitations.

(a) A student pilot may not act as pilot in command of an aircraft:

(1) That is carrying a passenger;

(2) That is carrying property for compensation or hire;

(3) For compensation or hire;

(4) In furtherance of a business;

(5) On an international flight, except that a student pilot may make solo training flights from Haines, Gustavus, or Juneau, Alaska, to White Horse, Yukon, Canada, and return over the province of British Columbia;

(6) With a flight or surface visibility of less than 3 statute miles during daylight hours or 5 statute miles at night;

(7) When the flight cannot be made with visual reference to the surface; or

(8) In a manner contrary to any limitations placed in the pilot's logbook by an authorized instructor.

(b) A student pilot may not act as a required pilot flight crewmember on any aircraft for which more than one pilot is required by the type certificate of the aircraft or regulations under which the flight is conducted, except when receiving flight training from an authorized instructor on board an airship, and no person other than a required flight crewmember is carried on the aircraft.

(c) A student pilot seeking a sport pilot certificate must comply with the provisions of paragraphs (a) and (b) of this section and may not act as pilot in command—

(1) Of an aircraft other than a light-sport aircraft;

(2) At night;

(3) At an altitude of more than 10,000 feet MSL or 2,000 feet AGL, whichever is higher;

(4) In Class B, C, and D airspace, at an airport located in Class B, C, or D airspace, and to, from, through, or on an airport having an operational control tower without having received the ground and flight training specified in

§ 61.94 and an endorsement from an authorized instructor;

(5) Of a light-sport aircraft without having received the applicable ground training, flight training, and instructor endorsements specified in § 61.327 (a) and (b).

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44867, July 27, 2004; Amdt. 61–125, 75 FR 5220, Feb. 1, 2010]

### § 61.91 [Reserved]

### § 61.93 Solo cross-country flight requirements.

(a) *General.* (1) Except as provided in paragraph (b) of this section, a student pilot must meet the requirements of this section before—

(i) Conducting a solo cross-country flight, or any flight greater than 25 nautical miles from the airport from where the flight originated.

(ii) Making a solo flight and landing at any location other than the airport of origination.

(2) Except as provided in paragraph (b) of this section, a student pilot who seeks solo cross-country flight privileges must:

(i) Have received flight training from an instructor authorized to provide flight training on the maneuvers and procedures of this section that are appropriate to the make and model of aircraft for which solo cross-country privileges are sought;

(ii) Have demonstrated cross-country proficiency on the appropriate maneuvers and procedures of this section to an authorized instructor;

(iii) Have satisfactorily accomplished the pre-solo flight maneuvers and procedures required by § 61.87 of this part in the make and model of aircraft or similar make and model of aircraft for which solo cross-country privileges are sought; and

(iv) Comply with any limitations included in the authorized instructor's endorsement that are required by paragraph (c) of this section.

(3) A student pilot who seeks solo cross-country flight privileges must have received ground and flight training from an authorized instructor on the cross-country maneuvers and procedures listed in this section that are appropriate to the aircraft to be flown.

(b) *Authorization to perform certain solo flights and cross-country flights.* A student pilot must obtain an endorsement from an authorized instructor to make solo flights from the airport where the student pilot normally receives training to another location. A student pilot who receives this endorsement must comply with the requirements of this paragraph.

(1) Solo flights may be made to another airport that is within 25 nautical miles from the airport where the student pilot normally receives training, provided—

(i) An authorized instructor has given the student pilot flight training at the other airport, and that training includes flight in both directions over the route, entering and exiting the traffic pattern, and takeoffs and landings at the other airport;

(ii) The authorized instructor who gave the training endorses the student pilot's logbook authorizing the flight;

(iii) The student pilot has a solo flight endorsement in accordance with § 61.87 of this part;

(iv) The authorized instructor has determined that the student pilot is proficient to make the flight; and

(v) The purpose of the flight is to practice takeoffs and landings at that other airport.

(2) Repeated specific solo cross-country flights may be made to another airport that is within 50 nautical miles of the airport from which the flight originated, provided—

(i) The authorized instructor has given the student flight training in both directions over the route, including entering and exiting the traffic patterns, takeoffs, and landings at the airports to be used;

(ii) The authorized instructor who gave the training has endorsed the student's logbook certifying that the student is proficient to make such flights;

(iii) The student has a solo flight endorsement in accordance with § 61.87 of this part; and

(iv) The student has a solo cross country flight endorsement in accordance with paragraph (c) of this section; however, for repeated solo cross country flights to another airport within 50 nautical miles from which the flight

originated, separate endorsements are not required to be made for each flight.

(c) *Endorsements for solo cross-country flights.* Except as specified in paragraph (b)(2) of this section, a student pilot must have the endorsements prescribed in this paragraph for each cross-country flight:

(1) *Student pilot certificate endorsement.* A student pilot must have a solo cross-country endorsement from the authorized instructor who conducted the training, and that endorsement must be placed on that person's student pilot certificate for the specific category of aircraft to be flown.

(2) *Logbook endorsement.* (i) A student pilot must have a solo cross-country endorsement from an authorized instructor that is placed in the student pilot's logbook for the specific make and model of aircraft to be flown.

(ii) For each cross-country flight, the authorized instructor who reviews the cross-country planning must make an endorsement in the person's logbook after reviewing that person's cross-country planning, as specified in paragraph (d) of this section. The endorsement must—

(A) Specify the make and model of aircraft to be flown;

(B) State that the student's preflight planning and preparation is correct and that the student is prepared to make the flight safely under the known conditions; and

(C) State that any limitations required by the student's authorized instructor are met.

(d) *Limitations on authorized instructors to permit solo cross-country flights.* An authorized instructor may not permit a student pilot to conduct a solo cross-country flight unless that instructor has:

(1) Determined that the student's cross-country planning is correct for the flight;

(2) Reviewed the current and forecast weather conditions and has determined that the flight can be completed under VFR;

(3) Determined that the student is proficient to conduct the flight safely;

(4) Determined that the student has the appropriate solo cross-country endorsement for the make and model of aircraft to be flown; and

(5) Determined that the student's solo flight endorsement is current for the make and model aircraft to be flown.

(e) *Maneuvers and procedures for cross-country flight training in a single-engine airplane.* A student pilot who is receiving training for cross-country flight in a single-engine airplane must receive and log flight training in the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Use of radios for VFR navigation and two-way communication, except that a student pilot seeking a sport pilot certificate must only receive and log flight training on the use of radios installed in the aircraft to be flown;

(10) Takeoff, approach, and landing procedures, including short-field, soft-field, and crosswind takeoffs, approaches, and landings;

(11) Climbs at best angle and best rate; and

(12) Control and maneuvering solely by reference to flight instruments, including straight and level flight, turns, descents, climbs, use of radio aids, and ATC directives. For student pilots seeking a sport pilot certificate, the

provisions of this paragraph only apply when receiving training for cross-country flight in an airplane that has a $V_H$ greater than 87 knots CAS.

(f) *Maneuvers and procedures for cross-country flight training in a multiengine airplane.* A student pilot who is receiving training for cross-country flight in a multiengine airplane must receive and log flight training in the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Use of radios for VFR navigation and two-way communications;

(10) Takeoff, approach, and landing procedures, including short-field, soft-field, and crosswind takeoffs, approaches, and landings;

(11) Climbs at best angle and best rate; and

(12) Control and maneuvering solely by reference to flight instruments, including straight and level flight, turns, descents, climbs, use of radio aids, and ATC directives.

(g) *Maneuvers and procedures for cross-country flight training in a helicopter.* A student pilot who is receiving training for cross-country flight in a helicopter must receive and log flight training for the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Use of radios for VFR navigation and two-way communications; and

(10) Takeoff, approach, and landing procedures.

(h) *Maneuvers and procedures for cross-country flight training in a gyroplane.* A student pilot who is receiving training for cross-country flight in a gyroplane must receive and log flight training in the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Use of radios for VFR navigation and two-way communication, except that a student pilot seeking a sport pilot certificate must only receive and log flight training on the use of radios installed in the aircraft to be flown; and

(10) Takeoff, approach, and landing procedures, including short-field and soft-field takeoffs, approaches, and landings.

(i) *Maneuvers and procedures for cross-country flight training in a powered-lift.* A student pilot who is receiving training for cross-country flight training in a powered-lift must receive and log flight training in the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Use of radios for VFR navigation and two-way communications;

(10) Takeoff, approach, and landing procedures that include high-altitude, steep, and shallow takeoffs, approaches, and landings; and

(11) Control and maneuvering solely by reference to flight instruments, including straight and level flight, turns, descents, climbs, use of radio aids, and ATC directives.

(j) *Maneuvers and procedures for cross-country flight training in a glider.* A student pilot who is receiving training for cross-country flight in a glider must receive and log flight training in the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Landings accomplished without the use of the altimeter from at least 2,000 feet above the surface; and

(10) Recognition of weather and upper air conditions favorable for cross-country soaring, ascending and descending flight, and altitude control.

(k) *Maneuvers and procedures for cross-country flight training in an airship.* A

student pilot who is receiving training for cross-country flight in an airship must receive and log flight training for the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(2) Use of aircraft performance charts pertaining to cross-country flight;

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(4) Emergency procedures;

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications;

(9) Use of radios for VFR navigation and two-way communication, except that a student pilot seeking a sport pilot certificate must only receive and log flight training on the use of radios installed in the aircraft to be flown;

(10) Control of air pressure with regard to ascending and descending flight and altitude control;

(11) Control of the airship solely by reference to flight instruments, except for a student pilot seeking a sport pilot certificate; and

(12) Recognition of weather and upper air conditions conducive for the direction of cross-country flight.

(l) *Maneuvers and procedures for cross-country flight training in a powered parachute.* A student pilot who is receiving training for cross-country flight in a powered parachute must receive and log flight training in the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass, as appropriate.

(2) Use of aircraft performance charts pertaining to cross-country flight.

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognizing critical weather situations and estimating visibility while in flight.

(4) Emergency procedures.

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach.

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance.

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown.

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications.

(9) If equipped for flight with navigation radios, the use of radios for VFR navigation.

(10) Recognition of weather and upper air conditions favorable for the cross-country flight.

(11) Takeoff, approach and landing procedures.

(m) *Maneuvers and procedures for cross-country flight training in a weight-shift-control aircraft.* A student pilot who is receiving training for cross-country flight in a weight-shift-control aircraft must receive and log flight training for the following maneuvers and procedures:

(1) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass, as appropriate.

(2) Use of aircraft performance charts pertaining to cross-country flight.

(3) Procurement and analysis of aeronautical weather reports and forecasts, including recognizing critical weather situations and estimating visibility while in flight.

(4) Emergency procedures.

(5) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach.

(6) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance.

(7) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown.

(8) Procedures for operating the instruments and equipment installed in the aircraft to be flown, including recognition and use of the proper operational procedures and indications.

(9) If equipped for flight using navigation radios, the use of radios for VFR navigation.

(10) Recognition of weather and upper air conditions favorable for the cross-country flight.

(11) Takeoff, approach and landing procedures, including crosswind approaches and landings.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997; Amdt. 61–110, 69 FR 44867, July 27, 2004; Amdt. 61–124, 74 FR 42557, Aug. 21, 2009; Amdt. 61–125, 75 FR 5220, Feb. 1, 2010]

### § 61.94 Student pilot seeking a sport pilot certificate or a recreational pilot certificate: Operations at airports within, and in airspace located within, Class B, C, and D airspace, or at airports with an operational control tower in other airspace.

(a) A student pilot seeking a sport pilot certificate or a recreational pilot certificate who wants to obtain privileges to operate in Class B, C, and D airspace, at an airport located in Class B, C, or D airspace, and to, from, through, or at an airport having an operational control tower, must receive and log ground and flight training from an authorized instructor in the following aeronautical knowledge areas and areas of operation:

(1) The use of radios, communications, navigation systems and facilities, and radar services.

(2) Operations at airports with an operating control tower, to include three takeoffs and landings to a full stop, with each landing involving a flight in the traffic pattern, at an airport with an operating control tower.

(3) Applicable flight rules of part 91 of this chapter for operations in Class B, C, and D airspace and air traffic control clearances.

(4) Ground and flight training for the specific Class B, C, or D airspace for which the solo flight is authorized, if applicable, within the 90-day period preceding the date of the flight in that airspace. The flight training must be received in the specific airspace area for which solo flight is authorized.

(5) Ground and flight training for the specific airport located in Class B, C, or D airspace for which the solo flight is authorized, if applicable, within the 90-day period preceding the date of the flight at that airport. The flight and ground training must be received at the specific airport for which solo flight is authorized.

(b) The authorized instructor who provides the training specified in paragraph (a) of this section must provide a logbook endorsement that certifies the student has received that training and is proficient to conduct solo flight in that specific airspace or at that specific airport and in those aeronautical knowledge areas and areas of operation specified in this section.

[Doc. No. FAA–2001–11133, 69 FR 44867, July 27, 2004]

### § 61.95 Operations in Class B airspace and at airports located within Class B airspace.

(a) A student pilot may not operate an aircraft on a solo flight in Class B airspace unless:

(1) The student pilot has received both ground and flight training from an authorized instructor on that Class B airspace area, and the flight training was received in the specific Class B airspace area for which solo flight is authorized;

(2) The logbook of that student pilot has been endorsed by the authorized instructor who gave the student pilot flight training, and the endorsement is dated within the 90-day period preceding the date of the flight in that Class B airspace area; and

(3) The logbook endorsement specifies that the student pilot has received

the required ground and flight training, and has been found proficient to conduct solo flight in that specific Class B airspace area.

(b) A student pilot may not operate an aircraft on a solo flight to, from, or at an airport located within Class B airspace pursuant to § 91.131(b) of this chapter unless:

(1) The student pilot has received both ground and flight training from an instructor authorized to provide training to operate at that airport, and the flight and ground training has been received at the specific airport for which the solo flight is authorized;

(2) The logbook of that student pilot has been endorsed by an authorized instructor who gave the student pilot flight training, and the endorsement is dated within the 90-day period preceding the date of the flight at that airport; and

(3) The logbook endorsement specifies that the student pilot has received the required ground and flight training, and has been found proficient to conduct solo flight operations at that specific airport.

(c) This section does not apply to a student pilot seeking a sport pilot certificate or a recreational pilot certificate.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997; Amdt. 61–110, 69 FR 44868, July 27, 2004]

## Subpart D—Recreational Pilots

### § 61.96 Applicability and eligibility requirements: General.

(a) This subpart prescribes the requirement for the issuance of recreational pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the general operating rules for persons who hold those certificates and ratings.

(b) To be eligible for a recreational pilot certificate, a person who applies for that certificate must:

(1) Be at least 17 years of age;

(2) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft;

(3) Receive a logbook endorsement from an authorized instructor who—

(i) Conducted the training or reviewed the applicant's home study on the aeronautical knowledge areas listed in § 61.97(b) of this part that apply to the aircraft category and class rating sought; and

(ii) Certified that the applicant is prepared for the required knowledge test.

(4) Pass the required knowledge test on the aeronautical knowledge areas listed in § 61.97(b) of this part;

(5) Receive flight training and a logbook endorsement from an authorized instructor who—

(i) Conducted the training on the areas of operation listed in § 61.98(b) of this part that apply to the aircraft category and class rating sought; and

(ii) Certified that the applicant is prepared for the required practical test.

(6) Meet the aeronautical experience requirements of § 61.99 of this part that apply to the aircraft category and class rating sought before applying for the practical test;

(7) Pass the practical test on the areas of operation listed in § 61.98(b) that apply to the aircraft category and class rating;

(8) Comply with the sections of this part that apply to the aircraft category and class rating; and

(9) Hold either a student pilot certificate or sport pilot certificate.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997; Amdt. 61–124, 74 FR 42558, Aug. 21, 2009]

### § 61.97 Aeronautical knowledge.

(a) *General.* A person who applies for a recreational pilot certificate must receive and log ground training from an authorized instructor or complete a home-study course on the aeronautical knowledge areas of paragraph (b) of this section that apply to the aircraft category and class rating sought.

(b) *Aeronautical knowledge areas.* (1) Applicable Federal Aviation Regulations of this chapter that relate to recreational pilot privileges, limitations, and flight operations;

(2) Accident reporting requirements of the National Transportation Safety Board;

(3) Use of the applicable portions of the ''Aeronautical Information Manual'' and FAA advisory circulars;

(4) Use of aeronautical charts for VFR navigation using pilotage with the aid of a magnetic compass;

(5) Recognition of critical weather situations from the ground and in flight, windshear avoidance, and the procurement and use of aeronautical weather reports and forecasts;

(6) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence;

(7) Effects of density altitude on takeoff and climb performance;

(8) Weight and balance computations;

(9) Principles of aerodynamics, powerplants, and aircraft systems;

(10) Stall awareness, spin entry, spins, and spin recovery techniques, if applying for an airplane single-engine rating;

(11) Aeronautical decision making and judgment; and

(12) Preflight action that includes—

(i) How to obtain information on runway lengths at airports of intended use, data on takeoff and landing distances, weather reports and forecasts, and fuel requirements; and

(ii) How to plan for alternatives if the planned flight cannot be completed or delays are encountered.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997]

### § 61.98 Flight proficiency.

(a) *General.* A person who applies for a recreational pilot certificate must receive and log ground and flight training from an authorized instructor on the areas of operation of this section that apply to the aircraft category and class rating sought.

(b) *Areas of operation.* (1) *For a single-engine airplane rating:* (i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport operations;

(iv) Takeoffs, landings, and go-arounds;

(v) Performance maneuvers;

(vi) Ground reference maneuvers;

(vii) Navigation;

(viii) Slow flight and stalls;

(ix) Emergency operations; and

(x) Postflight procedures.

(2) *For a helicopter rating:* (i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport and heliport operations;

(iv) Hovering maneuvers;

(v) Takeoffs, landings, and go-arounds;

(vi) Performance maneuvers;

(vii) Ground reference maneuvers;

(viii) Navigation;

(ix) Emergency operations; and

(x) Postflight procedures.

(3) *For a gyroplane rating:* (i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport operations;

(iv) Takeoffs, landings, and go-arounds;

(v) Performance maneuvers;

(vi) Ground reference maneuvers;

(vii) Navigation;

(viii) Flight at slow airspeeds;

(ix) Emergency operations; and

(x) Postflight procedures.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997]

### § 61.99 Aeronautical experience.

A person who applies for a recreational pilot certificate must receive and log at least 30 hours of flight time that includes at least—

(a) 15 hours of flight training from an authorized instructor on the areas of operation listed in § 61.98 of this part that consists of at least:

(1) Except as provided in § 61.100 of this part, 2 hours of flight training en route to an airport that is located more than 25 nautical miles from the airport where the applicant normally trains, which includes at least three takeoffs and three landings at the airport located more than 25 nautical miles from the airport where the applicant normally trains; and

(2) Three hours of flight training with an authorized instructor in the aircraft for the rating sought in preparation for the practical test within the preceding 2 calendar months from the month of the test.

(b) 3 hours of solo flying in the aircraft for the rating sought, on the areas of operation listed in § 61.98 of

this part that apply to the aircraft category and class rating sought.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44868, July 27, 2004; Amdt. 61–124A, 74 FR 53645, Oct. 20, 2009]

### § 61.100 Pilots based on small islands.

(a) An applicant located on an island from which the flight training required in § 61.99(a)(1) of this part cannot be accomplished without flying over water for more than 10 nautical miles from the nearest shoreline need not comply with the requirements of that section. However, if other airports that permit civil operations are available to which a flight may be made without flying over water for more than 10 nautical miles from the nearest shoreline, the applicant must show completion of a dual flight between two airports, which must include three landings at the other airport.

(b) An applicant who complies with paragraph (a) of this section and meets all requirements for the issuance of a recreational pilot certificate, except the requirements of § 61.99(a)(1) of this part, will be issued a pilot certificate with an endorsement containing the following limitation, ''Passenger carrying prohibited on flights more than 10 nautical miles from (the appropriate island).'' The limitation may be subsequently amended to include another island if the applicant complies with the requirements of paragraph (a) of this section for another island.

(c) Upon meeting the requirements of § 61.99(a)(1) of this part, the applicant may have the limitation(s) in paragraph (b) of this section removed.

### § 61.101 Recreational pilot privileges and limitations.

(a) A person who holds a recreational pilot certificate may:

(1) Carry no more than one passenger; and

(2) Not pay less than the pro rata share of the operating expenses of a flight with a passenger, provided the expenses involve only fuel, oil, airport expenses, or aircraft rental fees.

(b) A person who holds a recreational pilot certificate may act as pilot in command of an aircraft on a flight within 50 nautical miles from the departure airport, provided that person has—

(1) Received ground and flight training for takeoff, departure, arrival, and landing procedures at the departure airport;

(2) Received ground and flight training for the area, terrain, and aids to navigation that are in the vicinity of the departure airport;

(3) Been found proficient to operate the aircraft at the departure airport and the area within 50 nautical miles from that airport; and

(4) Received from an authorized instructor a logbook endorsement, which is carried in the person's possession in the aircraft, that permits flight within 50 nautical miles from the departure airport.

(c) A person who holds a recreational pilot certificate may act as pilot in command of an aircraft on a flight that exceeds 50 nautical miles from the departure airport, provided that person has—

(1) Received ground and flight training from an authorized instructor on the cross-country training requirements of subpart E of this part that apply to the aircraft rating held;

(2) Been found proficient in cross-country flying; and

(3) Received from an authorized instructor a logbook endorsement, which is carried on the person's possession in the aircraft, that certifies the person has received and been found proficient in the cross-country training requirements of subpart E of this part that apply to the aircraft rating held.

(d) A person who holds a recreational pilot certificate may act as pilot in command of an aircraft in Class B, C, and D airspace, at an airport located in Class B, C, or D airspace, and to, from, through, or at an airport having an operational control tower, provided that person has—

(1) Received and logged ground and flight training from an authorized instructor on the following aeronautical knowledge areas and areas of operation, as appropriate to the aircraft rating held:

(i) The use of radios, communications, navigation system and facilities, and radar services.

(ii) Operations at airports with an operating control tower to include three takeoffs and landings to a full stop, with each landing involving a flight in the traffic pattern at an airport with an operating control tower.

(iii) Applicable flight rules of part 91 of this chapter for operations in Class B, C, and D airspace and air traffic control clearances;

(2) Been found proficient in those aeronautical knowledge areas and areas of operation specified in paragraph (d)(1) of this section; and

(3) Received from an authorized instructor a logbook endorsement, which is carried on the person's possession or readily accessible in the aircraft, that certifies the person has received and been found proficient in those aeronautical knowledge areas and areas of operation specified in paragraph (d)(1) of this section.

(e) Except as provided in paragraphs (d) and (i) of this section, a recreational pilot may not act as pilot in command of an aircraft—

(1) That is certificated—

(i) For more than four occupants;

(ii) With more than one powerplant;

(iii) With a powerplant of more than 180 horsepower, except aircraft certificated in the rotorcraft category; or

(iv) With retractable landing gear;

(2) That is classified as a multiengine airplane, powered-lift, glider, airship, balloon, powered parachute, or weight-shift-control aircraft;

(3) That is carrying a passenger or property for compensation or hire;

(4) For compensation or hire;

(5) In furtherance of a business;

(6) Between sunset and sunrise;

(7) In Class A, B, C, and D airspace, at an airport located in Class B, C, or D airspace, or to, from, through, or at an airport having an operational control tower;

(8) At an altitude of more than 10,000 feet MSL or 2,000 feet AGL, whichever is higher;

(9) When the flight or surface visibility is less than 3 statute miles;

(10) Without visual reference to the surface;

(11) On a flight outside the United States, unless authorized by the country in which the flight is conducted;

(12) To demonstrate that aircraft in flight as an aircraft salesperson to a prospective buyer;

(13) That is used in a passenger-carrying airlift and sponsored by a charitable organization; and

(14) That is towing any object.

(f) A recreational pilot may not act as a pilot flight crewmember on any aircraft for which more than one pilot is required by the type certificate of the aircraft or the regulations under which the flight is conducted, except when:

(1) Receiving flight training from a person authorized to provide flight training on board an airship; and

(2) No person other than a required flight crewmember is carried on the aircraft.

(g) A person who holds a recreational pilot certificate, has logged fewer than 400 flight hours, and has not logged pilot-in-command time in an aircraft within the 180 days preceding the flight shall not act as pilot in command of an aircraft until the pilot receives flight training and a logbook endorsement from an authorized instructor, and the instructor certifies that the person is proficient to act as pilot in command of the aircraft. This requirement can be met in combination with the requirements of §§ 61.56 and 61.57 of this part, at the discretion of the authorized instructor.

(h) A recreational pilot certificate issued under this subpart carries the notation, ''Holder does not meet ICAO requirements.''

(i) For the purpose of obtaining additional certificates or ratings while under the supervision of an authorized instructor, a recreational pilot may fly as the sole occupant of an aircraft:

(1) For which the pilot does not hold an appropriate category or class rating;

(2) Within airspace that requires communication with air traffic control; or

(3) Between sunset and sunrise, provided the flight or surface visibility is at least 5 statute miles.

(j) In order to fly solo as provided in paragraph (i) of this section, the recreational pilot must meet the appropriate aeronautical knowledge and flight training requirements of § 61.87

for that aircraft. When operating an aircraft under the conditions specified in paragraph (i) of this section, the recreational pilot shall carry the logbook that has been endorsed for each flight by an authorized instructor who:

(1) Has given the recreational pilot training in the make and model of aircraft in which the solo flight is to be made;

(2) Has found that the recreational pilot has met the applicable requirements of § 61.87; and

(3) Has found that the recreational pilot is competent to make solo flights in accordance with the logbook endorsement.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44868, July 27, 2004; Amdt. 61–124, 74 FR 42558, Aug. 21, 2009]

## Subpart E—Private Pilots

### § 61.102 Applicability.

This subpart prescribes the requirements for the issuance of private pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the general operating rules for persons who hold those certificates and ratings.

### § 61.103 Eligibility requirements: General.

To be eligible for a private pilot certificate, a person must:

(a) Be at least 17 years of age for a rating in other than a glider or balloon.

(b) Be at least 16 years of age for a rating in a glider or balloon.

(c) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(d) Receive a logbook endorsement from an authorized instructor who:

(1) Conducted the training or reviewed the person's home study on the aeronautical knowledge areas listed in § 61.105(b) of this part that apply to the aircraft rating sought; and

(2) Certified that the person is prepared for the required knowledge test.

(e) Pass the required knowledge test on the aeronautical knowledge areas listed in § 61.105(b) of this part.

(f) Receive flight training and a logbook endorsement from an authorized instructor who:

(1) Conducted the training in the areas of operation listed in § 61.107(b) of this part that apply to the aircraft rating sought; and

(2) Certified that the person is prepared for the required practical test.

(g) Meet the aeronautical experience requirements of this part that apply to the aircraft rating sought before applying for the practical test.

(h) Pass a practical test on the areas of operation listed in § 61.107(b) of this part that apply to the aircraft rating sought.

(i) Comply with the appropriate sections of this part that apply to the aircraft category and class rating sought.

(j) Hold a U.S. student pilot certificate, sport pilot certificate, or recreational pilot certificate.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–124, 74 FR 42558, Aug. 21, 2009]

### § 61.105 Aeronautical knowledge.

(a) *General.* A person who is applying for a private pilot certificate must receive and log ground training from an authorized instructor or complete a home-study course on the aeronautical knowledge areas of paragraph (b) of this section that apply to the aircraft category and class rating sought.

(b) *Aeronautical knowledge areas.* (1) Applicable Federal Aviation Regulations of this chapter that relate to private pilot privileges, limitations, and flight operations;

(2) Accident reporting requirements of the National Transportation Safety Board;

(3) Use of the applicable portions of the ''Aeronautical Information Manual'' and FAA advisory circulars;

(4) Use of aeronautical charts for VFR navigation using pilotage, dead reckoning, and navigation systems;

(5) Radio communication procedures;

(6) Recognition of critical weather situations from the ground and in flight, windshear avoidance, and the

procurement and use of aeronautical weather reports and forecasts;

(7) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence;

(8) Effects of density altitude on takeoff and climb performance;

(9) Weight and balance computations;

(10) Principles of aerodynamics, powerplants, and aircraft systems;

(11) Stall awareness, spin entry, spins, and spin recovery techniques for the airplane and glider category ratings;

(12) Aeronautical decision making and judgment; and

(13) Preflight action that includes—

(i) How to obtain information on runway lengths at airports of intended use, data on takeoff and landing distances, weather reports and forecasts, and fuel requirements; and

(ii) How to plan for alternatives if the planned flight cannot be completed or delays are encountered.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40902, July 30, 1997]

### § 61.107 Flight proficiency.

(a) *General.* A person who applies for a private pilot certificate must receive and log ground and flight training from an authorized instructor on the areas of operation of this section that apply to the aircraft category and class rating sought.

(b) *Areas of operation.* (1) For an airplane category rating with a single-engine class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport and seaplane base operations;

(iv) Takeoffs, landings, and go-arounds;

(v) Performance maneuvers;

(vi) Ground reference maneuvers;

(vii) Navigation;

(viii) Slow flight and stalls;

(ix) Basic instrument maneuvers;

(x) Emergency operations;

(xi) Night operations, except as provided in § 61.110 of this part; and

(xii) Postflight procedures.

(2) For an airplane category rating with a multiengine class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport and seaplane base operations;

(iv) Takeoffs, landings, and go-arounds;

(v) Performance maneuvers;

(vi) Ground reference maneuvers;

(vii) Navigation;

(viii) Slow flight and stalls;

(ix) Basic instrument maneuvers;

(x) Emergency operations;

(xi) Multiengine operations;

(xii) Night operations, except as provided in § 61.110 of this part; and

(xiii) Postflight procedures.

(3) For a rotorcraft category rating with a helicopter class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport and heliport operations;

(iv) Hovering maneuvers;

(v) Takeoffs, landings, and go-arounds;

(vi) Performance maneuvers;

(vii) Navigation;

(viii) Emergency operations;

(ix) Night operations, except as provided in § 61.110 of this part; and

(x) Postflight procedures.

(4) For a rotorcraft category rating with a gyroplane class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport operations;

(iv) Takeoffs, landings, and go-arounds;

(v) Performance maneuvers;

(vi) Ground reference maneuvers;

(vii) Navigation;

(viii) Flight at slow airspeeds;

(ix) Emergency operations;

(x) Night operations, except as provided in § 61.110 of this part; and

(xi) Postflight procedures.

(5) For a powered-lift category rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport and heliport operations;

(iv) Hovering maneuvers;

(v) Takeoffs, landings, and go-arounds;

(vi) Performance maneuvers;

(vii) Ground reference maneuvers;

(viii) Navigation;

(ix) Slow flight and stalls;

(x) Basic instrument maneuvers;

(xi) Emergency operations;

(xii) Night operations, except as provided in § 61.110 of this part; and

(xiii) Postflight procedures.
(6) For a glider category rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and gliderport operations;
(iv) Launches and landings;
(v) Performance speeds;
(vi) Soaring techniques;
(vii) Performance maneuvers;
(viii) Navigation;
(ix) Slow flight and stalls;
(x) Emergency operations; and
(xi) Postflight procedures.
(7) For a lighter-than-air category rating with an airship class rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport operations;
(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;
(vi) Ground reference maneuvers;
(vii) Navigation;
(viii) Emergency operations; and
(ix) Postflight procedures.
(8) For a lighter-than-air category rating with a balloon class rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport operations;
(iv) Launches and landings;
(v) Performance maneuvers;
(vi) Navigation;
(vii) Emergency operations; and
(viii) Postflight procedures.
(9) For a powered parachute category rating—
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and seaplane base operations, as applicable;
(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;
(vi) Ground reference maneuvers;
(vii) Navigation;
(viii) Night operations, except as provided in § 61.110;
(ix) Emergency operations; and
(x) Post-flight procedures.
(10) For a weight-shift-control aircraft category rating—
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and seaplane base operations, as applicable;
(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;
(vi) Ground reference maneuvers;
(vii) Navigation;
(viii) Slow flight and stalls;
(ix) Night operations, except as provided in § 61.110;
(x) Emergency operations; and
(xi) Post-flight procedures.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44868, July 27, 2004]

### § 61.109 Aeronautical experience.

(a) *For an airplane single-engine rating.* Except as provided in paragraph (k) of this section, a person who applies for a private pilot certificate with an airplane category and single-engine class rating must log at least 40 hours of flight time that includes at least 20 hours of flight training from an authorized instructor and 10 hours of solo flight training in the areas of operation listed in § 61.107(b)(1) of this part, and the training must include at least—
(1) 3 hours of cross-country flight training in a single-engine airplane;
(2) Except as provided in § 61.110 of this part, 3 hours of night flight training in a single-engine airplane that includes—
(i) One cross-country flight of over 100 nautical miles total distance; and
(ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.
(3) 3 hours of flight training in a single-engine airplane on the control and maneuvering of an airplane solely by reference to instruments, including straight and level flight, constant airspeed climbs and descents, turns to a heading, recovery from unusual flight attitudes, radio communications, and the use of navigation systems/facilities and radar services appropriate to instrument flight;
(4) 3 hours of flight training with an authorized instructor in a single-engine airplane in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test; and
(5) 10 hours of solo flight time in a single-engine airplane, consisting of at least—
(i) 5 hours of solo cross-country time;

(ii) One solo cross country flight of 150 nautical miles total distance, with full-stop landings at three points, and one segment of the flight consisting of a straight-line distance of more than 50 nautical miles between the takeoff and landing locations; and

(iii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(b) *For an airplane multiengine rating.* Except as provided in paragraph (k) of this section, a person who applies for a private pilot certificate with an airplane category and multiengine class rating must log at least 40 hours of flight time that includes at least 20 hours of flight training from an authorized instructor and 10 hours of solo flight training in the areas of operation listed in §61.107(b)(2) of this part, and the training must include at least—

(1) 3 hours of cross-country flight training in a multiengine airplane;

(2) Except as provided in §61.110 of this part, 3 hours of night flight training in a multiengine airplane that includes—

(i) One cross-country flight of over 100 nautical miles total distance; and

(ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.

(3) 3 hours of flight training in a multiengine airplane on the control and maneuvering of an airplane solely by reference to instruments, including straight and level flight, constant airspeed climbs and descents, turns to a heading, recovery from unusual flight attitudes, radio communications, and the use of navigation systems/facilities and radar services appropriate to instrument flight;

(4) 3 hours of flight training with an authorized instructor in a multiengine airplane in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test; and

(5) 10 hours of solo flight time in an airplane consisting of at least—

(i) 5 hours of solo cross-country time;

(ii) One solo cross country flight of 150 nautical miles total distance, with full-stop landings at three points, and one segment of the flight consisting of a straight-line distance of more than 50 nautical miles between the takeoff and landing locations; and

(iii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(c) *For a helicopter rating.* Except as provided in paragraph (k) of this section, a person who applies for a private pilot certificate with rotorcraft category and helicopter class rating must log at least 40 hours of flight time that includes at least 20 hours of flight training from an authorized instructor and 10 hours of solo flight training in the areas of operation listed in §61.107(b)(3) of this part, and the training must include at least—

(1) 3 hours of cross-country flight training in a helicopter;

(2) Except as provided in §61.110 of this part, 3 hours of night flight training in a helicopter that includes—

(i) One cross-country flight of over 50 nautical miles total distance; and

(ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.

(3) 3 hours of flight training with an authorized instructor in a helicopter in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test; and

(4) 10 hours of solo flight time in a helicopter, consisting of at least—

(i) 3 hours cross-country time;

(ii) One solo cross country flight of 100 nautical miles total distance, with landings at three points, and one segment of the flight being a straight-line distance of more than 25 nautical miles between the takeoff and landing locations; and

(iii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(d) *For a gyroplane rating.* Except as provided in paragraph (k) of this section, a person who applies for a private pilot certificate with rotorcraft category and gyroplane class rating must

log at least 40 hours of flight time that includes at least 20 hours of flight training from an authorized instructor and 10 hours of solo flight training in the areas of operation listed in §61.107(b)(4) of this part, and the training must include at least—

(1) 3 hours of cross-country flight training in a gyroplane;

(2) Except as provided in §61.110 of this part, 3 hours of night flight training in a gyroplane that includes—

(i) One cross-country flight of over 50 nautical miles total distance; and

(ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.

(3) 3 hours of flight training with an authorized instructor in a gyroplane in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test; and

(4) 10 hours of solo flight time in a gyroplane, consisting of at least—

(i) 3 hours of cross-country time;

(ii) One solo cross country flight of 100 nautical miles total distance, with landings at three points, and one segment of the flight being a straight-line distance of more than 25 nautical miles between the takeoff and landing locations; and

(iii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(e) *For a powered-lift rating.* Except as provided in paragraph (k) of this section, a person who applies for a private pilot certificate with a powered-lift category rating must log at least 40 hours of flight time that includes at least 20 hours of flight training from an authorized instructor and 10 hours of solo flight training in the areas of operation listed in §61.107(b)(5) of this part, and the training must include at least—

(1) 3 hours of cross-country flight training in a powered-lift;

(2) Except as provided in §61.110 of this part, 3 hours of night flight training in a powered-lift that includes—

(i) One cross-country flight of over 100 nautical miles total distance; and

(ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.

(3) 3 hours of flight training in a powered-lift on the control and maneuvering of a powered-lift solely by reference to instruments, including straight and level flight, constant airspeed climbs and descents, turns to a heading, recovery from unusual flight attitudes, radio communications, and the use of navigation systems/facilities and radar services appropriate to instrument flight;

(4) 3 hours of flight training with an authorized instructor in a powered-lift in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test; and

(5) 10 hours of solo flight time in an airplane or powered-lift consisting of at least—

(i) 5 hours cross-country time;

(ii) One solo cross country flight of 150 nautical miles total distance, with full-stop landings at three points, and one segment of the flight consisting of a straight-line distance of more than 50 nautical miles between the takeoff and landing locations; and

(iii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(f) *For a glider category rating.* (1) If the applicant for a private pilot certificate with a glider category rating has not logged at least 40 hours of flight time as a pilot in a heavier-than-air aircraft, the applicant must log at least 10 hours of flight time in a glider in the areas of operation listed in §61.107(b)(6) of this part, and that flight time must include at least—

(i) 20 flights in a glider in the areas of operations listed in §61.107(b)(6) of this part, including at least 3 training flights with an authorized instructor in a glider in preparation for the practical test that must have been performed within the preceding 2 calendar months from the month of the test; and

(ii) 2 hours of solo flight time in a glider in the areas of operation listed in §61.107(b)(6) of this part, with not

less than 10 launches and landings being performed.

(2) If the applicant has logged at least 40 hours of flight time in a heavier-than-air aircraft, the applicant must log at least 3 hours of flight time in a glider in the areas of operation listed in § 61.107(b)(6) of this part, and that flight time must include at least—

(i) 10 solo flights in a glider in the areas of operation listed in § 61.107(b)(6) of this part; and

(ii) 3 training flights with an authorized instructor in a glider in preparation for the practical test that must have been performed within the preceding 2 calendar months from the month of the test.

(g) *For an airship rating.* A person who applies for a private pilot certificate with a lighter-than-air category and airship class rating must log at least:

(1) 25 hours of flight training in airships on the areas of operation listed in § 61.107(b)(7) of this part, which consists of at least:

(i) 3 hours of cross-country flight training in an airship;

(ii) Except as provided in § 61.110 of this part, 3 hours of night flight training in an airship that includes:

(A) A cross-country flight of over 25 nautical miles total distance; and

(B) Five takeoffs and five landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.

(2) 3 hours of flight training in an airship on the control and maneuvering of an airship solely by reference to instruments, including straight and level flight, constant airspeed climbs and descents, turns to a heading, recovery from unusual flight attitudes, radio communications, and the use of navigation systems/facilities and radar services appropriate to instrument flight;

(3) Three hours of flight training with an authorized instructor in an airship in preparation for the practical test within the preceding 2 calendar months from the month of the test; and

(4) 5 hours performing the duties of pilot in command in an airship with an authorized instructor.

(h) *For a balloon rating.* A person who applies for a private pilot certificate with a lighter-than-air category and balloon class rating must log at least 10 hours of flight training that includes at least six training flights with an authorized instructor in the areas of operation listed in § 61.107(b)(8) of this part, that includes—

(1) *Gas balloon.* If the training is being performed in a gas balloon, at least two flights of 2 hours each that consists of—

(i) At least one training flight with an authorized instructor in a gas balloon in preparation for the practical test within the preceding 2 calendar months from the month of the test;

(ii) At least one flight performing the duties of pilot in command in a gas balloon with an authorized instructor; and

(iii) At least one flight involving a controlled ascent to 3,000 feet above the launch site.

(2) *Balloon with an airborne heater.* If the training is being performed in a balloon with an airborne heater, at least—

(i) At least two training flights of 1 hour each with an authorized instructor in a balloon with an airborne heater in preparation for the practical test within the preceding 2 calendar months from the month of the test;

(ii) One solo flight in a balloon with an airborne heater; and

(iii) At least one flight involving a controlled ascent to 2,000 feet above the launch site.

(i) *For a powered parachute rating.* A person who applies for a private pilot certificate with a powered parachute category rating must log at least 25 hours of flight time in a powered parachute that includes at least 10 hours of flight training with an authorized instructor, including 30 takeoffs and landings, and 10 hours of solo flight training in the areas of operation listed in § 61.107 (b)(9) and the training must include at least—

(1) One hour of cross-country flight training in a powered parachute that includes a 1-hour cross-country flight with a landing at an airport at least 25 nautical miles from the airport of departure;

(2) Except as provided in § 61.110, 3 hours of night flight training in a powered parachute that includes 10 takeoffs and landings (with each landing involving a flight in the traffic pattern) at an airport;

(3) Three hours of flight training with an authorized instructor in a powered parachute in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test;

(4) Three hours of solo flight time in a powered parachute, consisting of at least—

(i) One solo cross-country flight with a landing at an airport at least 25 nautical miles from the departure airport; and

(ii) Twenty solo takeoffs and landings to a full stop (with each landing involving a flight in a traffic pattern) at an airport; and

(5) Three takeoffs and landings (with each landing involving a flight in the traffic pattern) in an aircraft at an airport with an operating control tower.

(j) *For a weight-shift-control aircraft rating.* A person who applies for a private pilot certificate with a weight-shift-control rating must log at least 40 hours of flight time that includes at least 20 hours of flight training with an authorized instructor and 10 hours of solo flight training in the areas of operation listed in § 61.107(b)(10) and the training must include at least—

(1) Three hours of cross-country flight training in a weight-shift-control aircraft;

(2) Except as provided in § 61.110, 3 hours of night flight training in a weight-shift-control aircraft that includes—

(i) One cross-country flight of over 75 nautical miles total distance that includes a point of landing that is a straight-line distance of more than 50 nautical miles from the original point of departure; and

(ii) Ten takeoffs and landings (with each landing involving a flight in the traffic pattern) at an airport;

(3) Three hours of flight training with an authorized instructor in a weight-shift-control aircraft in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test;

(4) Ten hours of solo flight time in a weight-shift-control aircraft, consisting of at least—

(i) Five hours of solo cross-country time; and

(ii) One solo cross-country flight over 100 nautical miles total distance, with landings at a minimum of three points, and one segment of the flight being a straight line distance of at least 50 nautical miles between takeoff and landing locations; and

(5) Three takeoffs and landings (with each landing involving a flight in the traffic pattern) in an aircraft at an airport with an operating control tower.

(k) *Permitted credit for use of a flight simulator or flight training device.* (1) Except as provided in paragraphs (k)(2) of this section, a maximum of 2.5 hours of training in a flight simulator or flight training device representing the category, class, and type, if applicable, of aircraft appropriate to the rating sought, may be credited toward the flight training time required by this section, if received from an authorized instructor.

(2) A maximum of 5 hours of training in a flight simulator or flight training device representing the category, class, and type, if applicable, of aircraft appropriate to the rating sought, may be credited toward the flight training time required by this section if the training is accomplished in a course conducted by a training center certificated under part 142 of this chapter.

(3) Except when fewer hours are approved by the Administrator, an applicant for a private pilot certificate with an airplane, rotorcraft, or powered-lift rating, who has satisfactorily completed an approved private pilot course conducted by a training center certificated under part 142 of this chapter, need only have a total of 35 hours of aeronautical experience to meet the requirements of this section.

[Doc. No. 25910, 62 FR 40902, July 30, 1997, as amended by Amdt. 61–104, 63 FR 20287, Apr. 23, 1998; Amdt. 61–110, 69 FR 44868, July 27, 2004; Amdt. 61–124, 74 FR 42558, Aug. 21, 2009; Amdt. 61–124A, 74 FR 53645, Oct. 20, 2009; Amdt. 61–125, 75 FR 5220, Feb. 1, 2010]

### § 61.110 Night flying exceptions.

(a) Subject to the limitations of paragraph (b) of this section, a person is not required to comply with the night flight training requirements of this subpart if the person receives flight training in and resides in the State of Alaska.

(b) A person who receives flight training in and resides in the State of Alaska but does not meet the night flight training requirements of this section:

(1) May be issued a pilot certificate with a limitation ''Night flying prohibited''; and

(2) Must comply with the appropriate night flight training requirements of this subpart within the 12-calendar-month period after the issuance of the pilot certificate. At the end of that period, the certificate will become invalid for use until the person complies with the appropriate night training requirements of this subpart. The person may have the ''Night flying prohibited'' limitation removed if the person—

(i) Accomplishes the appropriate night flight training requirements of this subpart; and

(ii) Presents to an examiner a logbook or training record endorsement from an authorized instructor that verifies accomplishment of the appropriate night flight training requirements of this subpart.

(c) A person who does not meet the night flying requirements in § 61.109(d)(2), (i)(2), or (j)(2) may be issued a private pilot certificate with the limitation ''Night flying prohibited.'' This limitation may be removed by an examiner if the holder complies with the requirements of § 61.109(d)(2), (i)(2), or (j)(2), as appropriate.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40904, July 30, 1997; Amdt. 61–110, 69 FR 44869, July 27, 2004]

### § 61.111 Cross-country flights: Pilots based on small islands.

(a) Except as provided in paragraph (b) of this section, an applicant located on an island from which the cross-country flight training required in § 61.109 of this part cannot be accomplished without flying over water for more than 10 nautical miles from the nearest shoreline need not comply with the requirements of that section.

(b) If other airports that permit civil operations are available to which a flight may be made without flying over water for more than 10 nautical miles from the nearest shoreline, the applicant must show completion of two round-trip solo flights between those two airports that are farthest apart, including a landing at each airport on both flights.

(c) An applicant who complies with paragraph (a) or paragraph (b) of this section, and meets all requirements for the issuance of a private pilot certificate, except the cross-country training requirements of § 61.109 of this part, will be issued a pilot certificate with an endorsement containing the following limitation, ''Passenger carrying prohibited on flights more than 10 nautical miles from (the appropriate island).'' The limitation may be subsequently amended to include another island if the applicant complies with the requirements of paragraph (b) of this section for another island.

(d) Upon meeting the cross-country training requirements of § 61.109 of this part, the applicant may have the limitation in paragraph (c) of this section removed.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40904, July 30, 1997]

### § 61.113 Private pilot privileges and limitations: Pilot in command.

(a) Except as provided in paragraphs (b) through (h) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

(b) A private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:

(1) The flight is only incidental to that business or employment; and

(2) The aircraft does not carry passengers or property for compensation or hire.

(c) A private pilot may not pay less than the pro rata share of the operating expenses of a flight with passengers, provided the expenses involve only fuel, oil, airport expenditures, or rental fees.

(d) A private pilot may act as pilot in command of a charitable, nonprofit, or community event flight described in § 91.146, if the sponsor and pilot comply with the requirements of § 91.146.

(e) A private pilot may be reimbursed for aircraft operating expenses that are directly related to search and location operations, provided the expenses involve only fuel, oil, airport expenditures, or rental fees, and the operation is sanctioned and under the direction and control of:

(1) A local, State, or Federal agency; or

(2) An organization that conducts search and location operations.

(f) A private pilot who is an aircraft salesman and who has at least 200 hours of logged flight time may demonstrate an aircraft in flight to a prospective buyer.

(g) A private pilot who meets the requirements of § 61.69 may act as a pilot in command of an aircraft towing a glider or unpowered ultralight vehicle.

(h) A private pilot may act as pilot in command for the purpose of conducting a production flight test in a light-sport aircraft intended for certification in the light-sport category under § 21.190 of this chapter, provided that—

(1) The aircraft is a powered parachute or a weight-shift-control aircraft;

(2) The person has at least 100 hours of pilot-in-command time in the category and class of aircraft flown; and

(3) The person is familiar with the processes and procedures applicable to the conduct of production flight testing, to include operations conducted under a special flight permit and any associated operating limitations.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44869, July 27, 2004; Amdt. 61–115, 72 FR 6910, Feb. 13, 2007; Amdt. 61–125, 75 FR 5220, Feb. 1, 2010]

### § 61.115 Balloon rating: Limitations.

(a) If a person who applies for a private pilot certificate with a balloon rating takes a practical test in a balloon with an airborne heater:

(1) The pilot certificate will contain a limitation restricting the exercise of the privileges of that certificate to a balloon with an airborne heater; and

(2) The limitation may be removed when the person obtains the required aeronautical experience in a gas balloon and receives a logbook endorsement from an authorized instructor who attests to the person's accomplishment of the required aeronautical experience and ability to satisfactorily operate a gas balloon.

(b) If a person who applies for a private pilot certificate with a balloon rating takes a practical test in a gas balloon:

(1) The pilot certificate will contain a limitation restricting the exercise of the privilege of that certificate to a gas balloon; and

(2) The limitation may be removed when the person obtains the required aeronautical experience in a balloon with an airborne heater and receives a logbook endorsement from an authorized instructor who attests to the person's accomplishment of the required aeronautical experience and ability to satisfactorily operate a balloon with an airborne heater.

### § 61.117 Private pilot privileges and limitations: Second in command of aircraft requiring more than one pilot.

Except as provided in § 61.113 of this part, no private pilot may, for compensation or hire, act as second in command of an aircraft that is type certificated for more than one pilot, nor may that pilot act as second in command of such an aircraft that is carrying passengers or property for compensation or hire.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40904, July 30, 1997]

### §§ 61.118–61.120 [Reserved]

## Subpart F—Commercial Pilots

### § 61.121 Applicability.

This subpart prescribes the requirements for the issuance of commercial pilot certificates and ratings, the conditions under which those certificates

and ratings are necessary, and the general operating rules for persons who hold those certificates and ratings.

### § 61.123 Eligibility requirements: General.

To be eligible for a commercial pilot certificate, a person must:

(a) Be at least 18 years of age;

(b) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(c) Receive a logbook endorsement from an authorized instructor who:

(1) Conducted the required ground training or reviewed the person's home study on the aeronautical knowledge areas listed in § 61.125 of this part that apply to the aircraft category and class rating sought; and

(2) Certified that the person is prepared for the required knowledge test that applies to the aircraft category and class rating sought.

(d) Pass the required knowledge test on the aeronautical knowledge areas listed in § 61.125 of this part;

(e) Receive the required training and a logbook endorsement from an authorized instructor who:

(1) Conducted the training on the areas of operation listed in § 61.127(b) of this part that apply to the aircraft category and class rating sought; and

(2) Certified that the person is prepared for the required practical test.

(f) Meet the aeronautical experience requirements of this subpart that apply to the aircraft category and class rating sought before applying for the practical test;

(g) Pass the required practical test on the areas of operation listed in § 61.127(b) of this part that apply to the aircraft category and class rating sought;

(h) Hold at least a private pilot certificate issued under this part or meet the requirements of § 61.73; and

(i) Comply with the sections of this part that apply to the aircraft category and class rating sought.

### § 61.125 Aeronautical knowledge.

(a) *General.* A person who applies for a commercial pilot certificate must receive and log ground training from an authorized instructor, or complete a home-study course, on the aeronautical knowledge areas of paragraph (b) of this section that apply to the aircraft category and class rating sought.

(b) *Aeronautical knowledge areas.* (1) Applicable Federal Aviation Regulations of this chapter that relate to commercial pilot privileges, limitations, and flight operations;

(2) Accident reporting requirements of the National Transportation Safety Board;

(3) Basic aerodynamics and the principles of flight;

(4) Meteorology to include recognition of critical weather situations, windshear recognition and avoidance, and the use of aeronautical weather reports and forecasts;

(5) Safe and efficient operation of aircraft;

(6) Weight and balance computations;

(7) Use of performance charts;

(8) Significance and effects of exceeding aircraft performance limitations;

(9) Use of aeronautical charts and a magnetic compass for pilotage and dead reckoning;

(10) Use of air navigation facilities;

(11) Aeronautical decision making and judgment;

(12) Principles and functions of aircraft systems;

(13) Maneuvers, procedures, and emergency operations appropriate to the aircraft;

(14) Night and high-altitude operations;

(15) Procedures for operating within the National Airspace System; and

(16) Procedures for flight and ground training for lighter-than-air ratings.

### § 61.127 Flight proficiency.

(a) *General.* A person who applies for a commercial pilot certificate must receive and log ground and flight training from an authorized instructor on the areas of operation of this section that apply to the aircraft category and class rating sought.

(b) *Areas of operation.* (1) For an airplane category rating with a single-engine class rating:

(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and seaplane base operations;
(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;
(vi) Ground reference maneuvers;
(vii) Navigation;
(viii) Slow flight and stalls;
(ix) Emergency operations;
(x) High-altitude operations; and
(xi) Postflight procedures.
(2) For an airplane category rating with a multiengine class rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and seaplane base operations;
(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;
(vi) Navigation;
(vii) Slow flight and stalls;
(viii) Emergency operations;
(ix) Multiengine operations;
(x) High-altitude operations; and
(xi) Postflight procedures.
(3) For a rotorcraft category rating with a helicopter class rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and heliport operations;
(iv) Hovering maneuvers;
(v) Takeoffs, landings, and go-arounds;
(vi) Performance maneuvers;
(vii) Navigation;
(viii) Emergency operations;
(ix) Special operations; and
(x) Postflight procedures.
(4) For a rotorcraft category rating with a gyroplane class rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport operations;
(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;
(vi) Ground reference maneuvers;
(vii) Navigation;
(viii) Flight at slow airspeeds;
(ix) Emergency operations; and
(x) Postflight procedures.
(5) For a powered-lift category rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and heliport operations;
(iv) Hovering maneuvers;
(v) Takeoffs, landings, and go-arounds;
(vi) Performance maneuvers;
(vii) Navigation;
(viii) Slow flight and stalls;
(ix) Emergency operations;
(x) High-altitude operations;
(xi) Special operations; and
(xii) Postflight procedures.
(6) For a glider category rating:
(i) Preflight preparation;
(ii) Preflight procedures;
(iii) Airport and gliderport operations;
(iv) Launches and landings;
(v) Performance speeds;
(vi) Soaring techniques;
(vii) Performance maneuvers;
(viii) Navigation;
(ix) Slow flight and stalls;
(x) Emergency operations; and
(xi) Postflight procedures.
(7) For a lighter-than-air category rating with an airship class rating:
(i) Fundamentals of instructing;
(ii) Technical subjects;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport operations;
(vii) Takeoffs, landings, and go-arounds;
(viii) Performance maneuvers;
(ix) Navigation;
(x) Emergency operations; and
(xi) Postflight procedures.
(8) For a lighter-than-air category rating with a balloon class rating:
(i) Fundamentals of instructing;
(ii) Technical subjects;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport operations;
(vii) Launches and landings;
(viii) Performance maneuvers;
(ix) Navigation;
(x) Emergency operations; and
(xi) Postflight procedures.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–124, 74 FR 42558, Aug. 21, 2009]

### § 61.129 Aeronautical experience.

(a) *For an airplane single-engine rating.* Except as provided in paragraph (i)

of this section, a person who applies for a commercial pilot certificate with an airplane category and single-engine class rating must log at least 250 hours of flight time as a pilot that consists of at least:

(1) 100 hours in powered aircraft, of which 50 hours must be in airplanes.

(2) 100 hours of pilot-in-command flight time, which includes at least—

(i) 50 hours in airplanes; and

(ii) 50 hours in cross-country flight of which at least 10 hours must be in airplanes.

(3) 20 hours of training on the areas of operation listed in § 61.127(b)(1) of this part that includes at least—

(i) Ten hours of instrument training using a view-limiting device including attitude instrument flying, partial panel skills, recovery from unusual flight attitudes, and intercepting and tracking navigational systems. Five hours of the 10 hours required on instrument training must be in a single engine airplane;

(ii) 10 hours of training in an airplane that has a retractable landing gear, flaps, and a controllable pitch propeller, or is turbine-powered, or for an applicant seeking a single-engine seaplane rating, 10 hours of training in a seaplane that has flaps and a controllable pitch propeller;

(iii) One 2-hour cross country flight in a single engine airplane in daytime conditions that consists of a total straight-line distance of more than 100 nautical miles from the original point of departure;

(iv) One 2-hour cross country flight in a single engine airplane in nighttime conditions that consists of a total straight-line distance of more than 100 nautical miles from the original point of departure; and

(v) Three hours in a single-engine airplane with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test.

(4) Ten hours of solo flight time in a single engine airplane or 10 hours of flight time performing the duties of pilot in command in a single engine airplane with an authorized instructor on board (either of which may be credited towards the flight time requirement under paragraph (a)(2) of this section), on the areas of operation listed under § 61.127(b)(1) that include—

(i) One cross-country flight of not less than 300 nautical miles total distance, with landings at a minimum of three points, one of which is a straight-line distance of at least 250 nautical miles from the original departure point. However, if this requirement is being met in Hawaii, the longest segment need only have a straight-line distance of at least 150 nautical miles; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(b) *For an airplane multiengine rating.* Except as provided in paragraph (i) of this section, a person who applies for a commercial pilot certificate with an airplane category and multiengine class rating must log at least 250 hours of flight time as a pilot that consists of at least:

(1) 100 hours in powered aircraft, of which 50 hours must be in airplanes.

(2) 100 hours of pilot-in-command flight time, which includes at least—

(i) 50 hours in airplanes; and

(ii) 50 hours in cross-country flight of which at least 10 hours must be in airplanes.

(3) 20 hours of training on the areas of operation listed in § 61.127(b)(2) of this part that includes at least—

(i) Ten hours of instrument training using a view-limiting device including attitude instrument flying, partial panel skills, recovery from unusual flight attitudes, and intercepting and tracking navigational systems. Five hours of the 10 hours required on instrument training must be in a multiengine airplane;

(ii) 10 hours of training in a multiengine airplane that has a retractable landing gear, flaps, and controllable pitch propellers, or is turbine-powered, or for an applicant seeking a multiengine seaplane rating, 10 hours of training in a multiengine seaplane that has flaps and a controllable pitch propeller;

(iii) One 2-hour cross country flight in a multiengine airplane in daytime conditions that consists of a total straight-line distance of more than 100

nautical miles from the original point of departure;

(iv) One 2-hour cross country flight in a multiengine airplane in nighttime conditions that consists of a total straight-line distance of more than 100 nautical miles from the original point of departure; and

(v) Three hours in a multiengine airplane with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test.

(4) 10 hours of solo flight time in a multiengine airplane or 10 hours of flight time performing the duties of pilot in command in a multiengine airplane with an authorized instructor (either of which may be credited towards the flight time requirement in paragraph (b)(2) of this section), on the areas of operation listed in §61.127(b)(2) of this part that includes at least—

(i) One cross-country flight of not less than 300 nautical miles total distance with landings at a minimum of three points, one of which is a straight-line distance of at least 250 nautical miles from the original departure point. However, if this requirement is being met in Hawaii, the longest segment need only have a straight-line distance of at least 150 nautical miles; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight with a traffic pattern) at an airport with an operating control tower.

(c) *For a helicopter rating.* Except as provided in paragraph (i) of this section, a person who applies for a commercial pilot certificate with a rotorcraft category and helicopter class rating must log at least 150 hours of flight time as a pilot that consists of at least:

(1) 100 hours in powered aircraft, of which 50 hours must be in helicopters.

(2) 100 hours of pilot-in-command flight time, which includes at least—

(i) 35 hours in helicopters; and

(ii) 10 hours in cross-country flight in helicopters.

(3) 20 hours of training on the areas of operation listed in §61.127(b)(3) of this part that includes at least—

(i) Five hours on the control and maneuvering of a helicopter solely by reference to instruments using a view-limiting device including attitude instrument flying, partial panel skills, recovery from unusual flight attitudes, and intercepting and tracking navigational systems. This aeronautical experience may be performed in an aircraft, flight simulator, flight training device, or an aviation training device;

(ii) One 2-hour cross country flight in a helicopter in daytime conditions that consists of a total straight-line distance of more than 50 nautical miles from the original point of departure;

(iii) One 2-hour cross country flight in a helicopter in nighttime conditions that consists of a total straight-line distance of more than 50 nautical miles from the original point of departure; and

(iv) Three hours in a helicopter with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test.

(4) Ten hours of solo flight time in a helicopter or 10 hours of flight time performing the duties of pilot in command in a helicopter with an authorized instructor on board (either of which may be credited towards the flight time requirement under paragraph (c)(2) of this section), on the areas of operation listed under §61.127(b)(3) that includes—

(i) One cross-country flight with landings at a minimum of three points, with one segment consisting of a straight-line distance of at least 50 nautical miles from the original point of departure; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern).

(d) *For a gyroplane rating.* A person who applies for a commercial pilot certificate with a rotorcraft category and gyroplane class rating must log at least 150 hours of flight time as a pilot (of which 5 hours may have been accomplished in a flight simulator or flight training device that is representative of a gyroplane) that consists of at least:

(1) 100 hours in powered aircraft, of which 25 hours must be in gyroplanes.

(2) 100 hours of pilot-in-command flight time, which includes at least—

(i) 10 hours in gyroplanes; and

(ii) 3 hours in cross-country flight in gyroplanes.

(3) 20 hours of training on the areas of operation listed in §61.127(b)(4) of this part that includes at least—

(i) 2.5 hours on the control and maneuvering of a gyroplane solely by reference to instruments using a view-limiting device including attitude instrument flying, partial panel skills, recovery from unusual flight attitudes, and intercepting and tracking navigational systems. This aeronautical experience may be performed in an aircraft, flight simulator, flight training device, or an aviation training device;

(ii) One 2-hour cross country flight in a gyroplane in daytime conditions that consists of a total straight-line distance of more than 50 nautical miles from the original point of departure;

(iii) Two hours of flight training during nighttime conditions in a gyroplane at an airport, that includes 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern); and

(iv) Three hours in a gyroplane with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test.

(4) Ten hours of solo flight time in a gyroplane or 10 hours of flight time performing the duties of pilot in command in a gyroplane with an authorized instructor on board (either of which may be credited towards the flight time requirement under paragraph (d)(2) of this section), on the areas of operation listed in §61.127(b)(4) that includes—

(i) One cross-country flight with landings at a minimum of three points, with one segment consisting of a straight-line distance of at least 50 nautical miles from the original point of departure; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern).

(e) *For a powered-lift rating.* Except as provided in paragraph (i) of this section, a person who applies for a commercial pilot certificate with a powered-lift category rating must log at least 250 hours of flight time as a pilot that consists of at least:

(1) 100 hours in powered aircraft, of which 50 hours must be in a powered-lift.

(2) 100 hours of pilot-in-command flight time, which includes at least—

(i) 50 hours in a powered-lift; and

(ii) 50 hours in cross-country flight of which 10 hours must be in a powered-lift.

(3) 20 hours of training on the areas of operation listed in §61.127(b)(5) of this part that includes at least—

(i) Ten hours of instrument training using a view-limiting device including attitude instrument flying, partial panel skills, recovery from unusual flight attitudes, and intercepting and tracking navigational systems. Five hours of the 10 hours required on instrument training must be in a powered-lift;

(ii) One 2-hour cross country flight in a powered-lift in daytime conditions that consists of a total straight-line distance of more than 100 nautical miles from the original point of departure;

(iii) One 2-hour cross country flight in a powered-lift in nighttime conditions that consists of a total straight-line distance of more than 100 nautical miles from the original point of departure; and

(iv) 3 hours in a powered-lift with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test.

(4) Ten hours of solo flight time in a powered-lift or 10 hours of flight time performing the duties of pilot in command in a powered-lift with an authorized instructor on board (either of which may be credited towards the flight time requirement under paragraph (e)(2) of this section, on the areas of operation listed in §61.127(b)(5) that includes—

(i) One cross-country flight of not less than 300 nautical miles total distance with landings at a minimum of three points, one of which is a straight-line distance of at least 250 nautical miles from the original departure point. However, if this requirement is being met in Hawaii the longest segment need only have a straight-line distance of at least 150 nautical miles; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(f) *For a glider rating.* A person who applies for a commercial pilot certificate with a glider category rating must log at least—

(1) 25 hours of flight time as a pilot in a glider and that flight time must include at least 100 flights in a glider as pilot in command, including at least—

(i) Three hours of flight training in a glider with an authorized instructor or 10 training flights in a glider with an authorized instructor on the areas of operation listed in § 61.127(b)(6) of this part, including at least 3 training flights in a glider with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test; and

(ii) 2 hours of solo flight that include not less than 10 solo flights in a glider on the areas of operation listed in § 61.127(b)(6) of this part; or

(2) 200 hours of flight time as a pilot in heavier-than-air aircraft and at least 20 flights in a glider as pilot in command, including at least—

(i) Three hours of flight training in a glider or 10 training flights in a glider with an authorized instructor on the areas of operation listed in § 61.127(b)(6) of this part including at least 3 training flights in a glider with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test; and

(ii) 5 solo flights in a glider on the areas of operation listed in § 61.127(b)(6) of this part.

(g) *For an airship rating.* A person who applies for a commercial pilot certificate with a lighter-than-air category and airship class rating must log at least 200 hours of flight time as a pilot, which includes at least the following hours:

(1) 50 hours in airships.

(2) Thirty hours of pilot in command flight time in airships or performing the duties of pilot in command in an airship with an authorized instructor aboard, which consists of—

(i) 10 hours of cross-country flight time in airships; and

(ii) 10 hours of night flight time in airships.

(3) Forty hours of instrument time to include—

(i) Instrument training using a view-limiting device for attitude instrument flying, partial panel skills, recovery from unusual flight attitudes, and intercepting and tracking navigational systems; and

(ii) Twenty hours of instrument flight time, of which 10 hours must be in flight in airships.

(4) 20 hours of flight training in airships on the areas of operation listed in § 61.127(b)(7) of this part, which includes at least—

(i) Three hours in an airship with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test;

(ii) One hour cross country flight in an airship in daytime conditions that consists of a total straight-line distance of more than 25 nautical miles from the point of departure; and

(iii) One hour cross country flight in an airship in nighttime conditions that consists of a total straight-line distance of more than 25 nautical miles from the point of departure.

(5) 10 hours of flight training performing the duties of pilot in command with an authorized instructor on the areas of operation listed in § 61.127(b)(7) of this part, which includes at least—

(i) One cross-country flight with landings at a minimum of three points, with one segment consisting of a straight-line distance of at least 25 nautical miles from the original point of departure; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern).

(h) *For a balloon rating.* A person who applies for a commercial pilot certificate with a lighter-than-air category and a balloon class rating must log at least 35 hours of flight time as a pilot, which includes at least the following requirements:

(1) 20 hours in balloons;

(2) 10 flights in balloons;

(3) Two flights in balloons as the pilot in command; and

(4) 10 hours of flight training that includes at least 10 training flights with an authorized instructor in balloons on the areas of operation listed in § 61.127(b)(8) of this part, which consists of at least—

(i) For a gas balloon—

(A) Two training flights of 2 hours each in a gas balloon with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test;

(B) 2 flights performing the duties of pilot in command in a gas balloon with an authorized instructor on the appropriate areas of operation; and

(C) One flight involving a controlled ascent to 5,000 feet above the launch site.

(ii) For a balloon with an airborne heater—

(A) Two training flights of 1 hour each in a balloon with an airborne heater with an authorized instructor in preparation for the practical test within the preceding 2 calendar months from the month of the test;

(B) Two solo flights in a balloon with an airborne heater on the appropriate areas of operation; and

(C) One flight involving a controlled ascent to 3,000 feet above the launch site.

(i) *Permitted credit for use of a flight simulator or flight training device.* (1) Except as provided in paragraph (i)(2) of this section, an applicant who has not accomplished the training required by this section in a course conducted by a training center certificated under part 142 of this chapter may:

(i) Credit a maximum of 50 hours toward the total aeronautical experience requirements for an airplane or powered-lift rating, provided the aeronautical experience was obtained from an authorized instructor in a flight simulator or flight training device that represents that class of airplane or powered-lift category and type, if applicable, appropriate to the rating sought; and

(ii) Credit a maximum of 25 hours toward the total aeronautical experience requirements of this section for a helicopter rating, provided the aeronautical experience was obtained from an authorized instructor in a flight simulator or flight training device that represents a helicopter and type, if applicable, appropriate to the rating sought.

(2) An applicant who has accomplished the training required by this section in a course conducted by a training center certificated under part 142 of this chapter may:

(i) Credit a maximum of 100 hours toward the total aeronautical experience requirements of this section for an airplane and powered-lift rating, provided the aeronautical experience was obtained from an authorized instructor in a flight simulator or flight training device that represents that class of airplane or powered-lift category and type, if applicable, appropriate to the rating sought; and

(ii) Credit a maximum of 50 hours toward the total aeronautical experience requirements of this section for a helicopter rating, provided the aeronautical experience was obtained from an authorized instructor in a flight simulator or flight training device that represents a helicopter and type, if applicable, appropriate to the rating sought.

(3) Except when fewer hours are approved by the FAA, an applicant for the commercial pilot certificate with the airplane or powered-lift rating who has completed 190 hours of aeronautical experience is considered to have met the total aeronautical experience requirements of this section, provided the applicant satisfactorily completed an approved commercial pilot course under part 142 of this chapter and the approved course was appropriate to the commercial pilot certificate and aircraft rating sought.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–101, 62 FR 16892, Apr. 8, 1997; Amdt. 61–103, 62 FR 40904, July 30, 1997; Amdt. 61–104, 63 FR 20288, Apr. 23, 1998; Amdt. 61–124, 74 FR 42558, Aug. 21, 2009; Amdt. 61–124A, 74 FR 53645, Oct. 20, 2009]

### § 61.131 Exceptions to the night flying requirements.

(a) Subject to the limitations of paragraph (b) of this section, a person is not required to comply with the night flight training requirements of

this subpart if the person receives flight training in and resides in the State of Alaska.

(b) A person who receives flight training in and resides in the State of Alaska but does not meet the night flight training requirements of this section:

(1) May be issued a pilot certificate with the limitation ''night flying prohibited.''

(2) Must comply with the appropriate night flight training requirements of this subpart within the 12-calendar-month period after the issuance of the pilot certificate. At the end of that period, the certificate will become invalid for use until the person complies with the appropriate night flight training requirements of this subpart. The person may have the ''night flying prohibited'' limitation removed if the person—

(i) Accomplishes the appropriate night flight training requirements of this subpart; and

(ii) Presents to an examiner a logbook or training record endorsement from an authorized instructor that verifies accomplishment of the appropriate night flight training requirements of this subpart.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40905, July 30, 1997]

### § 61.133 Commercial pilot privileges and limitations.

(a) *Privileges*—(1) *General.* A person who holds a commercial pilot certificate may act as pilot in command of an aircraft—

(i) Carrying persons or property for compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation; and

(ii) For compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation.

(2) *Commercial pilots with lighter-than-air category ratings.* A person with a commercial pilot certificate with a lighter-than-air category rating may—

(i) *For an airship*—(A) Give flight and ground training in an airship for the issuance of a certificate or rating;

(B) Give an endorsement for a pilot certificate with an airship rating;

(C) Endorse a student pilot certificate or logbook for solo operating privileges in an airship;

(D) Act as pilot in command of an airship under IFR or in weather conditions less than the minimum prescribed for VFR flight; and

(E) Give flight and ground training and endorsements that are required for a flight review, an operating privilege or recency-of-experience requirements of this part.

(ii) *For a balloon*—(A) Give flight and ground training in a balloon for the issuance of a certificate or rating;

(B) Give an endorsement for a pilot certificate with a balloon rating;

(C) Endorse a student pilot certificate or logbook for solo operating privileges in a balloon; and

(D) Give ground and flight training and endorsements that are required for a flight review, an operating privilege, or recency-of-experience requirements of this part.

(b) *Limitations.* (1) A person who applies for a commercial pilot certificate with an airplane category or powered-lift category rating and does not hold an instrument rating in the same category and class will be issued a commercial pilot certificate that contains the limitation, ''The carriage of passengers for hire in (airplanes) (powered-lifts) on cross-country flights in excess of 50 nautical miles or at night is prohibited.'' The limitation may be removed when the person satisfactorily accomplishes the requirements listed in § 61.65 of this part for an instrument rating in the same category and class of aircraft listed on the person's commercial pilot certificate.

(2) If a person who applies for a commercial pilot certificate with a balloon rating takes a practical test in a balloon with an airborne heater—

(i) The pilot certificate will contain a limitation restricting the exercise of the privileges of that certificate to a balloon with an airborne heater.

(ii) The limitation specified in paragraph (b)(2)(i) of this section may be removed when the person obtains the required aeronautical experience in a

gas balloon and receives a logbook endorsement from an authorized instructor who attests to the person's accomplishment of the required aeronautical experience and ability to satisfactorily operate a gas balloon.

(3) If a person who applies for a commercial pilot certificate with a balloon rating takes a practical test in a gas balloon—

(i) The pilot certificate will contain a limitation restricting the exercise of the privileges of that certificate to a gas balloon.

(ii) The limitation specified in paragraph (b)(3)(i) of this section may be removed when the person obtains the required aeronautical experience in a balloon with an airborne heater and receives a logbook endorsement from an authorized instructor who attests to the person's accomplishment of the required aeronautical experience and ability to satisfactorily operate a balloon with an airborne heater.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40905, July 30, 1997]

**§§ 61.135–61.141 [Reserved]**

## Subpart G—Airline Transport Pilots

### § 61.151 Applicability.

This subpart prescribes the requirements for the issuance of airline transport pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the general operating rules for persons who hold those certificates and ratings.

### § 61.153 Eligibility requirements: General.

To be eligible for an airline transport pilot certificate, a person must:

(a) Meet the following age requirements:

(1) For an airline transport pilot certificate obtained under the aeronautical experience requirements of §§ 61.159, 61.161, or 61.163, be at least 23 years of age; or

(2) For an airline transport pilot certificate obtained under the aeronautical experience requirements of § 61.160, be at least 21 years of age.

(b) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft;

(c) Be of good moral character;

(d) Meet at least one of the following requirements:

(1) Holds a commercial pilot certificate with an instrument rating issued under this part;

(2) Meet the military experience requirements under § 61.73 of this part to qualify for a commercial pilot certificate, and an instrument rating if the person is a rated military pilot or former rated military pilot of an Armed Force of the United States; or

(3) Holds either a foreign airline transport pilot license with instrument privileges, or a foreign commercial pilot license with an instrument rating, that—

(i) Was issued by a contracting State to the Convention on International Civil Aviation; and

(ii) Contains no geographical limitations.

(e) After July 31, 2014, for an airline transport pilot certificate with an airplane category multiengine class rating or an airline transport pilot certificate obtained concurrently with an airplane type rating, receive a graduation certificate from an authorized training provider certifying completion of the airline transport pilot certification training program specified in § 61.156 before applying for the knowledge test required by paragraph (g) of this section;

(f) Meet the aeronautical experience requirements of this subpart that apply to the aircraft category and class rating sought before applying for the practical test;

(g) Pass a knowledge test on the aeronautical knowledge areas of § 61.155(c) of this part that apply to the aircraft category and class rating sought;

(h) Pass the practical test on the areas of operation listed in § 61.157(e) of this part that apply to the aircraft category and class rating sought; and

(i) Comply with the sections of this subpart that apply to the aircraft category and class rating sought.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40905, July 30, 1997; Amdt. 61–124, 74 FR 42559, Aug. 21, 2009; Amdt. 61–130, 78 FR 42374, July 15, 2013]

### § 61.155 Aeronautical knowledge.

(a) *General.* The knowledge test for an airline transport pilot certificate is based on the aeronautical knowledge areas listed in paragraph (c) of this section that are appropriate to the aircraft category and class rating sought.

(b) *Aircraft type rating.* A person who is applying for an additional aircraft type rating to be added to an airline transport pilot certificate is not required to pass a knowledge test if that person's airline transport pilot certificate lists the aircraft category and class rating that is appropriate to the type rating sought.

(c) *Aeronautical knowledge areas.* (1) Applicable Federal Aviation Regulations of this chapter that relate to airline transport pilot privileges, limitations, and flight operations;

(2) Meteorology, including knowledge of and effects of fronts, frontal characteristics, cloud formations, icing, and upper-air data;

(3) General system of weather and NOTAM collection, dissemination, interpretation, and use;

(4) Interpretation and use of weather charts, maps, forecasts, sequence reports, abbreviations, and symbols;

(5) National Weather Service functions as they pertain to operations in the National Airspace System;

(6) Windshear and microburst awareness, identification, and avoidance;

(7) Principles of air navigation under instrument meteorological conditions in the National Airspace System;

(8) Air traffic control procedures and pilot responsibilities as they relate to en route operations, terminal area and radar operations, and instrument departure and approach procedures;

(9) Aircraft loading, weight and balance, use of charts, graphs, tables, formulas, and computations, and their effect on aircraft performance;

(10) Aerodynamics relating to an aircraft's flight characteristics and performance in normal and abnormal flight regimes;

(11) Human factors;

(12) Aeronautical decision making and judgment;

(13) Crew resource management to include crew communication and coordination; and

(14) After July 31, 2014, for airplane category multiengine class rating or airplane type rating, the content of the airline transport pilot certification training program in § 61.156.

(d) An applicant who successfully completes the knowledge test for an airline transport pilot certificate prior to August 1, 2014, must successfully complete the practical test within 24 months from the month in which the knowledge test was successfully completed. An applicant who passes the knowledge test prior to August 1, 2014, but fails to successfully complete the practical test within 24 months must complete the airline transport pilot certification training program specified in § 61.156 and retake the knowledge test prior to applying for the practical test.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–130, 78 FR 42374, July 15, 2013]

### § 61.156 Training requirements: Airplane category—multiengine class rating or airplane type rating concurrently with airline transport pilot certificate.

After July 31, 2014, a person who applies for the knowledge test for an airline transport pilot certificate with an airplane category multiengine class rating must present a graduation certificate from an authorized training provider under part 121, 135, 141, or 142 of this chapter certifying the applicant has completed the following training in a course approved by the Administrator.

(a) *Academic training.* The applicant for the knowledge test must receive at least 30 hours of classroom instruction that includes the following:

(1) At least 8 hours of instruction on aerodynamics including high altitude operations;

(2) At least 2 hours of instruction on meteorology, including adverse weather phenomena and weather detection systems; and

(3) At least 14 hours of instruction on air carrier operations, including the following areas:

(i) Physiology;

(ii) Communications;

(iii) Checklist philosophy;

(iv) Operational control;

(v) Minimum equipment list/configuration deviation list;

(vi) Ground operations;

(vii) Turbine engines;

(viii) Transport category aircraft performance;

(ix) Automation, navigation, and flight path warning systems.

(4) At least 6 hours of instruction on leadership, professional development, crew resource management, and safety culture.

(b) *FSTD training.* The applicant for the knowledge test must receive at least 10 hours of training in a flight simulation training device qualified under part 60 of this chapter that represents a multiengine turbine airplane. The training must include the following:

(1) At least 6 hours of training in a Level C or higher full flight simulator qualified under part 60 of this chapter that represents a multiengine turbine airplane with a maximum takeoff weight of 40,000 pounds or greater. The training must include the following areas:

(i) Low energy states/stalls;

(ii) Upset recovery techniques; and

(iii) Adverse weather conditions, including icing, thunderstorms, and crosswinds with gusts.

(2) The remaining FSTD training may be completed in a Level 4 or higher flight simulation training device. The training must include the following areas:

(i) Navigation including flight management systems; and

(ii) Automation including autoflight.

(c) *Deviation authority.* The Administrator may issue deviation authority from the weight requirement in paragraph (b)(1) of this section upon a determination that the objectives of the training can be met in an alternative device.

[Doc. No. FAA–2010–0100, 78 FR 42375, July 15, 2013]

### § 61.157 Flight proficiency.

(a) *General.* (1) The practical test for an airline transport pilot certificate is given for—

(i) An airplane category and single engine class rating.

(ii) An airplane category and multiengine class rating.

(iii) A rotorcraft category and helicopter class rating.

(iv) A powered-lift category rating.

(v) An aircraft type rating.

(2) A person who is applying for an airline transport pilot practical test must meet—

(i) The eligibility requirements of § 61.153; and

(ii) The aeronautical knowledge and aeronautical experience requirements of this subpart that apply to the aircraft category and class rating sought.

(b) *Aircraft type rating.* Except as provided in paragraph (c) of this section, a person who applies for an aircraft type rating to be added to an airline transport pilot certificate or applies for a type rating to be concurrently completed with an airline transport pilot certificate:

(1) Must receive and log ground and flight training from an authorized instructor on the areas of operation under this section that apply to the aircraft type rating;

(2) Must receive a logbook endorsement from an authorized instructor that certifies the applicant completed the training on the areas of operation listed under paragraph (e) of this section that apply to the aircraft type rating; and

(3) Must perform the practical test in actual or simulated instrument conditions, except as provided under paragraph (g) of this section.

(c) *Exceptions.* A person who applies for an aircraft type rating to be added to an airline transport pilot certificate or an aircraft type rating concurrently with an airline transport pilot certificate, and who is an employee of a certificate holder operating under part 121 or part 135 of this chapter, does not need to comply with the requirements

of paragraph (b) of this section if the applicant presents a training record that shows completion of that certificate holder's approved training program for the aircraft type rating.

(d) *Upgrading type ratings.* Any type rating(s) and limitations on a pilot certificate of an applicant who completes an airline transport pilot practical test will be included at the airline transport pilot certification level, provided the applicant passes the practical test in the same category and class of aircraft for which the applicant holds the type rating(s).

(e) *Areas of operation.* (1) For an airplane category—single engine class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Takeoff and departure phase;

(iv) In-flight maneuvers;

(v) Instrument procedures;

(vi) Landings and approaches to landings;

(vii) Normal and abnormal procedures;

(viii) Emergency procedures; and

(ix) Postflight procedures.

(2) For an airplane category—multiengine class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Takeoff and departure phase;

(iv) In-flight maneuvers;

(v) Instrument procedures;

(vi) Landings and approaches to landings;

(vii) Normal and abnormal procedures;

(viii) Emergency procedures; and

(ix) Postflight procedures.

(3) For a powered-lift category rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Takeoff and departure phase;

(iv) In-flight maneuvers;

(v) Instrument procedures;

(vi) Landings and approaches to landings;

(vii) Normal and abnormal procedures;

(viii) Emergency procedures; and

(ix) Postflight procedures.

(4) For a rotorcraft category—helicopter class rating:

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Takeoff and departure phase;

(iv) In-flight maneuvers;

(v) Instrument procedures;

(vi) Landings and approaches to landings;

(vii) Normal and abnormal procedures;

(viii) Emergency procedures; and

(ix) Postflight procedures.

(f) *Proficiency and competency checks conducted under part 121, part 135, or subpart K of part 91.* (1) Successful completion of any of the following checks satisfies the flight proficiency requirements of this section for the issuance of an airline transport pilot certificate and/or the appropriate aircraft rating:

(i) A proficiency check under § 121.441 of this chapter.

(ii) Both a competency check under § 135.293(a)(2) and § 135.293(b) of this chapter and pilot-in-command instrument proficiency check under § 135.297 of this chapter.

(iii) Both a competency check under § 91.1065 of this chapter and a pilot-in-command instrument proficiency check under § 91.1069 of this chapter.

(2) The checks specified in paragraph (f)(1) of this section must be conducted by one of the following:

(i) An FAA Aviation Safety Inspector.

(ii) An Aircrew Program Designee who is authorized to perform proficiency and/or competency checks for the air carrier whose approved training program has been satisfactorily completed by the pilot applicant.

(iii) A Training Center Evaluator with appropriate certification authority who is also authorized to perform the portions of the competency and/or proficiency checks required by paragraph (f)(1) of this section for the air carrier whose approved training program has been satisfactorily completed by the pilot applicant.

(g) *Aircraft not capable of instrument maneuvers and procedures.* An applicant may add a type rating to an airline transport pilot certificate with an aircraft that is not capable of the instrument maneuvers and procedures required on the practical test under the following circumstances—

(1) The rating is limited to ''VFR only.''

(2) The type rating is added to an airline transport pilot certificate that has instrument privileges in that category and class of aircraft.

(3) The ''VFR only'' limitation may be removed for that aircraft type after the applicant:

(i) Passes a practical test in that type of aircraft on the appropriate instrument maneuvers and procedures in § 61.157; or

(ii) Becomes qualified in § 61.73(d) for that type of aircraft.

(h) *Multiengine airplane with a single-pilot station.* An applicant for a type rating, at the ATP certification level, in a multiengine airplane with a single-pilot station must perform the practical test in the multi-seat version of that airplane. The practical test may be performed in the single-seat version of that airplane if the Examiner is in a position to observe the applicant during the practical test in the case where there is no multi-seat version of that multiengine airplane.

(i) *Single engine airplane with a single-pilot station.* An applicant for a type rating, at the ATP certification level, in a single engine airplane with a single-pilot station must perform the practical test in the multi-seat version of that single engine airplane. The practical test may be performed in the single-seat version of that airplane if the Examiner is in a position to observe the applicant during the practical test in the case where there is no multi-seat version of that single engine airplane.

(j) *Waiver authority.* An Examiner who conducts a practical test may waive any task for which the FAA has provided waiver authority.

[Doc. No. FAA–2006–26661, 74 FR 42560, Aug. 21, 2009; Amdt. 61–124A, 74 FR 53647, Oct. 20, 2009; Amdt. 61–130, 78 FR 42375, July 15, 2013]

### § 61.158 [Reserved]

### § 61.159 Aeronautical experience: Airplane category rating.

(a) Except as provided in paragraphs (b), (c), and (d) of this section, a person who is applying for an airline transport pilot certificate with an airplane category and class rating must have at least 1,500 hours of total time as a pilot that includes at least:

(1) 500 hours of cross-country flight time.

(2) 100 hours of night flight time.

(3) 50 hours of flight time in the class of airplane for the rating sought. A maximum of 25 hours of training in a full flight simulator representing the class of airplane for the rating sought may be credited toward the flight time requirement of this paragraph if the training was accomplished as part of an approved training course in parts 121, 135, 141, or 142 of this chapter. A flight training device or aviation training device may not be used to satisfy this requirement.

(4) 75 hours of instrument flight time, in actual or simulated instrument conditions, subject to the following:

(i) Except as provided in paragraph (a)(4)(ii) of this section, an applicant may not receive credit for more than a total of 25 hours of simulated instrument time in a flight simulator or flight training device.

(ii) A maximum of 50 hours of training in a flight simulator or flight training device may be credited toward the instrument flight time requirements of paragraph (a)(4) of this section if the training was accomplished in a course conducted by a training center certificated under part 142 of this chapter.

(iii) Training in a flight simulator or flight training device must be accomplished in a flight simulator or flight training device, representing an airplane.

(5) 250 hours of flight time in an airplane as a pilot in command, or as second in command performing the duties of pilot in command while under the supervision of a pilot in command, or any combination thereof, which includes at least—

(i) 100 hours of cross-country flight time; and

(ii) 25 hours of night flight time.

(6) Not more than 100 hours of the total aeronautical experience requirements of paragraph (a) of this section or § 61.160 may be obtained in a full flight simulator or flight training device provided the device represents an airplane and the aeronautical experience was accomplished as part of an approved training course in parts 121, 135, 141, or 142 of this chapter.

(b) A person who has performed at least 20 night takeoffs and landings to a full stop may substitute each additional night takeoff and landing to a full stop for 1 hour of night flight time to satisfy the requirements of paragraph (a)(2) of this section; however, not more than 25 hours of night flight time may be credited in this manner.

(c) A commercial pilot may credit the following second-in-command flight time or flight-engineer flight time toward the 1,500 hours of total time as a pilot required by paragraph (a) of this section:

(1) Second-in-command time, provided the time is acquired in an airplane—

(i) Required to have more than one pilot flight crewmember by the airplane's flight manual, type certificate, or the regulations under which the flight is being conducted;

(ii) Engaged in operations under subpart K of part 91, part 121, or part 135 of this chapter for which a second in command is required; or

(iii) That is required by the operating rules of this chapter to have more than one pilot flight crewmember.

(2) Flight-engineer time, provided the time—

(i) Is acquired in an airplane required to have a flight engineer by the airplane's flight manual or type certificate;

(ii) Is acquired while engaged in operations under part 121 of this chapter for which a flight engineer is required;

(iii) Is acquired while the person is participating in a pilot training program approved under part 121 of this chapter; and

(iv) Does not exceed more than 1 hour for each 3 hours of flight engineer flight time for a total credited time of no more than 500 hours.

(3) Flight-engineer time, provided the flight time—

(i) Is acquired as a U.S. Armed Forces' flight engineer crewmember in an airplane that requires a flight engineer crewmember by the flight manual;

(ii) Is acquired while the person is participating in a flight engineer crewmember training program for the U.S. Armed Forces; and

(iii) Does not exceed 1 hour for each 3 hours of flight engineer flight time for a total credited time of no more than 500 hours.

(d) An applicant is issued an airline transport pilot certificate with the limitation, ''Holder does not meet the pilot in command aeronautical experience requirements of ICAO,'' as prescribed under Article 39 of the Convention on International Civil Aviation, if the applicant does not meet the ICAO requirements contained in Annex 1 ''Personnel Licensing'' to the Convention on International Civil Aviation, but otherwise meets the aeronautical experience requirements of this section.

(e) An applicant is entitled to an airline transport pilot certificate without the ICAO limitation specified under paragraph (d) of this section when the applicant presents satisfactory evidence of having met the ICAO requirements under paragraph (d) of this section and otherwise meets the aeronautical experience requirements of this section.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40906, July 30, 1997; Amdt. 61–104, 63 FR 20288, Apr. 23, 1998; Amdt. 61–109, 68 FR 54560, Sept. 17, 2003; Amdt. 61–124, 74 FR 42561, Aug. 21, 2009; Amdt. 61–130, 78 FR 42375, July 15, 2013; Admt. 61–130A, 78 FR 44874, July 25, 2013; Amdt. 61–130B, 78 FR 77573, Dec. 24, 2013]

### § 61.160 Aeronautical experience—airplane category restricted privileges.

(a) Except for a person who has been removed from flying status for lack of proficiency or because of a disciplinary action involving aircraft operations, a U.S. military pilot or former U.S. military pilot may apply for an airline transport pilot certificate with an airplane category multiengine class rating or an airline transport pilot certificate concurrently with an airplane type rating with a minimum of 750 hours of total time as a pilot if the pilot presents:

(1) An official Form DD–214 (Certificate of Release or Discharge from Active Duty) indicating that the person was honorably discharged from the U.S. Armed Forces or an official U.S. Armed Forces record that shows the pilot is currently serving in the U.S. Armed Forces; and

(2) An official U.S. Armed Forces record that shows the person graduated

from a U.S. Armed Forces undergraduate pilot training school and received a rating qualification as a military pilot.

(b) A person may apply for an airline transport pilot certificate with an airplane category multiengine class rating or an airline transport pilot certificate concurrently with an airplane type rating with a minimum of 1,000 hours of total time as a pilot if the person:

(1) Holds a Bachelor's degree with an aviation major from an institution of higher education, as defined in § 61.1, that has been issued a letter of authorization by the Administrator under § 61.169;

(2) Completes 60 semester credit hours of aviation and aviation-related coursework that has been recognized by the Administrator as coursework designed to improve and enhance the knowledge and skills of a person seeking a career as a professional pilot;

(3) Holds a commercial pilot certificate with an airplane category and instrument rating if:

(i) The required ground training was completed as part of an approved part 141 curriculum at the institution of higher education; and

(ii) The required flight training was completed as part of an approved part 141 curriculum at the institution of higher education or at a part 141 pilot school that has a training agreement under § 141.26 of this chapter with the institution of higher education; and

(4) Presents official transcripts or other documentation acceptable to the Administrator from the institution of higher education certifying that the graduate has satisfied the requirements in paragraphs (b)(1) through (3) of this section.

(c) A person may apply for an airline transport pilot certificate with an airplane category multiengine class rating or an airline transport pilot certificate concurrently with an airplane type rating with a minimum of 1,250 hours of total time as a pilot if the person:

(1) Holds an Associate's degree with an aviation major from an institution of higher education, as defined in § 61.1, that has been issued a letter of authorization by the Administrator under § 61.169;

(2) Completes at least 30 semester credit hours of aviation and aviation-related coursework that has been recognized by the Administrator as coursework designed to improve and enhance the knowledge and skills of a person seeking a career as a professional pilot;

(3) Holds a commercial pilot certificate with an airplane category and instrument rating if:

(i) The required ground training was completed as part of an approved part 141 curriculum at the institution of higher education; and

(ii) The required flight training was completed as part of an approved part 141 curriculum at the institution of higher education or at a part 141 pilot school that has a written training agreement under § 141.26 of this chapter with the institution of higher education; and

(4) Presents official transcripts or other documentation acceptable to the Administrator from the institution of higher education certifying that the graduate has satisfied the requirements in paragraphs (c)(1) through (3) of this section.

(d) A graduate of an institution of higher education who completes fewer than 60 semester credit hours but at least 30 credit hours and otherwise satisfies the requirements of paragraph (b) may apply for airline transport pilot certificate with an airplane category multiengine class rating or an airline transport pilot certificate concurrently with an airplane type rating with a minimum of 1,250 hours of total time as a pilot.

(e) A person who applies for an airline transport pilot certificate under the total flight times listed in paragraphs (a), (b), and (c) of this section must otherwise meet the aeronautical experience requirements of § 61.159, except that the person may apply for an airline transport pilot certificate with 200 hours of cross-country flight time.

(f) A person who has 1,500 hours total time as a pilot, 200 hours of cross-country flight time, and otherwise meets

the aeronautical experience requirements of § 61.159 may apply for an airline transport pilot certificate under this section.

(g) An airline transport pilot certificate obtained under this section is subject to the pilot in command limitations set forth in § 61.167(b) and must contain the following limitation, ''Restricted in accordance with 14 CFR 61.167.'' The pilot is entitled to an airline transport pilot certificate without the limitation specified in this paragraph when the applicant presents satisfactory evidence of having met the aeronautical experience requirements of § 61.159 and the age requirement of § 61.153(a)(1).

(h) An applicant who meets the aeronautical experience requirements of paragraphs (a), (b), (c), and (d) of this section is issued an airline transport pilot certificate with the limitation, ''Holder does not meet the pilot in command aeronautical experience requirements of ICAO,'' as prescribed under Article 39 of the Convention on International Civil Aviation if the applicant does not meet the ICAO requirements contained in Annex 1 ''Personnel Licensing'' to the Convention on International Civil Aviation. An applicant is entitled to an airline transport pilot certificate without the ICAO limitation specified under this paragraph when the applicant presents satisfactory evidence of having met the ICAO requirements and otherwise meets the aeronautical experience requirements of § 61.159.

[Doc. No. FAA–2010–0100, 78 FR 42375, July 15, 2013]

### § 61.161 Aeronautical experience: Rotorcraft category and helicopter class rating.

(a) A person who is applying for an airline transport pilot certificate with a rotorcraft category and helicopter class rating, must have at least 1,200 hours of total time as a pilot that includes at least:

(1) 500 hours of cross-country flight time;

(2) 100 hours of night flight time, of which 15 hours are in helicopters;

(3) 200 hours of flight time in helicopters, which includes at least 75 hours as a pilot in command, or as second in command performing the duties of a pilot in command under the supervision of a pilot in command, or any combination thereof; and

(4) 75 hours of instrument flight time in actual or simulated instrument meteorological conditions, of which at least 50 hours are obtained in flight with at least 25 hours in helicopters as a pilot in command, or as second in command performing the duties of a pilot in command under the supervision of a pilot in command, or any combination thereof.

(b) Training in a flight simulator or flight training device may be credited toward the instrument flight time requirements of paragraph (a)(4) of this section, subject to the following:

(1) Training in a flight simulator or a flight training device must be accomplished in a flight simulator or flight training device that represents a rotorcraft.

(2) Except as provided in paragraph (b)(3) of this section, an applicant may receive credit for not more than a total of 25 hours of simulated instrument time in a flight simulator and flight training device.

(3) A maximum of 50 hours of training in a flight simulator or flight training device may be credited toward the instrument flight time requirements of paragraph (a)(4) of this section if the aeronautical experience is accomplished in an approved course conducted by a training center certificated under part 142 of this chapter.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40906, July 30, 1997; Amdt. 61–104, 63 FR 20289, Apr. 23, 1998]

### § 61.163 Aeronautical experience: Powered-lift category rating.

(a) A person who is applying for an airline transport pilot certificate with a powered-lift category rating must have at least 1,500 hours of total time as a pilot that includes at least:

(1) 500 hours of cross-country flight time;

(2) 100 hours of night flight time;

(3) 250 hours in a powered-lift as a pilot in command, or as a second in command performing the duties of a pilot in command under the supervision of a pilot in command, or any

combination thereof, which includes at least—

(i) 100 hours of cross-country flight time; and

(ii) 25 hours of night flight time.

(4) 75 hours of instrument flight time in actual or simulated instrument conditions, subject to the following:

(i) Except as provided in paragraph (a)(4)(ii) of this section, an applicant may not receive credit for more than a total of 25 hours of simulated instrument time in a flight simulator or flight training device.

(ii) A maximum of 50 hours of training in a flight simulator or flight training device may be credited toward the instrument flight time requirements of paragraph (a)(4) of this section if the training was accomplished in a course conducted by a training center certificated under part 142 of this chapter.

(iii) Training in a flight simulator or flight training device must be accomplished in a flight simulator or flight training device that represents a powered-lift.

(b) Not more than 100 hours of the total aeronautical experience requirements of paragraph (a) of this section may be obtained in a flight simulator or flight training device that represents a powered-lift, provided the aeronautical experience was obtained in an approved course conducted by a training center certificated under part 142 of this chapter.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40906, July 30, 1997; Amdt. 61–104, 63 FR 20289, Apr. 23, 1998]

### § 61.165 Additional aircraft category and class ratings.

(a) *Rotorcraft category and helicopter class rating.* A person applying for an airline transport certificate with a rotorcraft category and helicopter class rating who holds an airline transport pilot certificate with another aircraft category rating must:

(1) Meet the eligibility requirements of § 61.153 of this part;

(2) Pass a knowledge test on the aeronautical knowledge areas of § 61.155(c) of this part;

(3) Comply with the requirements in § 61.157(b) of this part, if appropriate;

(4) Meet the applicable aeronautical experience requirements of § 61.161 of this part; and

(5) Pass the practical test on the areas of operation of § 61.157(e)(4) of this part.

(b) *Airplane category rating with a single-engine class rating.* A person applying for an airline transport certificate with an airplane category and single-engine class rating who holds an airline transport pilot certificate with another aircraft category rating must:

(1) Meet the eligibility requirements of § 61.153 of this part;

(2) Pass a knowledge test on the aeronautical knowledge areas of § 61.155(c) of this part;

(3) Comply with the requirements in § 61.157(b) of this part, if appropriate;

(4) Meet the applicable aeronautical experience requirements of § 61.159 of this part; and

(5) Pass the practical test on the areas of operation of § 61.157(e)(1) of this part.

(c) *Airplane category rating with a multiengine class rating.* A person applying for an airline transport certificate with an airplane category and multiengine class rating who holds an airline transport certificate with another aircraft category rating must:

(1) Meet the eligibility requirements of § 61.153 of this part;

(2) After July 31, 2014, successfully complete the airline transport pilot certification training program specified in § 61.156;

(3) Pass a knowledge test for an airplane category multiengine class rating or type rating on the aeronautical knowledge areas of § 61.155(c);

(4) Comply with the requirements in § 61.157(b) of this part, if appropriate;

(5) Meet the aeronautical experience requirements of § 61.159 or § 61.160; and

(6) Pass the practical test on the areas of operation of § 61.157(e)(2) of this part.

(d) *Powered-lift category.* A person applying for an airline transport pilot certificate with a powered-lift category rating who holds an airline transport certificate with another aircraft category rating must:

(1) Meet the eligibility requirements of § 61.153 of this part;

(2) Pass a required knowledge test on the aeronautical knowledge areas of § 61.155(c) of this part;

(3) Comply with the requirements in § 61.157(b) of this part, if appropriate;

(4) Meet the applicable aeronautical experience requirements of § 61.163 of this part; and

(5) Pass the required practical test on the areas of operation of § 61.157(e)(3) of this part.

(e) *Additional class rating within the same aircraft category.* Except as provided in paragraph (f) of this section, a person applying for an airline transport pilot certificate with an additional class rating who holds an airline transport certificate in the same aircraft category must—

(1) Meet the eligibility requirements of § 61.153, except paragraph (g) of that section;

(2) Comply with the requirements in § 61.157(b) of this part, if applicable;

(3) Meet the applicable aeronautical experience requirements of subpart G of this part; and

(4) Pass a practical test on the areas of operation of § 61.157(e) appropriate to the aircraft rating sought.

(f) *Adding a multiengine class rating or airplane type rating to an airline transport pilot certificate with a single engine class rating.* A person applying to add a multiengine class rating or airplane type rating to an airline transport pilot certificate with an airplane category single engine class rating must—

(1) Meet the eligibility requirements of § 61.153;

(2) After July 31, 2014, pass a required knowledge test on the aeronautical knowledge areas of § 61.155(c), as applicable to multiengine airplanes;

(3) Comply with the requirements in § 61.157(b), if applicable;

(4) Meet the applicable aeronautical experience requirements of § 61.159; and

(5) Pass a practical test on the areas of operation of § 61.157(e)(2).

(g) *Category class ratings for the operation of aircraft with experimental certificates.* Notwithstanding the provisions of paragraphs (a) through (f) of this section, a person holding an airline transport certificate may apply for a category and class rating limited to a specific make and model of experimental aircraft, provided—

(1) The person has logged at least 5 hours flight time while acting as pilot in command in the same category, class, make, and model of aircraft that has been issued an experimental certificate;

(2) The person has received a logbook endorsement from an authorized instructor who has determined that he or she is proficient to act as pilot in command of the same category, class, make, and model of aircraft for which application is made; and

(3) The flight time specified in paragraph (g)(1) of this section must be logged between September 1, 2004 and August 31, 2005.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40906, July 30, 1997; Amdt. 61–110, 69 FR 44869, July 27, 2004; Amdt. 61–130, 78 FR 42376, July 15, 2013; Amdt. 61–130B, 78 FR 77574, Dec. 24, 2013]

### § 61.167 Airline transport pilot privileges and limitations.

(a) *Privileges.* (1) A person who holds an airline transport pilot certificate is entitled to the same privileges as a person who holds a commercial pilot certificate with an instrument rating.

(2) A person who holds an airline transport pilot certificate and has met the aeronautical experience requirements of § 61.159 and the age requirements of § 61.153(a)(1) of this part may instruct—

(i) Other pilots in air transportation service in aircraft of the category, class, and type, as applicable, for which the airline transport pilot is rated and endorse the logbook or other training record of the person to whom training has been given;

(ii) In flight simulators, and flight training devices representing the aircraft referenced in paragraph (a)(2)(i) of this section, when instructing under the provisions of this section and endorse the logbook or other training record of the person to whom training has been given;

(iii) Only as provided in this section, except that an airline transport pilot who also holds a flight instructor certificate can exercise the instructor privileges under subpart H of this part for which he or she is rated; and

(iv) In an aircraft, only if the aircraft has functioning dual controls, when instructing under the provisions of this section.

(3) Excluding briefings and debriefings, an airline transport pilot may not instruct in aircraft, flight simulators, and flight training devices under this section—

(i) For more than 8 hours in any 24-consecutive-hour period; or

(ii) For more than 36 hours in any 7-consecutive-day period.

(4) An airline transport pilot may not instruct in Category II or Category III operations unless he or she has been trained and successfully tested under Category II or Category III operations, as applicable.

(b) *Limitations.* A person who holds an airline transport pilot certificate and has not satisfied the age requirement of § 61.153(a)(1) and the aeronautical experience requirements of § 61.159 may not:

(1) Act as pilot in command in operations conducted under part 121, § 91.1053(a)(2)(i), or § 135.243(a)(1) of this chapter, or

(2) Serve as second in command in flag or supplemental operations in part 121 of this chapter requiring three or more pilots.

[Doc. No. FAA–2010–0100, 78 FR 42376, July 15, 2013, as amended by Amdt. 61–130B, 78 FR 77574, Dec. 24, 2013]

### § 61.169 Letters of authorization for institutions of higher education.

(a) An institution of higher education that is accredited, as defined in § 61.1, may apply for a letter of authorization for the purpose of certifying its graduates for an airline transport pilot certificate under the academic and aeronautical experience requirements in § 61.160. The application must be in a form and manner acceptable to the Administrator.

(b) An institution of higher education must comply with the provisions of the letter of authorization and may not certify a graduate unless it determines that the graduate has satisfied the requirements of § 61.160, as appropriate.

(c) The Administrator may rescind or amend a letter of authorization if the Administrator determines that the institution of higher education is not complying or is unable to comply with the provisions of the letter of authorization.

[Doc. No. FAA–2010–0100, 78 FR 42377, July 15, 2013]

### §§ 61.170–69.171 [Reserved]

## Subpart H—Flight Instructors Other than Flight Instructors With a Sport Pilot Rating

### § 61.181 Applicability.

This subpart prescribes the requirements for the issuance of flight instructor certificates and ratings (except for flight instructor certificates with a sport pilot rating), the conditions under which those certificates and ratings are necessary, and the limitations on those certificates and ratings.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004]

### § 61.183 Eligibility requirements.

To be eligible for a flight instructor certificate or rating a person must:

(a) Be at least 18 years of age;

(b) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's flight instructor certificate as are necessary;

(c) Hold either a commercial pilot certificate or airline transport pilot certificate with:

(1) An aircraft category and class rating that is appropriate to the flight instructor rating sought; and

(2) An instrument rating, or privileges on that person's pilot certificate that are appropriate to the flight instructor rating sought, if applying for—

(i) A flight instructor certificate with an airplane category and single-engine class rating;

(ii) A flight instructor certificate with an airplane category and multiengine class rating;

(iii) A flight instructor certificate with a powered-lift rating; or

(iv) A flight instructor certificate with an instrument rating.

(d) Receive a logbook endorsement from an authorized instructor on the fundamentals of instructing listed in § 61.185 of this part appropriate to the required knowledge test;

(e) Pass a knowledge test on the areas listed in § 61.185(a)(1) of this part, unless the applicant:

(1) Holds a flight instructor certificate or ground instructor certificate issued under this part;

(2) Holds a teacher's certificate issued by a State, county, city, or municipality that authorizes the person to teach at an educational level of the 7th grade or higher; or

(3) Is employed as a teacher at an accredited college or university.

(f) Pass a knowledge test on the aeronautical knowledge areas listed in § 61.185(a)(2) and (a)(3) of this part that are appropriate to the flight instructor rating sought;

(g) Receive a logbook endorsement from an authorized instructor on the areas of operation listed in § 61.187(b) of this part, appropriate to the flight instructor rating sought;

(h) Pass the required practical test that is appropriate to the flight instructor rating sought in an:

(1) Aircraft that is representative of the category and class of aircraft for the aircraft rating sought; or

(2) Flight simulator or approved flight training device that is representative of the category and class of aircraft for the rating sought, and used in accordance with a course at a training center certificated under part 142 of this chapter.

(i) Accomplish the following for a flight instructor certificate with an airplane or a glider rating:

(1) Receive a logbook endorsement from an authorized instructor indicating that the applicant is competent and possesses instructional proficiency in stall awareness, spin entry, spins, and spin recovery procedures after providing the applicant with flight training in those training areas in an airplane or glider, as appropriate, that is certificated for spins; and

(2) Demonstrate instructional proficiency in stall awareness, spin entry, spins, and spin recovery procedures. However, upon presentation of the endorsement specified in paragraph (i)(1) of this section an examiner may accept that endorsement as satisfactory evidence of instructional proficiency in stall awareness, spin entry, spins, and spin recovery procedures for the practical test, provided that the practical test is not a retest as a result of the applicant failing the previous test for deficiencies in the knowledge or skill of stall awareness, spin entry, spins, or spin recovery instructional procedures. If the retest is a result of deficiencies in the ability of an applicant to demonstrate knowledge or skill of stall awareness, spin entry, spins, or spin recovery instructional procedures, the examiner must test the person on stall awareness, spin entry, spins, and spin recovery instructional procedures in an airplane or glider, as appropriate, that is certificated for spins;

(j) Log at least 15 hours as pilot in command in the category and class of aircraft that is appropriate to the flight instructor rating sought; and

(k) Comply with the appropriate sections of this part that apply to the flight instructor rating sought.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40907, July 30, 1997; Amdt. 61–124, 74 FR 42561, Aug. 21, 2009]

### § 61.185 Aeronautical knowledge.

(a) A person who is applying for a flight instructor certificate must receive and log ground training from an authorized instructor on:

(1) Except as provided in paragraph (b) of this section, the fundamentals of instructing, including:

(i) The learning process;

(ii) Elements of effective teaching;

(iii) Student evaluation and testing;

(iv) Course development;

(v) Lesson planning; and

(vi) Classroom training techniques.

(2) The aeronautical knowledge areas for a recreational, private, and commercial pilot certificate applicable to the aircraft category for which flight instructor privileges are sought; and

(3) The aeronautical knowledge areas for the instrument rating applicable to the category for which instrument flight instructor privileges are sought.

(b) The following applicants do not need to comply with paragraph (a)(1) of this section:

(1) The holder of a flight instructor certificate or ground instructor certificate issued under this part;

(2) The holder of a current teacher's certificate issued by a State, county, city, or municipality that authorizes the person to teach at an educational level of the 7th grade or higher; or

(3) A person employed as a teacher at an accredited college or university.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40907, July 30, 1997]

### § 61.187 Flight proficiency.

(a) *General.* A person who is applying for a flight instructor certificate must receive and log flight and ground training from an authorized instructor on the areas of operation listed in this section that apply to the flight instructor rating sought. The applicant's logbook must contain an endorsement from an authorized instructor certifying that the person is proficient to pass a practical test on those areas of operation.

(b) *Areas of operation.* (1) For an airplane category rating with a single-engine class rating:

(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport and seaplane base operations;
(vii) Takeoffs, landings, and go-arounds;
(viii) Fundamentals of flight;
(ix) Performance maneuvers;
(x) Ground reference maneuvers;
(xi) Slow flight, stalls, and spins;
(xii) Basic instrument maneuvers;
(xiii) Emergency operations; and
(xiv) Postflight procedures.

(2) For an airplane category rating with a multiengine class rating:

(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport and seaplane base operations;
(vii) Takeoffs, landings, and go-arounds;
(viii) Fundamentals of flight;
(ix) Performance maneuvers;
(x) Ground reference maneuvers;
(xi) Slow flight and stalls;
(xii) Basic instrument maneuvers;
(xiii) Emergency operations;
(xiv) Multiengine operations; and
(xv) Postflight procedures.

(3) For a rotorcraft category rating with a helicopter class rating:

(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport and heliport operations;
(vii) Hovering maneuvers;
(viii) Takeoffs, landings, and go-arounds;
(ix) Fundamentals of flight;
(x) Performance maneuvers;
(xi) Emergency operations;
(xii) Special operations; and
(xiii) Postflight procedures.

(4) For a rotorcraft category rating with a gyroplane class rating:

(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport operations;
(vii) Takeoffs, landings, and go-arounds;
(viii) Fundamentals of flight;
(ix) Performance maneuvers;
(x) Flight at slow airspeeds;
(xi) Ground reference maneuvers;
(xii) Emergency operations; and
(xiii) Postflight procedures.

(5) For a powered-lift category rating:

(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport and heliport operations;
(vii) Hovering maneuvers;
(viii) Takeoffs, landings, and go-arounds;
(ix) Fundamentals of flight;
(x) Performance maneuvers;
(xi) Ground reference maneuvers;
(xii) Slow flight and stalls;
(xiii) Basic instrument maneuvers;
(xiv) Emergency operations;

(xv) Special operations; and
(xvi) Postflight procedures.
(6) For a glider category rating:
(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Preflight procedures;
(vi) Airport and gliderport operations;
(vii) Launches and landings;
(viii) Fundamentals of flight;
(ix) Performance speeds;
(x) Soaring techniques;
(xi) Performance maneuvers;
(xii) Slow flight, stalls, and spins;
(xiii) Emergency operations; and
(xiv) Postflight procedures.
(7) For an instrument rating with the appropriate aircraft category and class rating:
(i) Fundamentals of instructing;
(ii) Technical subject areas;
(iii) Preflight preparation;
(iv) Preflight lesson on a maneuver to be performed in flight;
(v) Air traffic control clearances and procedures;
(vi) Flight by reference to instruments;
(vii) Navigation aids;
(viii) Instrument approach procedures;
(ix) Emergency operations; and
(x) Postflight procedures.
(c) The flight training required by this section may be accomplished:
(1) In an aircraft that is representative of the category and class of aircraft for the rating sought; or
(2) In a flight simulator or flight training device representative of the category and class of aircraft for the rating sought, and used in accordance with an approved course at a training center certificated under part 142 of this chapter.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40907, July 30, 1997; Amdt. 61–124, 74 FR 42561, Aug. 21, 2009]

### § 61.189 Flight instructor records.

(a) A flight instructor must sign the logbook of each person to whom that instructor has given flight training or ground training.
(b) A flight instructor must maintain a record in a logbook or a separate document that contains the following:
(1) The name of each person whose logbook or student pilot certificate that instructor has endorsed for solo flight privileges, and the date of the endorsement; and
(2) The name of each person that instructor has endorsed for a knowledge test or practical test, and the record shall also indicate the kind of test, the date, and the results.
(c) Each flight instructor must retain the records required by this section for at least 3 years.

### § 61.191 Additional flight instructor ratings.

(a) A person who applies for an additional flight instructor rating on a flight instructor certificate must meet the eligibility requirements listed in § 61.183 of this part that apply to the flight instructor rating sought.
(b) A person who applies for an additional rating on a flight instructor certificate is not required to pass the knowledge test on the areas listed in § 61.185(a)(1) of this part.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40907, July 30, 1997]

### § 61.193 Flight instructor privileges.

A person who holds a flight instructor certificate is authorized within the limitations of that person's flight instructor certificate and ratings to train and issue endorsements that are required for:
(a) A student pilot certificate;
(b) A pilot certificate;
(c) A flight instructor certificate;
(d) A ground instructor certificate;
(e) An aircraft rating;
(f) An instrument rating;
(g) A flight review, operating privilege, or recency of experience requirement of this part;
(h) A practical test; and
(i) A knowledge test.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40907, July 30, 1997, as amended by Amdt. 61–124, 74 FR 42561, Aug. 21, 2009]

### § 61.195 Flight instructor limitations and qualifications.

A person who holds a flight instructor certificate is subject to the following limitations:

(a) *Hours of training.* In any 24-consecutive-hour period, a flight instructor may not conduct more than 8 hours of flight training.

(b) *Aircraft Ratings.* A flight instructor may not conduct flight training in any aircraft for which the flight instructor does not hold:

(1) A pilot certificate and flight instructor certificate with the applicable category and class rating; and

(2) If appropriate, a type rating.

(c) *Instrument Rating.* A flight instructor who provides instrument training for the issuance of an instrument rating, a type rating not limited to VFR, or the instrument training required for commercial pilot and airline transport pilot certificates must hold an instrument rating on his or her pilot certificate and flight instructor certificate that is appropriate to the category and class of aircraft used for the training provided.

(d) *Limitations on endorsements.* A flight instructor may not endorse a:

(1) Student pilot's certificate or logbook for solo flight privileges, unless that flight instructor has—

(i) Given that student the flight training required for solo flight privileges required by this part; and

(ii) Determined that the student is prepared to conduct the flight safely under known circumstances, subject to any limitations listed in the student's logbook that the instructor considers necessary for the safety of the flight.

(2) Student pilot's certificate and logbook for a solo cross-country flight, unless that flight instructor has determined the student's flight preparation, planning, equipment, and proposed procedures are adequate for the proposed flight under the existing conditions and within any limitations listed in the logbook that the instructor considers necessary for the safety of the flight;

(3) Student pilot's logbook for solo flight in a Class B airspace area or at an airport within Class B airspace unless that flight instructor has—

(i) Given that student ground and flight training in that Class B airspace or at that airport; and

(ii) Determined that the student is proficient to operate the aircraft safely.

(4) Logbook of a recreational pilot, unless that flight instructor has—

(i) Given that pilot the ground and flight training required by this part; and

(ii) Determined that the recreational pilot is proficient to operate the aircraft safely.

(5) Logbook of a pilot for a flight review, unless that instructor has conducted a review of that pilot in accordance with the requirements of § 61.56(a) of this part; or

(6) Logbook of a pilot for an instrument proficiency check, unless that instructor has tested that pilot in accordance with the requirements of § 61.57(d) of this part.

(e) *Training in an aircraft that requires a type rating.* A flight instructor may not give flight training in an aircraft that requires the pilot in command to hold a type rating unless the flight instructor holds a type rating for that aircraft on his or her pilot certificate.

(f) *Training received in a multiengine airplane, a helicopter, or a powered-lift.* A flight instructor may not give training required for the issuance of a certificate or rating in a multiengine airplane, a helicopter, or a powered-lift unless that flight instructor has at least 5 flight hours of pilot-in-command time in the specific make and model of multiengine airplane, helicopter, or powered-lift, as appropriate.

(g) *Position in aircraft and required pilot stations for providing flight training.* (1) A flight instructor must perform all training from in an aircraft that complies with the requirements of § 91.109 of this chapter.

(2) A flight instructor who provides flight training for a pilot certificate or rating issued under this part must provide that flight training in an aircraft that meets the following requirements—

(i) The aircraft must have at least two pilot stations and be of the same category, class, and type, if appropriate, that applies to the pilot certificate or rating sought.

(ii) For single-place aircraft, the presolo flight training must have been provided in an aircraft that has two pilot stations and is of the same category, class, and type, if appropriate.

(h) *Qualifications of the flight instructor for training first-time flight instructor applicants.* (1) The ground training provided to an initial applicant for a flight instructor certificate must be given by an authorized instructor who—

(i) Holds a ground or flight instructor certificate with the appropriate rating, has held that certificate for at least 24 calendar months, and has given at least 40 hours of ground training; or

(ii) Holds a ground or flight instructor certificate with the appropriate rating, and has given at least 100 hours of ground training in an FAA-approved course.

(2) Except for an instructor who meets the requirements of paragraph (h)(3)(ii) of this section, a flight instructor who provides training to an initial applicant for a flight instructor certificate must—

(i) Meet the eligibility requirements prescribed in § 61.183 of this part;

(ii) Hold the appropriate flight instructor certificate and rating;

(iii) Have held a flight instructor certificate for at least 24 months;

(iv) For training in preparation for an airplane, rotorcraft, or powered-lift rating, have given at least 200 hours of flight training as a flight instructor; and

(v) For training in preparation for a glider rating, have given at least 80 hours of flight training as a flight instructor.

(3) A flight instructor who serves as a flight instructor in an FAA-approved course for the issuance of a flight instructor rating must hold a flight instructor certificate with the appropriate rating and pass the required initial and recurrent flight instructor proficiency tests, in accordance with the requirements of the part under which the FAA-approved course is conducted, and must—

(i) Meet the requirements of paragraph (h)(2) of this section; or

(ii) Have trained and endorsed at least five applicants for a practical test for a pilot certificate, flight instructor certificate, ground instructor certificate, or an additional rating, and at least 80 percent of those applicants passed that test on their first attempt; and

(A) Given at least 400 hours of flight training as a flight instructor for training in an airplane, a rotorcraft, or for a powered-lift rating; or

(B) Given at least 100 hours of flight training as a flight instructor, for training in a glider rating.

(i) *Prohibition against self-endorsements.* A flight instructor shall not make any self-endorsement for a certificate, rating, flight review, authorization, operating privilege, practical test, or knowledge test that is required by this part.

(j) *Additional qualifications required to give training in Category II or Category III operations.* A flight instructor may not give training in Category II or Category III operations unless the flight instructor has been trained and tested in Category II or Category III operations, pursuant to § 61.67 or § 61.68 of this part, as applicable.

(k) *Training for night vision goggle operations.* A flight instructor may not conduct training for night vision goggle operations unless the flight instructor:

(1) Has a pilot and flight instructor certificate with the applicable category and class rating for the training;

(2) If appropriate, has a type rating on his or her pilot certificate for the aircraft;

(3) Is pilot in command qualified for night vision goggle operations, in accordance with § 61.31(k);

(4) Has logged 100 night vision goggle operations as the sole manipulator of the controls;

(5) Has logged 20 night vision goggle operations as the sole manipulator of the controls in the category and class, and type of aircraft, if aircraft class and type is appropriate, that the training will be given in;

(6) Is qualified to act as pilot in command in night vision goggle operations under § 61.57(f) or (g); and

(7) Has a logbook endorsement from an FAA Aviation Safety Inspector or a person who is authorized by the FAA to provide that logbook endorsement that states the flight instructor is authorized to perform the night vision goggle

pilot in command qualification and recent flight experience requirements under § 61.31(k) and § 61.57(f) and (g).

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997; Amdt. 61–103, 62 FR 40907, July 30, 1997; Amdt. 61–124, 74 FR 42561, Aug. 21, 2009]

### § 61.197 Renewal requirements for flight instructor certification.

(a) A person who holds a flight instructor certificate that has not expired may renew that flight instructor certificate by—

(1) Passing a practical test for—

(i) One of the ratings listed on the current flight instructor certificate; or

(ii) An additional flight instructor rating; or

(2) Submitting a completed and signed application with the FAA and satisfactorily completing one of the following renewal requirements—

(i) A record of training students showing that, during the preceding 24 calendar months, the flight instructor has endorsed at least 5 students for a practical test for a certificate or rating and at least 80 percent of those students passed that test on the first attempt.

(ii) A record showing that, within the preceding 24 calendar months, the flight instructor has served as a company check pilot, chief flight instructor, company check airman, or flight instructor in a part 121 or part 135 operation, or in a position involving the regular evaluation of pilots.

(iii) A graduation certificate showing that, within the preceding 3 calendar months, the person has successfully completed an approved flight instructor refresher course consisting of ground training or flight training, or a combination of both.

(iv) A record showing that, within the preceding 12 months from the month of application, the flight instructor passed an official U.S. Armed Forces military instructor pilot proficiency check.

(b) The expiration month of a renewed flight instructor certificate shall be 24 calendar months from—

(1) The month the renewal requirements of paragraph (a) of this section are accomplished; or

(2) The month of expiration of the current flight instructor certificate provided—

(i) The renewal requirements of paragraph (a) of this section are accomplished within the 3 calendar months preceding the expiration month of the current flight instructor certificate, and

(ii) If the renewal is accomplished under paragraph (a)(2)(iii) of this section, the approved flight instructor refresher course must be completed within the 3 calendar months preceding the expiration month of the current flight instructor certificate.

(c) The practical test required by paragraph (a)(1) of this section may be accomplished in a flight simulator or flight training device if the test is accomplished pursuant to an approved course conducted by a training center certificated under part 142 of this chapter.

[Doc. No. 25910, 63 FR 20289, Apr. 23, 1998, as amended by Amdt. 61–124, 74 FR 42562, Aug. 21, 2009]

### § 61.199 Reinstatement requirements of an expired flight instructor certificate.

(a) *Flight instructor certificates.* The holder of an expired flight instructor certificate who has not complied with the flight instructor renewal requirements of § 61.197 may reinstate that flight instructor certificate and ratings by filing a completed and signed application with the FAA and satisfactorily completing one of the following reinstatement requirements:

(1) A flight instructor certification practical test, as prescribed by § 61.183(h), for one of the ratings held on the expired flight instructor certificate.

(2) A flight instructor certification practical test for an additional rating.

(b) *Flight instructor ratings.* (1) A flight instructor rating or a limited flight instructor rating on a pilot certificate is no longer valid and may not be exchanged for a similar rating or a flight instructor certificate.

(2) The holder of a flight instructor rating or a limited flight instructor rating on a pilot certificate may be issued a flight instructor certificate with the current ratings, but only if

the person passes the required knowledge and practical test prescribed in this subpart for the issuance of the current flight instructor certificate and rating.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–104, 63 FR 20289, Apr. 23, 1998; Amdt. 61–124, 74 FR 42562, Aug. 21, 2009]

### § 61.201 [Reserved]

## Subpart I—Ground Instructors

### § 61.211 Applicability.

This subpart prescribes the requirements for the issuance of ground instructor certificates and ratings, the conditions under which those certificates and ratings are necessary, and the limitations upon those certificates and ratings.

### § 61.213 Eligibility requirements.

(a) To be eligible for a ground instructor certificate or rating a person must:

(1) Be at least 18 years of age;

(2) Be able to read, write, speak, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's ground instructor certificate as are necessary;

(3) Except as provided in paragraph (b) of this section, pass a knowledge test on the fundamentals of instructing to include—

(i) The learning process;

(ii) Elements of effective teaching;

(iii) Student evaluation and testing;

(iv) Course development;

(v) Lesson planning; and

(vi) Classroom training techniques.

(4) Pass a knowledge test on the aeronautical knowledge areas in—

(i) For a basic ground instructor rating §§ 61.97, 61.105, and 61.309;

(ii) For an advanced ground instructor rating §§ 61.97, 61.105, 61.125, 61.155, and 61.309; and

(iii) For an instrument ground instructor rating, § 61.65.

(b) The knowledge test specified in paragraph (a)(3) of this section is not required if the applicant:

(1) Holds a ground instructor certificate or flight instructor certificate issued under this part;

(2) Holds a teacher's certificate issued by a State, county, city, or municipality that authorizes the person to teach at an educational level of the 7th grade or higher; or

(3) Is employed as a teacher at an accredited college or university.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44869, July 27, 2004; Amdt. 61–124, 74 FR 42562, Aug. 21, 2009]

### § 61.215 Ground instructor privileges.

(a) A person who holds a basic ground instructor rating is authorized to provide—

(1) Ground training in the aeronautical knowledge areas required for the issuance of a sport pilot certificate, recreational pilot certificate, private pilot certificate, or associated ratings under this part;

(2) Ground training required for a sport pilot, recreational pilot, and private pilot flight review; and

(3) A recommendation for a knowledge test required for the issuance of a sport pilot certificate, recreational pilot certificate, or private pilot certificate under this part.

(b) A person who holds an advanced ground instructor rating is authorized to provide:

(1) Ground training on the aeronautical knowledge areas required for the issuance of any certificate or rating under this part except for the aeronautical knowledge areas required for an instrument rating.

(2) The ground training required for any flight review except for the training required for an instrument rating.

(3) A recommendation for a knowledge test required for the issuance of any certificate or rating under this part except for an instrument rating.

(c) A person who holds an instrument ground instructor rating is authorized to provide:

(1) Ground training in the aeronautical knowledge areas required for the issuance of an instrument rating under this part;

(2) Ground training required for an instrument proficiency check; and

(3) A recommendation for a knowledge test required for the issuance of an instrument rating under this part.

(d) A person who holds a ground instructor certificate is authorized, within the limitations of the ratings on the ground instructor certificate, to endorse the logbook or other training record of a person to whom the holder has provided the training or recommendation specified in paragraphs (a) through (c) of this section.

[Doc. No. 25910, 62 FR 16298, Apr. 4, 1997, as amended by Amdt. 61–110, 69 FR 44869, July 27, 2004; Amdt. 61–124, 74 FR 42562, Aug. 21, 2009]

### § 61.217 Recent experience requirements.

The holder of a ground instructor certificate may not perform the duties of a ground instructor unless the person can show that one of the following occurred during the preceding 12 calendar months:

(a) Employment or activity as a ground instructor giving pilot, flight instructor, or ground instructor training;

(b) Employment or activity as a flight instructor giving pilot, flight instructor, or ground instructor ground or flight training;

(c) Completion of an approved flight instructor refresher course and receipt of a graduation certificate for that course; or

(d) An endorsement from an authorized instructor certifying that the person has demonstrated knowledge in the subject areas prescribed under § 61.213(a)(3) and (a)(4), as appropriate.

[Doc. No. FAA–2006–26661, 74 FR 42562, Aug. 21, 2009]

## Subpart J—Sport Pilots

SOURCE: Docket No. FAA–2001–11133, 69 FR 44869, July 27, 2004, unless otherwise noted.

### § 61.301 What is the purpose of this subpart and to whom does it apply?

(a) This subpart prescribes the following requirements that apply to a sport pilot certificate:

(1) Eligibility.

(2) Aeronautical knowledge.

(3) Flight proficiency.

(4) Aeronautical experience.

(5) Endorsements.

(6) Privileges and limits.

(b) Other provisions of this part apply to the logging of flight time and testing.

(c) This subpart applies to applicants for, and holders of, sport pilot certificates. It also applies to holders of recreational pilot certificates and higher, as provided in § 61.303.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5221, Feb. 1, 2010]

### § 61.303 If I want to operate a light-sport aircraft, what operating limits and endorsement requirements in this subpart must I comply with?

(a) Use the following table to determine what operating limits and endorsement requirements in this subpart, if any, apply to you when you operate a light-sport aircraft. The medical certificate specified in this table must be in compliance with § 61.2 in regards to currency and validity. If you hold a recreational pilot certificate, but not a medical certificate, you must comply with cross country requirements in § 61.101 (c), even if your flight does not exceed 50 nautical miles from your departure airport. You must also comply with requirements in other subparts of this part that apply to your certificate and the operation you conduct.

| If you hold | And you hold | Then you may operate | And |
|---|---|---|---|
| (1) A medical certificate ..... | (i) A sport pilot certificate, ..... | (A) Any light-sport aircraft for which you hold the endorsements required for its category and class | (*1*) You must hold any other endorsements required by this subpart, and comply with the limitations in § 61.315. |

| If you hold | And you hold | Then you may operate | And |
|---|---|---|---|
| | (ii) At least a recreational pilot certificate with a category and class rating, | (A) Any light-sport aircraft in that category and class, | (*1*) You do not have to hold any of the endorsements required by this subpart, nor do you have to comply with the limitations in § 61.315. |
| | (iii) At least a recreational pilot certificate but not a rating for the category and class of light sport aircraft you operate, | (A) That light-sport aircraft, only if you hold the endorsements required in § 61.321 for its category and class, | (*1*) You must comply with the limitations in § 61.315, except § 61.315(c)(14) and, if a private pilot or higher, § 61.315(c)(7). |
| (2) Only a U.S. driver's license | (i) A sport pilot certificate, | (A) Any light-sport aircraft for which you hold the endorsements required for its category and class. | (*1*) You must hold any other endorsements required by this subpart, and comply with the limitations in § 61.315. |
| | (ii) At least a recreational pilot certificate with a category and class rating, | (A) Any light-sport aircraft in that category and class, | (*1*) You do not have to hold any of the endorsements required by this subpart, but you must comply with the limitations in § 61.315. |
| | (iii) At least a recreational pilot certificate but not a rating for the category and class of light-sport aircraft you operate, | (A) That light-sport aircraft, only if you hold the endorsements required in § 61.321 for its category and class, | (*1*) You must comply with the limitations in § 61.315, except § 61.315(c)(14) and, if a private pilot or higher, § 61.315(c)(7). |
| (3) Neither a medical certificate nor a U.S. driver's license | (i) A sport pilot certificate, | (A) Any light-sport glider or balloon for which you hold the endorsements required for its category and class | (*1*) You must hold any other endorsements required by this subpart, and comply with the limitations in § 61.315. |
| | (ii) At least a private pilot certificate with a category and class rating for glider or balloon, | (A) Any light-sport glider or balloon in that category and class | (*1*) You do not have to hold any of the endorsements required by this subpart, nor do you have to comply with the limitations in § 61.315. |
| | (iii) At least a private pilot certificate but not a rating for glider or balloon, | (A) Any light-sport glider or balloon, only if you hold the endorsements required in § 61.321 for its category and class | (*1*) You must comply with the limitations in § 61.315, except § 61.315(c)(14) and, if a private pilot or higher, § 61.315(c)(7). |

(b) A person using a U.S. driver's license to meet the requirements of this paragraph must—

(1) Comply with each restriction and limitation imposed by that person's U.S. driver's license and any judicial or administrative order applying to the operation of a motor vehicle;

(2) Have been found eligible for the issuance of at least a third-class airman medical certificate at the time of his or her most recent application (if the person has applied for a medical certificate);

(3) Not have had his or her most recently issued medical certificate (if the person has held a medical certificate) suspended or revoked or most recent Authorization for a Special Issuance of a Medical Certificate withdrawn; and

(4) Not know or have reason to know of any medical condition that would make that person unable to operate a light-sport aircraft in a safe manner.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004, as amended by Amdt. 61–124, 74 FR 42562, Aug. 21, 2009; Amdt. 61–125, 75 FR 5221, Feb. 1, 2010]

### § 61.305 What are the age and language requirements for a sport pilot certificate?

(a) To be eligible for a sport pilot certificate you must:

(1) Be at least 17 years old (or 16 years old if you are applying to operate a glider or balloon).

(2) Be able to read, speak, write, and understand English. If you cannot read, speak, write, and understand English because of medical reasons, the FAA may place limits on your certificate as are necessary for the safe operation of light-sport aircraft.

### § 61.307 What tests do I have to take to obtain a sport pilot certificate?

To obtain a sport pilot certificate, you must pass the following tests:

(a) *Knowledge test.* You must pass a knowledge test on the applicable aeronautical knowledge areas listed in § 61.309. Before you may take the knowledge test for a sport pilot certificate, you must receive a logbook endorsement from the authorized instructor who trained you or reviewed and evaluated your home-study course on the aeronautical knowledge areas listed in § 61.309 certifying you are prepared for the test.

(b) *Practical test.* You must pass a practical test on the applicable areas of operation listed in §§ 61.309 and 61.311. Before you may take the practical test for a sport pilot certificate, you must receive a logbook endorsement from the authorized instructor who provided you with flight training on the areas of operation specified in §§ 61.309 and 61.311 in preparation for the practical test. This endorsement certifies that you meet the applicable aeronautical knowledge and experience requirements and are prepared for the practical test.

### § 61.309 What aeronautical knowledge must I have to apply for a sport pilot certificate?

To apply for a sport pilot certificate you must receive and log ground training from an authorized instructor or complete a home-study course on the following aeronautical knowledge areas:

(a) Applicable regulations of this chapter that relate to sport pilot privileges, limits, and flight operations.

(b) Accident reporting requirements of the National Transportation Safety Board.

(c) Use of the applicable portions of the aeronautical information manual and FAA advisory circulars.

(d) Use of aeronautical charts for VFR navigation using pilotage, dead reckoning, and navigation systems, as appropriate.

(e) Recognition of critical weather situations from the ground and in flight, windshear avoidance, and the procurement and use of aeronautical weather reports and forecasts.

(f) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence.

(g) Effects of density altitude on takeoff and climb performance.

(h) Weight and balance computations.

(i) Principles of aerodynamics, powerplants, and aircraft systems.

(j) Stall awareness, spin entry, spins, and spin recovery techniques, as applicable.

(k) Aeronautical decision making and risk management.

(l) Preflight actions that include—

(1) How to get information on runway lengths at airports of intended use, data on takeoff and landing distances, weather reports and forecasts, and fuel requirements; and

(2) How to plan for alternatives if the planned flight cannot be completed or if you encounter delays.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5221, Feb. 1, 2010]

### § 61.311 What flight proficiency requirements must I meet to apply for a sport pilot certificate?

To apply for a sport pilot certificate you must receive and log ground and flight training from an authorized instructor on the following areas of operation, as appropriate, for airplane single-engine land or sea, glider, gyroplane, airship, balloon, powered parachute land or sea, and weight-shift-control aircraft land or sea privileges:

(a) Preflight preparation.

(b) Preflight procedures.

(c) Airport, seaplane base, and gliderport operations, as applicable.

(d) Takeoffs (or launches), landings, and go-arounds.

(e) Performance maneuvers, and for gliders, performance speeds.

(f) Ground reference maneuvers (not applicable to gliders and balloons).

(g) Soaring techniques (applicable only to gliders).

(h) Navigation.

(i) Slow flight (not applicable to lighter-than-air aircraft and powered parachutes).

(j) Stalls (not applicable to lighter-than-air aircraft, gyroplanes, and powered parachutes).

(k) Emergency operations.

(l) Post-flight procedures.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5221, Feb. 1, 2010]

### § 61.313 What aeronautical experience must I have to apply for a sport pilot certificate?

Use the following table to determine the aeronautical experience you must have to apply for a sport pilot certificate:

| If you are applying for a sport pilot certificate with . . . | Then you must log at least . . . | Which must include at least . . . |
|---|---|---|
| (a) Airplane category and single-engine land or sea class privileges, | (1) 20 hours of flight time, including at least 15 hours of flight training from an authorized instructor in a single-engine airplane and at least 5 hours of solo flight training in the areas of operation listed in § 61.311, | (i) 2 hours of cross-country flight training, (ii) 10 takeoffs and landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport, (iii) One solo cross-country flight of at least 75 nautical miles total distance, with a full-stop landing at a minimum of two points and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles between the takeoff and landing locations, and (iv) 2 hours of flight training with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |
| (b) Glider category privileges, and you have not logged at least 20 hours of flight time in a heavier-than-air aircraft, | (1) 10 hours of flight time in a glider, including 10 flights in a glider receiving flight training from an authorized instructor and at least 2 hours of solo flight training in the areas of operation listed in § 61.311, | (i) Five solo launches and landings, and (ii) at least 3 training flights with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |
| (c) Glider category privileges, and you have logged 20 hours flight time in a heavier-than-air aircraft, | (1) 3 hours of flight time in a glider, including five flights in a glider while receiving flight training from an authorized instructor and at least 1 hour of solo flight training in the areas of operation listed in § 61.311, | (i) Three solo launches and landings, and (ii) at least 3 training flights with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |
| (d) Rotorcraft category and gyroplane class privileges, | (1) 20 hours of flight time, including 15 hours of flight training from an authorized instructor in a gyroplane and at least 5 hours of solo flight training in the areas of operation listed in § 61.311, | (i) 2 hours of cross-country flight training, (ii) 10 takeoffs and landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport, (iii) One solo cross-country flight of at least 50 nautical miles total distance, with a full-stop landing at a minimum of two points, and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles between the takeoff and landing locations, and (iv) 2 hours of flight training with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |
| (e) Lighter-than-air category and airship class privileges, | (1) 20 hours of flight time, including 15 hours of flight training from an authorized instructor in an airship and at least 3 hours performing the duties of pilot in command in an airship with an authorized instructor in the areas of operation listed in § 61.311, | (i) 2 hours of cross-country flight training, (ii) Three takeoffs and landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport, (iii) One cross-country flight of at least 25 nautical miles between the takeoff and landing locations, and (iv) 2 hours of flight training with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |

| If you are applying for a sport pilot certificate with . . . | Then you must log at least . . . | Which must include at least . . . |
|---|---|---|
| (f) Lighter-than-air category and balloon class privileges, | (1) 7 hours of flight time in a balloon, including three flights with an authorized instructor and one flight performing the duties of pilot in command in a balloon with an authorized instructor in the areas of operation listed in § 61.311, | (i) 2 hours of cross-country flight training, and (ii) 1 hours of flight training with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |
| (g) Powered parachute category land or sea class privileges, | (1) 12 hours of flight time in a powered parachute, including 10 hours of flight training from an authorized instructor in a powered parachute, and at least 2 hours of solo flight training in the areas of operation listed in § 61.311 | (i) 1 hour of cross-country flight training, (ii) 20 takeoffs and landings to a full stop in a powered parachute with each landing involving flight in the traffic pattern at an airport; (iii) 10 solo takeoffs and landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport, (iv) One solo flight with a landing at a different airport and one segment of the flight consisting of a straight-line distance of at least 10 nautical miles between takeoff and landing locations, and (v) 1 hours of flight training with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |
| (h) Weight-shift-control aircraft category land or sea class privileges, | (1) 20 hours of light time, including 15 hours of flight training from an authorized instructor in a weight-shift-control aircraft and at least 5 hours of solo flight training in the areas of operation listed in § 61.311, | (i) 2 hours of cross-country flight training, (ii) 10 takeoffs and landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport, (iii) One solo cross-country flight of at least 50 nautical miles total distance, with a full-stop landing at a minimum of two points, and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles between takeoff and landing locations, and (iv) 2 hours of flight training with an authorized instructor on those areas of operation specified in § 61.311 in preparation for the practical test within the preceding 2 calendar months from the month of the test. |

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004; Amdt. 61–124A, 74 FR 53647, Oct. 20, 2009; Amdt. 61–125, 75 FR 5221, Feb. 1, 2010]

### § 61.315 What are the privileges and limits of my sport pilot certificate?

(a) If you hold a sport pilot certificate you may act as pilot in command of a light-sport aircraft, except as specified in paragraph (c) of this section.

(b) You may share the operating expenses of a flight with a passenger, provided the expenses involve only fuel, oil, airport expenses, or aircraft rental fees. You must pay at least half the operating expenses of the flight.

(c) You may not act as pilot in command of a light-sport aircraft:

(1) That is carrying a passenger or property for compensation or hire.

(2) For compensation or hire.

(3) In furtherance of a business.

(4) While carrying more than one passenger.

(5) At night.

(6) In Class A airspace.

(7) In Class B, C, and D airspace, at an airport located in Class B, C, or D airspace, and to, from, through, or at an airport having an operational control tower unless you have met the requirements specified in § 61.325.

(8) Outside the United States, unless you have prior authorization from the country in which you seek to operate. Your sport pilot certificate carries the limit ''Holder does not meet ICAO requirements.''

(9) To demonstrate the aircraft in flight to a prospective buyer if you are an aircraft salesperson.

(10) In a passenger-carrying airlift sponsored by a charitable organization.

(11) At an altitude of more than 10,000 feet MSL or 2,000 feet AGL, whichever is higher.

(12) When the flight or surface visibility is less than 3 statute miles.

(13) Without visual reference to the surface.

(14) If the aircraft:

(i) Has a $V_H$ greater than 87 knots CAS, unless you have met the requirements of § 61.327(b).

(ii) Has a $V_H$ less than or equal to 87 knots CAS, unless you have met the requirements of § 61.327(a) or have logged flight time as pilot in command of an airplane with a $V_H$ less than or equal to 87 knots CAS before April 2, 2010.

(15) Contrary to any operating limitation placed on the airworthiness certificate of the aircraft being flown.

(16) Contrary to any limit on your pilot certificate or airman medical certificate, or any other limit or endorsement from an authorized instructor.

(17) Contrary to any restriction or limitation on your U.S. driver's license or any restriction or limitation imposed by judicial or administrative order when using your driver's license to satisfy a requirement of this part.

(18) While towing any object.

(19) As a pilot flight crewmember on any aircraft for which more than one pilot is required by the type certificate of the aircraft or the regulations under which the flight is conducted.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5221, Feb. 1, 2010; Amdt. 61–125A, 75 FR 15610, Mar. 30, 2010]

### § 61.317 Is my sport pilot certificate issued with aircraft category and class ratings?

Your sport pilot certificate does not list aircraft category and class ratings. When you successfully pass the practical test for a sport pilot certificate, regardless of the light-sport aircraft privileges you seek, the FAA will issue you a sport pilot certificate without any category and class ratings. The FAA will provide you with a logbook endorsement for the category and class of aircraft in which you are authorized to act as pilot in command.

[Doc. No. FAA–2001–11133, 69 FR 44869, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5222, Feb. 1, 2010; Amdt. 61–125A, 75 FR 15610, Mar. 30, 2010]

### § 61.319 [Reserved]

### § 61.321 How do I obtain privileges to operate an additional category or class of light-sport aircraft?

If you hold a sport pilot certificate and seek to operate an additional category or class of light-sport aircraft, you must—

(a) Receive a logbook endorsement from the authorized instructor who trained you on the applicable aeronautical knowledge areas specified in § 61.309 and areas of operation specified in § 61.311. The endorsement certifies you have met the aeronautical knowledge and flight proficiency requirements for the additional light-sport aircraft privilege you seek;

(b) Successfully complete a proficiency check from an authorized instructor other than the instructor who trained you on the aeronautical knowledge areas and areas of operation specified in §§ 61.309 and 61.311 for the additional light-sport aircraft privilege you seek;

(c) Complete an application for those privileges on a form and in a manner acceptable to the FAA and present this application to the authorized instructor who conducted the proficiency check specified in paragraph (b) of this section; and

(d) Receive a logbook endorsement from the instructor who conducted the proficiency check specified in paragraph (b) of this section certifying you are proficient in the applicable areas of operation and aeronautical knowledge areas, and that you are authorized for the additional category and class light-sport aircraft privilege.

**§ 61.323 [Reserved]**

**§ 61.325 How do I obtain privileges to operate a light-sport aircraft at an airport within, or in airspace within, Class B, C, and D airspace, or in other airspace with an airport having an operational control tower?**

If you hold a sport pilot certificate and seek privileges to operate a light-sport aircraft in Class B, C, or D airspace, at an airport located in Class B, C, or D airspace, or to, from, through, or at an airport having an operational control tower, you must receive and log ground and flight training. The authorized instructor who provides this training must provide a logbook endorsement that certifies you are proficient in the following aeronautical knowledge areas and areas of operation:

(a) The use of radios, communications, navigation system/facilities, and radar services.

(b) Operations at airports with an operating control tower to include three takeoffs and landings to a full stop, with each landing involving a flight in the traffic pattern, at an airport with an operating control tower.

(c) Applicable flight rules of part 91 of this chapter for operations in Class B, C, and D airspace and air traffic control clearances.

**§ 61.327 Are there specific endorsement requirements to operate a light-sport aircraft based on $V_H$?**

(a) Except as specified in paragraph (c) of this section, if you hold a sport pilot certificate and you seek to operate a light-sport aircraft that is an airplane with a $V_H$ less than or equal to 87 knots CAS you must—

(1) Receive and log ground and flight training from an authorized instructor in an airplane that has a $V_H$ less than or equal to 87 knots CAS; and

(2) Receive a logbook endorsement from the authorized instructor who provided the training specified in paragraph (a)(1) of this section certifying that you are proficient in the operation of light-sport aircraft that is an airplane with a $V_H$ less than or equal to 87 knots CAS.

(b) If you hold a sport pilot certificate and you seek to operate a light-sport aircraft that has a $V_H$ greater than 87 knots CAS you must—

(1) Receive and log ground and flight training from an authorized instructor in an aircraft that has a $V_H$ greater than 87 knots CAS; and

(2) Receive a logbook endorsement from the authorized instructor who provided the training specified in paragraph (b)(1) of this section certifying that you are proficient in the operation of light-sport aircraft with a $V_H$ greater than 87 knots CAS.

(c) The training and endorsements required by paragraph (a) of this section are not required if you have logged flight time as pilot in command of an airplane with a $V_H$ less than or equal to 87 knots CAS prior to April 2, 2010.

[Doc. No. FAA–2007–29015, 75 FR 5222, Feb. 1, 2010; Amdt. 61–125A, 75 FR 15610, Mar. 30, 2010]

## Subpart K—Flight Instructors With a Sport Pilot Rating

SOURCE: Docket No. FAA–2001–11133, 69 FR 44875, July 27, 2004, unless otherwise noted.

**§ 61.401 What is the purpose of this subpart?**

(a) This part prescribes the following requirements that apply to a flight instructor certificate with a sport pilot rating:

(1) Eligibility.

(2) Aeronautical knowledge.

(3) Flight proficiency.

(4) Endorsements.

(5) Privileges and limits.

(b) Other provisions of this part apply to the logging of flight time and testing.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5222, Feb. 1, 2010]

**§ 61.403 What are the age, language, and pilot certificate requirements for a flight instructor certificate with a sport pilot rating?**

To be eligible for a flight instructor certificate with a sport pilot rating you must:

(a) Be at least 18 years old.

(b) Be able to read, speak, write, and understand English. If you cannot read, speak, write, and understand English because of medical reasons, the FAA

may place limits on your certificate as are necessary for the safe operation of light-sport aircraft.

(c) Hold at least a sport pilot certificate with category and class ratings or privileges, as applicable, that are appropriate to the flight instructor privileges sought.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–124, 74 FR 42562, Aug. 21, 2009]

### § 61.405 What tests do I have to take to obtain a flight instructor certificate with a sport pilot rating?

To obtain a flight instructor certificate with a sport pilot rating you must pass the following tests:

(a) *Knowledge test.* Before you take a knowledge test, you must receive a logbook endorsement certifying you are prepared for the test from an authorized instructor who trained you or evaluated your home-study course on the aeronautical knowledge areas listed in § 61.407. You must pass knowledge tests on—

(1) The fundamentals of instructing listed in § 61.407(a), unless you meet the requirements of § 61.407(c); and

(2) The aeronautical knowledge areas for a sport pilot certificate applicable to the aircraft category and class for which flight instructor privileges are sought.

(b) *Practical test.* (1) Before you take the practical test, you must—

(i) Receive a logbook endorsement from the authorized instructor who provided you with flight training on the areas of operation specified in § 61.409 that apply to the category and class of aircraft privileges you seek. This endorsement certifies you meet the applicable aeronautical knowledge and experience requirements and are prepared for the practical test;

(ii) If you are seeking privileges to provide instruction in an airplane or glider, receive a logbook endorsement from an authorized instructor indicating that you are competent and possess instructional proficiency in stall awareness, spin entry, spins, and spin recovery procedures after you have received flight training in those training areas in an airplane or glider, as appropriate, that is certificated for spins;

(2) You must pass a practical test—

(i) On the areas of operation listed in § 61.409 that are appropriate to the category and class of aircraft privileges you seek;

(ii) In an aircraft representative of the category and class of aircraft for the privileges you seek;

(iii) In which you demonstrate that you are able to teach stall awareness, spin entry, spins, and spin recovery procedures if you are seeking privileges to provide instruction in an airplane or glider. If you have not failed a practical test based on deficiencies in your ability to demonstrate knowledge or skill in these areas and you provide the endorsement required by paragraph (b)(1)(ii) of this section, an examiner may accept the endorsement instead of the demonstration required by this paragraph. If you are taking a test because you previously failed a test based on not meeting the requirements of this paragraph, you must pass a practical test on stall awareness, spin entry, spins, and spin recovery instructional competency and proficiency in the applicable category and class of aircraft that is certificated for spins.

### § 61.407 What aeronautical knowledge must I have to apply for a flight instructor certificate with a sport pilot rating?

(a) Except as specified in paragraph (c) of this section you must receive and log ground training from an authorized instructor on the fundamentals of instruction that includes:

(1) The learning process.

(2) Elements of effective teaching.

(3) Student evaluation and testing.

(4) Course development.

(5) Lesson planning.

(6) Classroom training techniques.

(b) You must receive and log ground training from an authorized instructor on the aeronautical knowledge areas applicable to a sport pilot certificate for the aircraft category and class in which you seek flight instructor privileges.

(c) You do not have to meet the requirements of paragraph (a) of this section if you—

(1) Hold a flight instructor certificate or ground instructor certificate issued under this part;

(2) Hold a teacher's certificate issued by a State, county, city, or municipality; or

(3) Are employed as a teacher at an accredited college or university.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–124, 74 FR 42562, Aug. 21, 2009]

### § 61.409 What flight proficiency requirements must I meet to apply for a flight instructor certificate with a sport pilot rating?

You must receive and log ground and flight training from an authorized instructor on the following areas of operation for the aircraft category and class in which you seek flight instructor privileges:

(a) Technical subject areas.

(b) Preflight preparation.

(c) Preflight lesson on a maneuver to be performed in flight.

(d) Preflight procedures.

(e) Airport, seaplane base, and gliderport operations, as applicable.

(f) Takeoffs (or launches), landings, and go-arounds.

(g) Fundamentals of flight.

(h) Performance maneuvers and for gliders, performance speeds.

(i) Ground reference maneuvers (except for gliders and lighter-than-air).

(j) Soaring techniques.

(k) Slow flight (not applicable to lighter-than-air and powered parachutes).

(l) Stalls (not applicable to lighter-than-air, powered parachutes, and gyroplanes).

(m) Spins (applicable to airplanes and gliders).

(n) Emergency operations.

(o) Tumble entry and avoidance techniques (applicable to weight-shift-control aircraft).

(p) Post-flight procedures.

### § 61.411 What aeronautical experience must I have to apply for a flight instructor certificate with a sport pilot rating?

Use the following table to determine the experience you must have for each aircraft category and class:

| If you are applying for a flight instructor certificate with a sport pilot rating for . . . | Then you must log at least . . . | Which must include at least . . . |
|---|---|---|
| (a) Airplane category and single-engine class privileges, | (1) 150 hours of flight time as a pilot, ..... | (i) 100 hours of flight time as pilot in command in powered aircraft,<br>(ii) 50 hours of flight time in a single-engine airplane,<br>(iii) 25 hours of cross-country flight time,<br>(iv) 10 hours of cross-country flight time in a single-engine airplane, and<br>(v) 15 hours of flight time as pilot in command in a single-engine airplane that is a light-sport aircraft. |
| (b) Glider category privileges, | (1) 25 hours of flight time as pilot in command in a glider, 100 flights in a glider, and 15 flights as pilot in command in a glider that is a light-sport aircraft, or.<br>(2) 100 hours in heavier-than-air aircraft, 20 flights in a glider, and 15 flights as pilot in command in a glider that is a light-sport aircraft. | |
| (c) Rotorcraft category and gyroplane class privileges, | (1) 125 hours of flight time as a pilot, ..... | (i) 100 hours of flight time as pilot in command in powered aircraft,<br>(ii) 50 hours of flight time in a gyroplane,<br>(iii) 10 hours of cross-country flight time,<br>(iv) 3 hours of cross-country flight time in a gyroplane, and<br>(v) 15 hours of flight time as pilot in command in a gyroplane that is a light-sport aircraft. |
| (d) Lighter-than-air category and airship class privileges, | (1) 100 hours of flight time as a pilot, ..... | (i) 40 hours of flight time in an airship,<br>(ii) 20 hours of pilot in command time in an airship,<br>(iii) 10 hours of cross-country flight time,<br>(iv) 5 hours of cross-country flight time in an airship, and |

| If you are applying for a flight instructor certificate with a sport pilot rating for . . . | Then you must log at least . . . | Which must include at least . . . |
|---|---|---|
| | | (v) 15 hours of flight time as pilot in command in an airship that is a light-sport aircraft. |
| (e) Lighter-than-air category and balloon class privileges, | (1) 35 hours of flight time as pilot-in-command, | (i) 20 hours of flight time in a balloon,<br>(ii) 10 flights in a balloon, and<br>(iii) 5 flights as pilot in command in a balloon that is a light-sport aircraft. |
| (f) Weight-shift-control aircraft category privileges, | (1) 150 hours of flight time as a pilot, ..... | (i) 100 hours of flight time as pilot in command in powered aircraft,<br>(ii) 50 hours of flight time in a weight-shift-control aircraft,<br>(iii) 25 hours of cross-country flight time,<br>(iv) 10 hours of cross-country flight time in a weight-shift-control aircraft, and<br>(v) 15 hours of flight time as pilot in command in a weight-shift-control aircraft that is a light-sport aircraft. |
| (g) Powered-parachute category privileges, | (1) 100 hours of flight time as a pilot, ..... | (i) 75 hours of flight time as pilot in command in powered aircraft,<br>(ii) 50 hours of flight time in a powered parachute,<br>(iii) 15 hours of cross-country flight time,<br>(iv) 5 hours of cross-country flight time in a powered parachute, and<br>(v) 15 hours of flight time as pilot in command in a powered parachute that is a light-sport aircraft. |

### § 61.413 What are the privileges of my flight instructor certificate with a sport pilot rating?

If you hold a flight instructor certificate with a sport pilot rating, you are authorized, within the limits of your certificate and rating, to provide training and endorsements that are required for, and relate to—

(a) A student pilot seeking a sport pilot certificate;

(b) A sport pilot certificate;

(c) A flight instructor certificate with a sport pilot rating;

(d) A powered parachute or weight-shift-control aircraft rating;

(e) Sport pilot privileges;

(f) A flight review or operating privilege for a sport pilot;

(g) A practical test for a sport pilot certificate, a private pilot certificate with a powered parachute or weight-shift-control aircraft rating or a flight instructor certificate with a sport pilot rating;

(h) A knowledge test for a sport pilot certificate, a private pilot certificate with a powered parachute or weight-shift-control aircraft rating or a flight instructor certificate with a sport pilot rating; and

(i) A proficiency check for an additional category or class privilege for a sport pilot certificate or a flight instructor certificate with a sport pilot rating.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5222, Feb. 1, 2010]

### § 61.415 What are the limits of a flight instructor certificate with a sport pilot rating?

If you hold a flight instructor certificate with a sport pilot rating, you may only provide flight training in a light-sport aircraft and are subject to the following limits:

(a) You may not provide ground or flight training in any aircraft for which you do not hold:

(1) A sport pilot certificate with applicable category and class privileges or a pilot certificate with the applicable category and class rating; and

(2) Applicable category and class privileges for your flight instructor certificate with a sport pilot rating.

(b) You may not provide ground or flight training for a private pilot certificate with a powered parachute or weight-shift-control aircraft rating unless you hold:

(1) At least a private pilot certificate with the applicable category and class rating; and

(2) Applicable category and class privileges for your flight instructor certificate with a sport pilot rating.

(c) You may not conduct more than 8 hours of flight training in any 24-consecutive-hour period.

(d) You may not endorse a:

(1) Student pilot's certificate or logbook for solo flight privileges, unless you have—

(i) Given that student the flight training required for solo flight privileges required by this part; and

(ii) Determined that the student is prepared to conduct the flight safely under known circumstances, subject to any limitations listed in the student's logbook that you consider necessary for the safety of the flight.

(2) Student pilot's certificate and logbook for a solo cross-country flight, unless you have determined the student's flight preparation, planning, equipment, and proposed procedures are adequate for the proposed flight under the existing conditions and within any limitations listed in the logbook that you consider necessary for the safety of the flight.

(3) Student pilot's certificate and logbook for solo flight in Class B, C, and D airspace areas, at an airport within Class B, C, or D airspace and to from, through or on an airport having an operational control tower, unless that you have—

(i) Given that student ground and flight training in that airspace or at that airport; and

(ii) Determined that the student is proficient to operate the aircraft safely.

(4) Logbook of a pilot for a flight review, unless you have conducted a review of that pilot in accordance with the requirements of § 61.56.

(e) You may not provide training to operate a light-sport aircraft in Class B, C, and D airspace, at an airport located in Class B, C, or D airspace, and to, from, through, or at an airport having an operational control tower, unless you have the endorsement specified in § 61.325, or are otherwise authorized to conduct operations in this airspace and at these airports.

(f) You may not provide training in a light-sport aircraft that is an airplane with a $V_H$ less than or equal to 87 knots CAS unless you have the endorsement specified in § 61.327 (a), or are otherwise authorized to operate that light-sport aircraft.

(g) You may not provide training in a light-sport aircraft with a $V_H$ greater than 87 knots CAS unless you have the endorsement specified in § 61.327 (b), or are otherwise authorized to operate that light-sport aircraft.

(h) You must perform all training in an aircraft that complies with the requirements of § 91.109 of this chapter.

(i) If you provide flight training for a certificate, rating or privilege, you must provide that flight training in an aircraft that meets the following:

(1) The aircraft must have at least two pilot stations and be of the same category and class appropriate to the certificate, rating or privilege sought.

(2) For single place aircraft, pre-solo flight training must be provided in an aircraft that has two pilot stations and is of the same category and class appropriate to the certificate, rating, or privilege sought.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5222, Feb. 1, 2010; Amdt. 61–125A, 75 FR 15610, Mar. 30, 2010]

### § 61.417 Will my flight instructor certificate with a sport pilot rating list aircraft category and class ratings?

Your flight instructor certificate does not list aircraft category and class ratings. When you successfully pass the practical test for a flight instructor certificate with a sport pilot rating, regardless of the light-sport aircraft privileges you seek, the FAA will issue you a flight instructor certificate with a sport pilot rating without any category and class ratings. The FAA will provide you with a logbook endorsement for the category and class of light-sport aircraft you are authorized to provide training in.

### § 61.419 How do I obtain privileges to provide training in an additional category or class of light-sport aircraft?

If you hold a flight instructor certificate with a sport pilot rating and seek

to provide training in an additional category or class of light-sport aircraft you must—

(a) Receive a logbook endorsement from the authorized instructor who trained you on the applicable areas of operation specified in § 61.409 certifying you have met the aeronautical knowledge and flight proficiency requirements for the additional category and class flight instructor privilege you seek;

(b) Successfully complete a proficiency check from an authorized instructor other than the instructor who trained you on the areas specified in § 61.409 for the additional category and class flight instructor privilege you seek;

(c) Complete an application for those privileges on a form and in a manner acceptable to the FAA and present this application to the authorized instructor who conducted the proficiency check specified in paragraph (b) of this section; and

(d) Receive a logbook endorsement from the instructor who conducted the proficiency check specified in paragraph (b) of this section certifying you are proficient in the areas of operation and authorized for the additional category and class flight instructor privilege.

### § 61.421 May I give myself an endorsement?

No. If you hold a flight instructor certificate with a sport pilot rating, you may not give yourself an endorsement for any certificate, privilege, rating, flight review, authorization, practical test, knowledge test, or proficiency check required by this part.

### § 61.423 What are the recordkeeping requirements for a flight instructor with a sport pilot rating?

(a) As a flight instructor with a sport pilot rating you must:

(1) Sign the logbook of each person to whom you have given flight training or ground training.

(2) Keep a record of the name, date, and type of endorsement for:

(i) Each person whose logbook or student pilot certificate you have endorsed for solo flight privileges.

(ii) Each person for whom you have provided an endorsement for a knowledge test, practical test, or proficiency check, and the record must indicate the kind of test or check, and the results.

(iii) Each person whose logbook you have endorsed as proficient to operate—

(A) An additional category or class of light-sport aircraft;

(B) In Class B, C, and D airspace; at an airport located in Class B, C, or D airspace; and to, from, through, or at an airport having an operational control tower;

(C) A light-sport aircraft that is an airplane with a $V_H$ less than or equal to 87 knots CAS; and

(D) A light-sport aircraft with a $V_H$ greater than 87 knots CAS.

(iv) Each person whose logbook you have endorsed as proficient to provide flight training in an additional category or class of light-sport aircraft.

(b) Within 10 days after providing an endorsement for a person to operate or provide training in an additional category and class of light-sport aircraft you must—

(1) Complete, sign, and submit to the FAA the application presented to you to obtain those privileges; and

(2) Retain a copy of the form.

(c) You must keep the records listed in this section for 3 years. You may keep these records in a logbook or a separate document.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–125, 75 FR 5222, Feb. 1, 2010; Amdt. 61–125A, 75 FR 15610, Mar. 30, 2010]

### § 61.425 How do I renew my flight instructor certificate?

If you hold a flight instructor certificate with a sport pilot rating you may renew your certificate in accordance with the provisions of § 61.197.

### § 61.427 What must I do if my flight instructor certificate with a sport pilot rating expires?

You may exchange your expired flight instructor certificate with a sport pilot rating for a new certificate with a sport pilot rating and any other rating on that certificate by passing a practical test as prescribed in § 61.405(b)

or § 61.183(h) for one of the ratings listed on the expired flight instructor certificate. The FAA will reinstate any privilege authorized by the expired certificate.

### § 61.429 May I exercise the privileges of a flight instructor certificate with a sport pilot rating if I hold a flight instructor certificate with another rating?

If you hold a flight instructor certificate, a commercial pilot certificate with an airship rating, or a commercial pilot certificate with a balloon rating issued under this part, and you seek to exercise the privileges of a flight instructor certificate with a sport pilot rating, you may do so without any further showing of proficiency, subject to the following limits:

(a) You are limited to the aircraft category and class ratings listed on your flight instructor certificate, commercial pilot certificate with an airship rating, or commercial pilot certificate with a balloon rating, as appropriate, when exercising your flight instructor privileges and the privileges specified in § 61.413.

(b) You must comply with the limits specified in § 61.415 and the recordkeeping requirements of § 61.423.

(c) If you want to exercise the privileges of your flight instructor certificate in a category or class of light-sport aircraft for which you are not currently rated, you must meet all applicable requirements to provide training in an additional category or class of light-sport aircraft specified in § 61.419.

[Doc. No. FAA–2001–11133, 69 FR 44875, July 27, 2004, as amended by Amdt. 61–124, 74 FR 42562, Aug. 21, 2009; Amdt. 61–125, 75 FR 5222, Feb. 1, 2010]

# PART 63—CERTIFICATION: FLIGHT CREWMEMBERS OTHER THAN PILOTS

SPECIAL FEDERAL AVIATION REGULATION NO. 100–2 [NOTE]

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AUTHORITY: 49 U.S.C. 106(g), 40113, 44701–44703, 44707, 44709–44711, 45102–45103, 45301–45302.

SPECIAL FEDERAL AVIATION REGULATION NO. 100–2

EDITORIAL NOTE: For the text of SFAR No. 100–2, see part 61 of this chapter.

## Subpart A—General

SOURCE: Docket No. 1179, 27 FR 7969, Aug. 10, 1962, unless otherwise noted.

### § 63.1 Applicability.

This part prescribes the requirements for issuing flight engineer and flight navigator certificates and the general operating rules for holders of those certificates.

### § 63.2 Certification of foreign flight crewmembers other than pilots.

A person who is neither a United States citizen nor a resident alien is issued a certificate under this part (other than under § 63.23 or § 63.42) outside the United States only when the Administrator finds that the certificate is needed for the operation of a U.S.-registered civil aircraft.

(Secs. 313, 601, 602, Federal Aviation Act of 1958, as amended (49 U.S.C. 1354, 1421, and 1422); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)); Title V, Independent Offices Appropriations Act of 1952 (31 U.S.C. 483(a)); sec. 28, International Air Transportation Competition Act of 1979 (49 U.S.C. 1159(b)))

[Doc. No. 22052, 47 FR 35693, Aug. 18, 1982]

### § 63.3 Certificates and ratings required.

(a) No person may act as a flight engineer of a civil aircraft of U.S. registry unless he has in his personal possession a current flight engineer certificate with appropriate ratings issued to him under this part and a second-class (or higher) medical certificate issued to him under part 67 of this chapter within the preceding 12 months. However, when the aircraft is operated within a foreign country, a current flight engineer certificate issued by the country in which the aircraft is operated, with evidence of current medical qualification for that certificate, may be used. Also, in the case of a flight engineer certificate issued under § 63.42, evidence of current medical qualification accepted for the issue of that certificate is used in place of a medical certificate.

(b) No person may act as a flight navigator of a civil aircraft of U.S. registry unless he has in his personal possession a current flight navigator certificate issued to him under this part and a second-class (or higher) medical certificate issued to him under part 67 of this chapter within the preceding 12 months. However, when the aircraft is operated within a foreign country, a current flight navigator certificate issued by the country in which the aircraft is operated, with evidence of current medical qualification for that certificate, may be used.

(c) Each person who holds a flight engineer or flight navigator certificate, or medical certificate, shall present either or both for inspection upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

(Secs. 3, 6, 9, 80 Stat. 931, 49 U.S.C. 1652, 1655, 1657)

[Doc. No. 1179, 27 FR 7969, Aug. 10, 1962, as amended by Amdt. 63–1, 27 FR 10410, Oct. 25, 1962; Amdt. 63–3, 30 FR 14559, Nov. 23, 1965; Amdt. 63–7, 31 FR 13523, Oct. 20, 1966; Doc. No. 8084, 32 FR 5769, Apr. 11, 1967; Amdt. 63–9, 33 FR 18613, Dec. 17, 1968; Amdt. 63–11, 35 FR 5320, Mar. 31, 1970]

### § 63.11 Application and issue.

(a) An application for a certificate and appropriate class rating, or for an additional rating, under this part must be made on a form and in a manner prescribed by the Administrator. Each person who applies for airmen certification services to be administered outside the United States for any certificate or rating issued under this part must show evidence that the fee prescribed in appendix A of part 187 of this chapter has been paid.

(b) An applicant who meets the requirements of this part is entitled to an appropriate certificate and appropriate class ratings.

(c) Unless authorized by the Administrator, a person whose flight engineer certificate is suspended may not apply for any rating to be added to that certificate during the period of suspension.

(d) Unless the order of revocation provides otherwise, a person whose flight engineer or flight navigator certificate is revoked may not apply for

the same kind of certificate for 1 year after the date of revocation.

(Secs. 313, 601, 602, Federal Aviation Act of 1958, as amended (49 U.S.C. 1354, 1421, and 1422); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)); Title V, Independent Offices Appropriations Act of 1952 (31 U.S.C. 483(a)); sec. 28, International Air Transportation Competition Act of 1979 (49 U.S.C. 1159(b)))

[Doc. No. 1179, 27 FR 7969, Aug. 10, 1962, as amended by Amdt. 63–3, 30 FR 14559, Nov. 23, 1965; Amdt. 63–7, 31 FR 13523, Oct. 20, 1966; Amdt. 63–22, 47 FR 35693, Aug. 16, 1982; Amdt. 63–35, 72 FR 18558, Apr. 12, 2007 ]

### § 63.12 Offenses involving alcohol or drugs.

(a) A conviction for the violation of any Federal or state statute relating to the growing, processing, manufacture, sale, disposition, possession, transportation, or importation of narcotic drugs, marihuana, or depressant or stimulant drugs or substances is grounds for—

(1) Denial of an application for any certificate or rating issued under this part for a period of up to 1 year after the date of final conviction; or

(2) Suspension or revocation of any certificate or rating issued under this part.

(b) The commission of an act prohibited by §91.17(a) or §91.19(a) of this chapter is grounds for—

(1) Denial of an application for a certificate or rating issued under this part for a period of up to 1 year after the date of that act; or

(2) Suspension or revocation of any certificate or rating issued under this part.

[Doc. No. 21956, 50 FR 15379, Apr. 17, 1985, as amended by Amdt. 63–27, 54 FR 34330, Aug. 18, 1989]

### § 63.12a Refusal to submit to an alcohol test or to furnish test results.

A refusal to submit to a test to indicate the percentage by weight of alcohol in the blood, when requested by a law enforcement officer in accordance with §91.11(c) of this chapter, or a refusal to furnish or authorize the release of the test results when requested by the Administrator in accordance with §91.17 (c) or (d) of this chapter, is grounds for—

(a) Denial of an application for any certificate or rating issued under this part for a period of up to 1 year after the date of that refusal; or

(b) Suspension or revocation of any certificate or rating issued under this part.

[Doc. No. 21956, 51 FR 1229, Jan. 9, 1986, as amended by Amdt. 63–27, 54 FR 34330, Aug. 18, 1989]

### § 63.12b [Reserved]

### § 63.13 Temporary certificate.

A certificate effective for a period of not more than 120 days may be issued to a qualified applicant, pending review of his application and supplementary documents and the issue of the certificate for which he applied.

[Doc. No. 1179, 27 FR 7969, Aug. 10, 1962, as amended by Amdt. 63–19, 43 FR 22639, May 25, 1978]

### § 63.14 Security disqualification.

(a) *Eligibility standard.* No person is eligible to hold a certificate, rating, or authorization issued under this part when the Transportation Security Administration (TSA) has notified the FAA in writing that the person poses a security threat.

(b) *Effect of the issuance by the TSA of an Initial Notification of Threat Assessment.* (1) The FAA will hold in abeyance pending the outcome of the TSA's final threat assessment review an application for any certificate, rating, or authorization under this part by any person who has been issued an Initial Notification of Threat Assessment by the TSA.

(2) The FAA will suspend any certificate, rating, or authorization issued under this part after the TSA issues to the holder an Initial Notification of Threat Assessment.

(c) *Effect of the issuance by the TSA of a Final Notification of Threat Assessment.* (1) The FAA will deny an application for any certificate, rating, or authorization under this part to any person who has been issued a Final Notification of Threat Assessment.

(2) The FAA will revoke any certificate, rating, or authorization issued under this part after the TSA has

issued to the holder a Final Notification of Threat Assessment.

[Doc. No. FAA–2003–14293, 68 FR 3774, Jan. 24, 2003]

### § 63.15 Duration of certificates.

(a) Except as provided in § 63.23 and paragraph (b) of this section, a certificate or rating issued under this part is effective until it is surrendered, suspended, or revoked.

(b) A flight engineer certificate (with any amendment thereto) issued under § 63.42 expires at the end of the 24th month after the month in which the certificate was issued or renewed. However, the holder may exercise the privileges of that certificate only while the foreign flight engineer license on which that certificate is based is effective.

(c) Any certificate issued under this part ceases to be effective if it is surrendered, suspended, or revoked. The holder of any certificate issued under this part that is suspended or revoked shall, upon the Administrator's request, return it to the Administrator.

(d) Except for temporary certificate issued under § 63.13, the holder of a paper certificate issued under this part may not exercise the privileges of that certificate after March 31, 2013.

(Sec. 6, 80 Stat. 937, 49 U.S.C. 1655; secs. 313, 601, 602, Federal Aviation Act of 1958, as amended (49 U.S.C. 1354, 1421, and 1422); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)); Title V, Independent Offices Appropriations Act of 1952 (31 U.S.C. 483(a)); sec. 28, International Air Transportation Competition Act of 1979 (49 U.S.C. 1159(b)))

[Doc. No. 8846, 33 FR 18613, Dec. 17, 1968, as amended by Amdt. 63–22, 47 FR 35693, Aug. 16, 1982; Amdt. 63–36, 73 FR 10668, Feb. 28, 2008]

### § 63.15a [Reserved]

### § 63.16 Change of name; replacement of lost or destroyed certificate.

(a) An application for a change of name on a certificate issued under this part must be accompanied by the applicant's current certificate and the marriage license, court order, or other document verifying the change. The documents are returned to the applicant after inspection.

(b) An application for a replacement of a lost or destroyed certificate is made by letter to the Department of Transportation, Federal Aviation Administration, Airman Certification Branch, Post Office Box 25082, Oklahoma City, OK 73125. The letter must—

(1) Contain the name in which the certificate was issued, the permanent mailing address (including zip code), social security number (if any), and date and place of birth of the certificate holder, and any available information regarding the grade, number, and date of issue of the certificate, and the ratings on it; and

(2) Be accompanied by a check or money order for $2, payable to the Federal Aviation Administration.

(c) An application for a replacement of a lost or destroyed medical certificate is made by letter to the Department of Transportation, Federal Aviation Administration, Civil Aeromedical Institute, Aeromedical Certification Branch, Post Office Box 25082, Oklahoma City, OK 73125, accompanied by a check or money order for $2.00.

(d) A person whose certificate issued under this part or medical certificate, or both, has been lost may obtain a telegram from the Federal Aviation Administration confirming that it was issued. The telegram may be carried as a certificate for a period not to exceed 60 days pending his receiving a duplicate under paragraph (b) or (c) of this section, unless he has been notified that the certificate has been suspended or revoked. The request for such a telegram may be made by prepaid telegram, stating the date upon which a duplicate certificate was requested, or including the request for a duplicate and a money order for the necessary amount. The request for a telegraphic certificate should be sent to the office prescribed in paragraph (b) or (c) of this section, as appropriate. However, a request for both at the same time should be sent to the office prescribed in paragraph (b) of this section.

[Doc. No. 7258, 31 FR 13523, Oct. 20, 1966, as amended by Doc. No. 8084, 32 FR 5769, Apr. 11, 1967; Amdt. 63–12, 35 FR 14075, Sept. 4, 1970; Amdt. 63–13, 36 FR 28654, Feb. 11, 1971]

### § 63.17 Tests: General procedure.

(a) Tests prescribed by or under this part are given at times and places, and by persons, designated by the Administrator.

(b) The minimum passing grade for each test is 70 percent.

### § 63.18 Written tests: Cheating or other unauthorized conduct.

(a) Except as authorized by the Administrator, no person may—

(1) Copy, or intentionally remove, a written test under this part;

(2) Give to another, or receive from another, any part or copy of that test;

(3) Give help on that test to, or receive help on that test from, any person during the period that test is being given.

(4) Take any part of that test in behalf of another person;

(5) Use any material or aid during the period that test is being given; or

(6) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) No person who commits an act prohibited by paragraph (a) of this section is eligible for any airman or ground instructor certificate or rating under this chapter for a period of 1 year after the date of that act. In addition, the commission of that act is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

[Doc. No. 4086, 30 FR 2196, Feb. 18, 1965]

### § 63.19 Operations during physical deficiency.

No person may serve as a flight engineer or flight navigator during a period of known physical deficiency, or increase in physical deficiency, that would make him unable to meet the physical requirements for his current medical certificate.

### § 63.20 Applications, certificates, logbooks, reports, and records; falsification, reproduction, or alteration.

(a) No person may make or cause to be made—

(1) Any fraudulent or intentionally false statement on any application for a certificate or rating under this part;

(2) Any fraudulent or intentionally false entry in any logbook, record, or report that is required to be kept, made, or used, to show compliance with any requirement for any certificate or rating under this part;

(3) Any reproduction, for fraudulent purpose, of any certificate or rating under this part; or

(4) Any alteration of any certificate or rating under this part.

(b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

[Doc. No. 4086, 30 FR 2196, Feb. 18, 1965]

### § 63.21 Change of address.

Within 30 days after any change in his permanent mailing address, the holder of a certificate issued under this part shall notify the Department of Transportation, Federal Aviation Administration, Airman Certification Branch, Post Office Box 25082, Oklahoma City, OK 73125, in writing, of his new address.

[Doc. No. 10536, 35 FR 14075, Sept. 4, 1970]

### § 63.23 Special purpose flight engineer and flight navigator certificates: Operation of U.S.-registered civil airplanes leased by a person not a U.S. citizen.

(a) *General.* The holder of a current foreign flight engineer or flight navigator certificate, license, or authorization issued by a foreign contracting State to the Convention on International Civil Aviation, who meets the requirements of this section, may hold a special purpose flight engineer or flight navigator certificate, as appropriate, authorizing the holder to perform flight engineer or flight navigator duties on a civil airplane of U.S. registry, leased to a person not a citizen of the United States, carrying persons or property for compensation or hire. Special purpose flight engineer and flight navigator certificates are issued under this section only for airplane types that can have a maximum passenger seating configuration, excluding any flight crewmember seat, of more than 30 seats or a maximum payload capacity (as defined in §135.2(e) of this chapter) of more than 7,500 pounds.

(b) *Eligibility.* To be eligible for the issuance, or renewal, of a certificate under this section, an applicant must present the following to the Administrator:

(1) A current foreign flight engineer or flight navigator certificate, license, or authorization issued by the aeronautical authority of a foreign contracting State to the Convention on International Civil Aviation or a facsimile acceptable to the Administrator. The certificate or license must authorize the applicant to perform the flight engineer or flight navigator duties to be authorized by a certificate issued under this section on the same airplane type as the leased airplane.

(2) A current certification by the lessee of the airplane—

(i) Stating that the applicant is employed by the lessee;

(ii) Specifying the airplane type on which the applicant will perform flight engineer or flight navigator duties; and

(iii) Stating that the applicant has received ground and flight instruction which qualifies the applicant to perform the duties to be assigned on the airplane.

(3) Documentation showing that the applicant currently meets the medical standards for the foreign flight engineer or flight navigator certificate, license, or authorization required by paragraph (b)(1) of this section, except that a U.S. medical certificate issued under part 67 of this chapter is not evidence that the applicant meets those standards unless the State which issued the applicant's foreign flight engineer or flight navigator certificate, license, or authorization accepts a U.S. medical certificate as evidence of medical fitness for a flight engineer or flight navigator certificate, license, or authorization.

(c) *Privileges.* The holder of a special purpose flight engineer or flight navigator certificate issued under this section may exercise the same privileges as those shown on the certificate, license, or authorization specified in paragraph (b)(1) of this section, subject to the limitations specified in this section.

(d) *Limitations.* Each certificate issued under this section is subject to the following limitations:

(1) It is valid only—

(i) For flights between foreign countries and for flights in foreign air commerce;

(ii) While it and the certificate, license, or authorization required by paragraph (b)(1) of this section are in the certificate holder's personal possession and are current;

(iii) While the certificate holder is employed by the person to whom the airplane described in the certification required by paragraph (b)(2) of this section is leased;

(iv) While the certificate holder is performing flight engineer or flight navigator duties on the U.S.-registered civil airplane described in the certification required by paragraph (b)(2) of this section; and

(v) While the medical documentation required by paragraph (b)(3) of this section is in the certificate holder's personal possession and is currently valid.

(2) Each certificate issued under this section contains the following:

(i) The name of the person to whom the U.S.-registered civil airplane is leased.

(ii) The type of airplane.

(iii) The limitation: ''Issued under, and subject to, § 63.23 of the Federal Aviation Regulations.''

(iv) The limitation: ''Subject to the privileges and limitations shown on the holder's foreign flight (engineer or navigator) certificate, license, or authorization.''

(3) Any additional limitations placed on the certificate which the Administrator considers necessary.

(e) *Termination.* Each special purpose flight engineer or flight navigator certificate issued under this section terminates—

(1) When the lease agreement for the airplane described in the certification required by paragraph (b)(2) of this section terminates;

(2) When the foreign flight engineer or flight navigator certificate, license, or authorization, or the medical documentation required by paragraph (b) of this section is suspended, revoked, or no longer valid; or

(3) After 24 months after the month in which the special purpose flight engineer or flight navigator certificate was issued.

(f) *Surrender of certificate.* The certificate holder shall surrender the special purpose flight engineer or flight navigator certificate to the Administrator

within 7 days after the date it terminates.

(g) *Renewal.* The certificate holder may have the certificate renewed by complying with the requirements of paragraph (b) of this section at the time of application for renewal.

(Secs. 313(a), 601, and 602, Federal Aviation Act of 1958; as amended (49 U.S.C. 1354(a), 1421, and 1422); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 19300, 45 FR 5672, Jan. 24, 1980]

## Subpart B—Flight Engineers

AUTHORITY: Secs. 313(a), 601, and 602, Federal Aviation Act of 1958; 49 U.S.C. 1354, 1421, 1422.

SOURCE: Docket No. 6458, 30 FR 14559, Nov. 23, 1965, unless otherwise noted.

### § 63.31 Eligibility requirements; general.

To be eligible for a flight engineer certificate, a person must—

(a) Be at least 21 years of age;

(b) Be able to read, speak, and understand the English language, or have an appropriate limitation placed on his flight engineer certificate;

(c) Hold at least a second-class medical certificate issued under part 67 of this chapter within the 12 months before the date he applies, or other evidence of medical qualification accepted for the issue of a flight engineer certificate under § 63.42; and

(d) Comply with the requirements of this subpart that apply to the rating he seeks.

(Sec. 6, 80 Stat. 937, 49 U.S.C. 1655)

[Doc. No. 6458, 30 FR 14559, Nov. 23, 1965, as amended by Amdt. 63–9, 33 FR 18614, Dec. 17, 1968]

### § 63.33 Aircraft ratings.

(a) The aircraft class ratings to be placed on flight engineer certificates are—

(1) Reciprocating engine powered;

(2) Turbopropeller powered; and

(3) Turbojet powered.

(b) To be eligible for an additional aircraft class rating after his flight engineer certificate with a class rating is issued to him, an applicant must pass the written test that is appropriate to the class of airplane for which an additional rating is sought, and—

(1) Pass the flight test for that class of aircraft; or

(2) Satisfactorily complete an approved flight engineer training program that is appropriate to the additional class rating sought.

### § 63.35 Knowledge requirements.

(a) An applicant for a flight engineer certificate must pass a written test on the following:

(1) The regulations of this chapter that apply to the duties of a flight engineer.

(2) The theory of flight and aerodynamics.

(3) Basic meteorology with respect to engine operations.

(4) Center of gravity computations.

(b) An applicant for the original or additional issue of a flight engineer class rating must pass a written test for that airplane class on the following:

(1) Preflight.

(2) Airplane equipment.

(3) Airplane systems.

(4) Airplane loading.

(5) Airplane procedures and engine operations with respect to limitations.

(6) Normal operating procedures.

(7) Emergency procedures.

(8) Mathematical computation of engine operations and fuel consumption.

(c) Before taking the written tests prescribed in paragraphs (a) and (b) of this section, an applicant for a flight engineer certificate must present satisfactory evidence of having completed one of the experience requirements of § 63.37. However, he may take the written tests before acquiring the flight training required by § 63.37.

(d) An applicant for a flight engineer certificate or rating must have passed the written tests required by paragraphs (a) and (b) of this section since the beginning of the 24th calendar month before the month in which the flight is taken. However, this limitation does not apply to an applicant for a flight engineer certificate or rating if—

(1) The applicant—

(i) Within the period ending 24 calendar months after the month in which the applicant passed the written test, is employed as a flight crewmember or

mechanic by a U.S. air carrier or commercial operator operating either under part 121 or as a commuter air carrier under part 135 (as defined in part 298 of this title) and is employed by such a certificate holder at the time of the flight test;

(ii) If employed as a flight crewmember, has completed initial training, and, if appropriate, transition or upgrade training; and

(iii) Meets the recurrent training requirements of the applicable part or, for mechanics, meets the recency of experience requirements of part 65; or

(2) Within the period ending 24 calendar months after the month in which the applicant passed the written test, the applicant participated in a flight engineer or maintenance training program of a U.S. scheduled military air transportation service and is currently participating in that program.

(e) An air carrier or commercial operator with an approved training program under part 121 of this chapter may, when authorized by the Administrator, provide as part of that program a written test that it may administer to satisfy the test required for an additional rating under paragraph (b) of this section.

(Sec. 6, 80 Stat. 937, 49 U.S.C. 1655; secs. 313(a), 601 through 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421 through 1425); sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)); and 14 CFR 11.49)

[Doc. No. 1179, 27 FR 7969, Aug. 10, 1962, as amended by Amdt. 63–17, 40 FR 32830, Aug. 5, 1975; Doc. No. 63–21, 47 FR 13316, Mar. 29, 1982]

### § 63.37 Aeronautical experience requirements.

(a) Except as otherwise specified therein, the flight time used to satisfy the aeronautical experience requirements of paragraph (b) of this section must have been obtained on an airplane—

(1) On which a flight engineer is required by this chapter; or

(2) That has at least three engines that are rated at least 800 horsepower each or the equivalent in turbine-powered engines.

(b) An applicant for a flight engineer certificate with a class rating must present, for the class rating sought, satisfactory evidence of one of the following:

(1) At least 3 years of diversified practical experience in aircraft and aircraft engine maintenance (of which at least 1 year was in maintaining multiengine aircraft with engines rated at least 800 horsepower each, or the equivalent in turbine engine powered aircraft), and at least 5 hours of flight training in the duties of a flight engineer.

(2) Graduation from at least a 2-year specialized aeronautical training course in maintaining aircraft and aircraft engines (of which at least 6 calendar months were in maintaining multiengine aircraft with engines rated at least 800 horsepower each or the equivalent in turbine engine powered aircraft), and at least 5 hours of flight training in the duties of a flight engineer.

(3) A degree in aeronautical, electrical, or mechanical engineering from a recognized college, university, or engineering school; at least 6 calendar months of practical experience in maintaining multiengine aircraft with engines rated at least 800 horsepower each, or the equivalent in turbine engine powered aircraft; and at least 5 hours of flight training in the duties of a flight engineer.

(4) At least a commercial pilot certificate with an instrument rating and at least 5 hours of flight training in the duties of a flight engineer.

(5) At least 200 hours of flight time in a transport category airplane (or in a military airplane with at least two engines and at least equivalent weight and horsepower) as pilot in command or second in command performing the functions of a pilot in command under the supervision of a pilot in command.

(6) At least 100 hours of flight time as a flight engineer.

(7) Within the 90–day period before he applies, successful completion of an approved flight engineer ground and flight course of instruction as provided in appendix C of this part.

(Sec. 6, 80 Stat. 937, 49 U.S.C. 1655)

[Doc. No. 6458, 30 FR 14559, Nov. 23, 1965, as amended by Amdt. 63–5, 31 FR 9047, July 1, 1966; Amdt. 63–17, 40 FR 32830, Aug. 5, 1975]

### § 63.39 Skill requirements.

(a) An applicant for a flight engineer certificate with a class rating must pass a practical test on the duties of a flight engineer in the class of airplane for which a rating is sought. The test may only be given on an airplane specified in § 63.37(a).

(b) The applicant must—

(1) Show that he can satisfactorily perform preflight inspection, servicing, starting, pretakeoff, and postlanding procedures;

(2) In flight, show that he can satisfactorily perform the normal duties and procedures relating to the airplane, airplane engines, propellers (if appropriate), systems, and appliances; and

(3) In flight, in an airplane simulator, or in an approved flight engineer training device, show that he can satisfactorily perform emergency duties and procedures and recognize and take appropriate action for malfunctions of the airplane, engines, propellers (if appropriate), systems and appliances.

### § 63.41 Retesting after failure.

An applicant for a flight engineer certificate who fails a written test or practical test for that certificate may apply for retesting—

(a) After 30 days after the date he failed that test; or

(b) After he has received additional practice or instruction (flight, synthetic trainer, or ground training, or any combination thereof) that is necessary, in the opinion of the Administrator or the applicant's instructor (if the Administrator has authorized him to determine the additional instruction necessary) to prepare the applicant for retesting.

### § 63.42 Flight engineer certificate issued on basis of a foreign flight engineer license.

(a) *Certificates issued.* The holder of a current foreign flight engineer license issued by a contracting State to the Convention on International Civil Aviation, who meets the requirements of this section, may have a flight engineer certificate issued to him for the operation of civil aircraft of U.S. registry. Each flight engineer certificate issued under this section specifies the number and State of issuance of the foreign flight engineer license on which it is based. If the holder of the certificate cannot read, speak, or understand the English language, the Administrator may place any limitation on the certificate that he considers necessary for safety.

(b) *Medical standards and certification.* An applicant must submit evidence that he currently meets the medical standards for the foreign flight engineer license on which the application for a certificate under this section is based. A current medical certificate issued under part 67 of this chapter will be excepted as evidence that the applicant meets those standards. However, a medical certificate issued under part 67 of this chapter is not evidence that the applicant meets those standards outside the United States unless the State that issued the applicant's foreign flight engineer license also accepts that medical certificate as evidence of the applicant's physical fitness for his foreign flight engineer license.

(c) *Ratings issued.* Aircraft class ratings listed on the applicant's foreign flight engineer license, in addition to any issued to him after testing under the provisions of this part, are placed on the applicant's flight engineer certificate. An applicant without an aircraft class rating on his foreign flight engineer license may be issued a class rating if he shows that he currently meets the requirements for exercising the privileges of his foreign flight engineer license on that class of aircraft.

(d) *Privileges and limitations.* The holder of a flight engineer certificate issued under this section may act as a flight engineer of a civil aircraft of U.S. registry subject to the limitations of this part and any additional limitations placed on his certificate by the Administrator. He is subject to these limitations while he is acting as a flight engineer of the aircraft within or outside the United States. However, he may not act as flight engineer or in any other capacity as a required flight crewmember, of a civil aircraft of U.S. registry that is carrying persons or property for compensation or hire.

(e) *Renewal of certificate and ratings.* The holder of a certificate issued under this section may have that certificate

and the ratings placed thereon renewed if, at the time of application for renewal, the foreign flight engineer license on which that certificate is based is in effect. Application for the renewal of the certificate and ratings thereon must be made before the expiration of the certificate.

(Sec. 6, 80 Stat. 937, 49 U.S.C. 1655)

[Doc. No. 8846, 33 FR 18614, Dec. 17, 1968, as amended by Amdt. 63–20, 45 FR 5673, Jan. 24, 1980]

### § 63.43 Flight engineer courses.

An applicant for approval of a flight engineer course must submit a letter to the Administrator requesting approval, and must also submit three copies of each course outline, a description of the facilities and equipment, and a list of the instructors and their qualifications. An air carrier or commercial operator with an approved flight engineer training course under part 121 of this chapter may apply for approval of a training course under this part by letter without submitting the additional information required by this paragraph. Minimum requirements for obtaining approval of a flight engineer course are set forth in appendix C of this part.

## Subpart C—Flight Navigators

AUTHORITY: Secs. 313(a), 314, 601, and 607; 49 U.S.C. 1354(a), 1355, 1421, and 1427.

SOURCE: Docket No. 1179, 27 FR 7970, Aug. 10, 1962, unless otherwise noted.

### § 63.51 Eligibility requirements; general.

To be eligible for a flight navigator certificate, a person must—

(a) Be at least 21 years of age;

(b) Be able to read, write, speak, and understand the English language;

(c) Hold at least a second-class medical certificate issued under part 67 of this chapter within the 12 months before the date he applies; and

(d) Comply with §§ 63.53, 63.55, and 63.57.

### § 63.53 Knowledge requirements.

(a) An applicant for a flight navigator certificate must pass a written test on—

(1) The regulations of this chapter that apply to the duties of a flight navigator;

(2) The fundamentals of flight navigation, including flight planning and cruise control;

(3) Practical meteorology, including analysis of weather maps, weather reports, and weather forecasts; and weather sequence abbreviations, symbols, and nomenclature;

(4) The types of air navigation facilities and procedures in general use;

(5) Calibrating and using air navigation instruments;

(6) Navigation by dead reckoning;

(7) Navigation by celestial means;

(8) Navigation by radio aids;

(9) Pilotage and map reading; and

(10) Interpretation of navigation aid identification signals.

(b) A report of the test is mailed to the applicant. A passing grade is evidence, for a period of 24 months after the test, that the applicant has complied with this section.

[Doc. No. 1179, 27 FR 7970, Aug. 10, 1962, as amended by Amdt. 63–19, 43 FR 22639, May 25, 1978]

### § 63.55 Experience requirements.

(a) An applicant for a flight navigator certificate must be a graduate of a flight navigator course approved by the Administrator or present satisfactory documentary evidence of—

(1) Satisfactory determination of his position in flight at least 25 times by night by celestial observations and at least 25 times by day by celestial observations in conjunction with other aids; and

(2) At least 200 hours of satisfactory flight navigation including celestial and radio navigation and dead reckoning.

A pilot who has logged 500 hours of cross-country flight time, of which at least 100 hours were at night, may be credited with not more than 100 hours for the purposes of paragraph (a)(2) of this section.

(b) Flight time used exclusively for practicing long-range navigation methods, with emphasis on celestial navigation and dead reckoning, is considered to be satisfactory navigation experience for the purposes of paragraph (a)

of this section. It must be substantiated by a logbook, by records of an armed force or a certificated air carrier, or by a letter signed by a certificated flight navigator and attached to the application.

### § 63.57 Skill requirements.

(a) An applicant for a flight navigator certificate must pass a practical test in navigating aircraft by—

(1) Dead reckoning;

(2) Celestial means; and

(3) Radio aids to navigation.

(b) An applicant must pass the written test prescribed by § 63.53 before taking the test under this section. However, if a delay in taking the test under this section would inconvenience the applicant or an air carrier, he may take it before he receives the result of the written test, or after he has failed the written test.

(c) The test requirements for this section are set forth in appendix A of this part.

[Doc. No. 1179, 27 FR 7970, Aug. 10, 1962, as amended by Amdt. 63–19, 43 FR 22639, May 25, 1978]

### § 63.59 Retesting after failure.

(a) An applicant for a flight navigator certificate who fails a written or practical test for that certificate may apply for retesting—

(1) After 30 days after the date he failed that test; or

(2) Before the 30 days have expired if the applicant presents a signed statement from a certificated flight navigator, certificated ground instructor, or any other qualified person approved by the Administrator, certifying that that person has given the applicant additional instruction in each of the subjects failed and that person considers the applicant ready for retesting.

(b) A statement from a certificated flight navigator, or from an operations official of an approved navigator course, is acceptable, for the purposes of paragraph (a)(2) of this section, for the written test and for the flight test. A statement from a person approved by the Administrator is acceptable for the written tests. A statement from a supervising or check navigator with the United States Armed Forces is acceptable for the written test and for the practical test.

(c) If the applicant failed the flight test, the additional instruction must have been administered in flight.

[Doc. No. 1179, 27 FR 7970, Aug. 10, 1962, as amended by Amdt. 63–19, 43 FR 22640, May 25, 1978]

### § 63.61 Flight navigator courses.

An applicant for approval of a flight navigator course must submit a letter to the Administrator requesting approval, and must also submit three copies of the course outline, a description of his facilities and equipment, and a list of the instructors and their qualifications. Requirements for the course are set forth in appendix B to this part.

## APPENDIX A TO PART 63—TEST REQUIREMENTS FOR FLIGHT NAVIGATOR CERTIFICATE

(a) *Demonstration of skill.* An applicant will be required to pass practical tests on the prescribed subjects. These tests may be given by FAA inspectors and designated flight navigator examiners.

(b) *The examination.* The practical examination consists of a ground test and a flight test as itemized on the examination check sheet. Each item must be completed satisfactorily in order for the applicant to obtain a passing grade. Items 5, 6, 7 of the ground test may be completed orally, and items 17, 22, 23, 34, 36, 37, 38, and 39 of the flight test may be completed by an oral examination when a lack of ground facilities or navigation equipment makes such procedure necessary. In these cases a notation to that effect shall be made in the ''Remarks'' space on the check sheet.

(c) *Examination procedure.* (1) An applicant will provide an aircraft in which celestial observations can be taken in all directions. Minimum equipment shall include a table for plotting, a drift meter or absolute altimeter, an instrument for taking visual bearings, and a radio direction finder.

(2) More than one flight may be used to complete the flight test and any type of flight pattern may be used. The test will be conducted chiefly over water whenever practicable, and without regard to radio range legs or radials. If the test is conducted chiefly over land, a chart should be used which shows very little or no topographical and aeronautical data. The total flight time will cover a period of at least four hours. Only one applicant may be examined at one time, and no applicant may perform other than navigator duties during the examination.

(3) When the test is conducted with an aircraft belonging to an air carrier, the navigation procedures should conform with those set forth in the carrier's operations manual. Items of the flight test which are not performed during the routine navigation of the flight will be completed by oral examination after the flight or at times during flight which the applicant indicates may be used for tests on those items. Since in-flight weather conditions, the reliability of the weather forecast, and the stability of the aircraft will have considerable effect on an applicant's performance, good judgment must be used by the agent or examiner in evaluating the tests.

(d) *Ground test.* For the ground test, in the order of the numbered items on the examination check sheet, an applicant will be required to:

(1) Identify without a star identifier, at least six navigational stars and all planets available for navigation at the time of the examination and explain the method of identification.

(2) Identify two additional stars with a star identifier or sky diagrams and explain identification procedure.

(3) Precompute a time-altitude curve for a period of about 20 minutes and take 10 single observations of a celestial body which is rising or setting rapidly. The intervals between observations should be at least one minute. Mark each observation on the graph to show accuracy. All observations, after corrections, shall plot within 8 minutes of arc from the time-altitude curve, and the average error shall not exceed 5 minutes of arc.

(4) Take and plot one 3-star fix and 3 LOP's of the sun. Plotted fix or an average of LOP's must fall within 5 miles of the actual position of the observer.

(5) Demonstrate or explain the compensation and swinging of a liquid-type magnetic compass.

(6) Demonstrate or explain a method of aligning one type of drift meter.

(7) Demonstrate or explain a method of aligning an astro-compass or periscopic sextant.

(e) *Flight test.* For the flight test, in the order of the numbered items on the examination check sheet, an applicant will be required to:

(1) Demonstrate his ability to read weather symbols and interpret synoptic surface and upper air weather maps with particular emphasis being placed on winds.

(2) Prepare a flight plan by zones from the forecast winds or pressure data of an upper air chart and the operator's data.

(3) Compute from the operator's data the predicted fuel consumption for each zone of the flight, including the alternate.

(4) Determine the point-of-no-return for the flight with all engines running and the equitime point with one engine inoperative. Graphical methods which are part of the company's operations manual may be used for these computations.

(5) Prepare a cruise control (howgozit) chart from the operator's data.

(6) Enter actual fuel consumed on the cruise control chart and interpret the variations of the actual curve from the predicted curve.

(7) Check the presence on board and operating condition of all navigation equipment. Normally a check list will be used. This check will include a time tick or chronometer comparison. Any lack of thoroughness during this check will justify this item being graded unsatisfactory.

(8) Locate emergency equipment, such as, the nearest fire extinguisher, life preserver, life rafts, exits, axe, first aid kits, etc.

(9) Recite the navigator's duties and stations during emergencies for the type of aircraft used for the test.

(10) Demonstrate the proper use of a flux gate compass or gyrosyn compass (when available), with special emphasis on the caging methods and the location of switches, circuit breakers, and fuses. If these compasses are not part of the aircraft's equipment, an oral examination will be given.

(11) Be accurate and use good judgment when setting and altering headings. Erroneous application of variation, deviation, or drift correction, or incorrect measurement of course on the chart will be graded as unsatisfactory.

(12) Demonstrate or explain the use of characteristics of various chart projections used in long-range air navigation, including the plotting of courses and bearings, and the measuring of distances.

(13) Demonstrate ability to identify designated landmarks by the use of a sectional or WAC chart.

(14) Use a computer with facility and accuracy for the computation of winds, drift correction and drift angles, ground speeds, ETA's, fuel loads, etc.

(15) Determine track, ground speed, and wind by the double drift method. When a drift meter is not part of the aircraft's equipment, an oral examination on the use of the drift meter and a double drift problem shall be completed.

(16) Determine ground speed and wind by the timing method with a drift meter. When a drift meter is not part of the aircraft's equipment, an oral examination on the procedure and a problem shall be completed.

(17) Demonstrate the use of air plot for determining wind between fixes and for plotting pressure lines of position when using pressure and absolute altimeter comparisons.

(18) Give ETA's to well defined check points at least once each hour after the second hour of flight. The average error shall

not be more than 5 percent of the intervening time intervals, and the maximum error of any one ETA shall not be more than 10 percent.

(19) Demonstrate knowledge and use of D/F equipment and radio facility information. Grading on this item will be based largely on the applicant's selection of those radio aids which will be of most value to his navigation, the manner with which he uses equipment, including filter box controls, and the precision with which he reads bearings. The aircraft's compass heading and all compass corrections must be considered for each bearing.

(20) Use care in tuning to radio stations to insure maximum reception of signal and check for interference signals. Receiver will be checked to ascertain that antenna and BFO (Voice-CW) switches are in correct positions.

(21) Identify at least three radio stations using International Morse code only for identification. The agent or examiner will tune in these stations so that the applicant will have no knowledge of the direction, distance, or frequency of the stations.

(22) Take at least one radio bearing by manual use of the loop. The agent or examiner will check the applicant's bearing by taking a manual bearing on the same station immediately after the applicant.

(23) Show the use of good judgment in evaluating radio bearings, and explain why certain bearings may be of doubtful value.

(24) Determine and apply correctly the correction required to be made to radio bearings before plotting them on a Mercator chart, and demonstrate the ability to plot bearings accurately on charts of the Mercator and Lambert conformal projections.

(25) Compute the compass heading, ETA, and fuel remaining if it is assumed that the flight would be diverted to an alternate airport at a time specified by the agent or examiner.

(26) Check the counter scales of a Loran receiver for accuracy, and explain the basic (face) adjustments which affect tuning and counter alignment. A guide sheet may be used for this test.

(27) Demonstrate a knowledge of the basic principle of Loran and the ability to tune a Loran receiver, to match signals, to read time differences, to plot Loran LOP's, and to identify and use sky waves.

(28) Take and plot bearings from a consol station and explain the precautions which must be taken when tuning a radio receiver for consol signals. Also, discuss those conditions which affect the reliability of consol bearings.

(29) Demonstrate the ability to properly operate and read an absolute altimeter.

(30) Determine the ''D'' factors for a series of compared readings of an absolute altimeter and a pressure altimeter.

(31) Determine drift angle or lateral displacement from the true headingline by application of Bellamy's formula or a variation thereof.

(32) Interpret the altimeter comparison data with respect to the pressure system found at flight level. From this data evaluate the accuracy of the prognostic weather map used for flight planning and apply this analysis to the navigation of the flight.

(33) Interpret single LOP's for most probable position, and show how a series of single LOP's of the same body may be used to indicate the probable track and ground speed. Also, show how a series of single LOP's (celestial or radio) from the same celestial body or radio station may be used to determine position when the change of azimuth or bearing is 30° or more between observations.

(34) Select one of the celestial LOP's used during the flight and explain how to make a single line of position approach to a point selected by the agent or examiner, giving headings, times, and ETA's.

(35) Demonstrate the proper use of an astro-compass or periscopic sextant for taking bearings.

(36) Determine compass deviation as soon as possible after reaching cruising altitude and whenever there is a change of compass heading of 15° or more.

(37) Take celestial fixes at hourly intervals when conditions permit. The accuracy of these fixes shall be checked by means of a Loran, radio, or visual fix whenever practicable. After allowing for the probable error of a Loran, radio, or visual fix, a celestial fix under favorable conditions should plot within 10 miles of the actual position.

(38) Select celestial bodies for observation, when possible, whose azimuths will differ by approximately 120° for a 3-body fix and will differ by approximately 90° for a 2-body fix. The altitudes of the selected bodies should be between 25° and 75° whenever practicable.

(39) Have POMAR and any other required reports ready for transmission at time of schedule, and be able to inform the pilot in command promptly with regard to the aircraft's position and progress in comparison with the flight plan.

(40) Keep a log with sufficient legible entries to provide a record from which the flight could be retraced.

(41) Note significant weather changes which might influence the drift or ground speed of the aircraft, such as, temperature, ''D'' factors, frontal conditions, turbulence, etc.

(42) Determine the wind between fixes as a regular practice.

(43) Estimate the time required and average ground speed during a letdown, under conditions specified by the pilot in command.

(44) Work with sufficient speed to determine the aircraft's position hourly by celestial means and also make all other observations and records pertinent to the navigation. The applicant should be able to take the observation, compute, and plot a celestial LOP within a time limit of 8 minutes; take and plot a Loran LOP within a time limit of 3 minutes for ground waves and 4 minutes for sky waves; observe the absolute and pressure altimeters and compute the drift or lateral displacement within a time limit of 3 minutes.

(45) Be accurate in reading instruments and making computations. Errors which are made and corrected without affecting the navigation will be disregarded unless they cause considerable loss of time.

An uncorrected error in computation (including reading instruments and books) which will affect the reported position more than 25 miles, the heading more than 3°, or any ETA more than 15 minutes will cause this item to be graded unsatisfactory.

(46) Be alert to changing weather or other conditions during flight which might affect the navigation. An applicant should not fail to take celestial observations just prior to encountering a broken or overcast sky condition; and he should not fail to take a bearing on a radio station, which operates at scheduled intervals and which would be a valuable aid to the navigation.

(47) Show a logical choice and sequence in using the various navigation methods according to time and accuracy, and check the positions determined by one method against positions determined by other methods.

(48) Use a logical sequence in performing the various duties of a navigator and plan work according to a schedule. The more important duties should not be neglected for others of less importance.

## APPENDIX B TO PART 63—FLIGHT NAVIGATOR TRAINING COURSE REQUIREMENTS

(a) *Training course outline*—(1) *Format.* The ground course outline and the flight course outline shall be combined in one looseleaf binder and shall include a table of contents, divided into two parts—ground course and flight course. Each part of the table of contents must contain a list of the major subjects, together with hours allotted to each subject and the total classroom and flight hours.

(2) *Ground course outline.* (i) It is not mandatory that a course outline have the subject headings arranged exactly as listed in this paragraph. Any arrangement of general headings and subheadings will be satisfactory provided all the subject material listed here is included and the acceptable minimum number of hours is assigned to each subject. Each general subject shall be broken down into detail showing items to be covered.

(ii) If any agency desires to include additional subjects in the ground training curriculum, such as international law, flight hygiene, or others which are not required, the hours allotted these additional subjects may not be included in the minimum classroom hours.

(iii) The following subjects with classroom hours are considered the minimum coverage for a ground training course for flight navigators:

| Subject | Classroom hours |
|---|---|
| Federal Aviation Administration | 5 |
| To include Parts 63, 91, and 121 of this chapter. | |
| Meteorology | 40 |
| To include: | |
| Basic weather principles. | |
| Temperature. | |
| Pressure. | |
| Winds. | |
| Moisture in the atmosphere. | |
| Stability. | |
| Clouds. | |
| Hazards. | |
| Air masses. | |
| Front weather. | |
| Fog. | |
| Thunderstorms. | |
| Icing. | |
| World weather and climate. | |
| Weather maps and weather reports. | |
| Forecasting. | |
| International Morse code: | |
| Ability to receive code groups of letters and numerals at a speed of eight words per minute | |
| Navigation instruments (exclusive of radio and radar) | 20 |
| To include: | |
| Compasses. | |
| Pressure altimeters. | |
| Airspeed indicators. | |
| Driftmeters. | |
| Bearing indicators. | |
| Aircraft octants. | |
| Instrument calibration and alignment. | |
| Charts and pilotage | 15 |
| To include: | |
| Chart projections. | |
| Chart symbols. | |
| Principles of pilotage. | |
| Dead reckoning | 30 |
| To include: | |
| Air plot. | |
| Ground plot. | |
| Calculation of ETA. | |
| Vector analysis. | |
| Use of computer. | |
| Search. | |
| Absolute altimeter with: | |
| Applications | 15 |
| To include: | |
| Principles of construction. | |
| Operating instructions. | |
| Use of Bellamy's formula. | |
| Flight planning with single drift correction. | |
| Radio and long-range navigational aids | 35 |

| Subject | Classroom hours |
|---|---|
| To include: | |
| Principles of radio transmission and reception. | |
| Radio aids to navigation. | |
| Government publications. | |
| Airborne D/F equipment. | |
| Errors of radio bearings. | |
| Quadrantal correction. | |
| Plotting radio bearings. | |
| ICAO Q code for direction finding. | |
| Loran. | |
| Consol. | |
| Celestial navigation | 150 |
| To include: | |
| The solar system. | |
| The celestial sphere. | |
| The astronomical triangle. | |
| Theory of lines of position. | |
| Use of the Air Almanac. | |
| Time and its applications. | |
| Navigation tables. | |
| Precomputation. | |
| Celestial line of position approach. | |
| Star identification. | |
| Corrections to celestial observations. | |
| Flight planning and cruise control | 25 |
| To include: | |
| The flight plan. | |
| Fuel consumption charts. | |
| Methods of cruise control. | |
| Flight progress chart. | |
| Point-of-no-return. | |
| Equitime point. | |
| Long-range flight problems | 15 |
| Total (exclusive of final examinations) | 350 |

(3) *Flight course outline.* (i) A minimum of 150 hours of supervised flight training shall be given, of which at least 50 hours of flight training must be given at night, and celestial navigation must be used during flights which total at least 125 hours.

(ii) A maximum of 50 hours of the required flight training may be obtained in acceptable types of synthetic flight navigator training devices.

(iii) Flights should be at least four hours in length and should be conducted off civil airways. Some training on long-range flights is desirable, but is not required. There is no limit to the number of students that may be trained on one flight, but at least one astrodrome or one periscopic sextant mounting must be provided for each group of four students.

(iv) Training must be given in dead reckoning, pilotage, radio navigation, celestial navigation, and the use of the absolute altimeter.

(b) *Equipment.* (1) Classroom equipment shall include one table at least 24″ × 32″ in dimensions for each student.

(2) Aircraft suitable for the flight training must be available to the approved course operator to insure that the flight training may be completed without undue delay.

The approved course operator may contract or obtain written agreements with aircraft operators for the use of suitable aircraft. A copy of the contract or written agreement with an aircraft operator shall be attached to each of the three copies of the course outline submitted for approval. In all cases, the approved course operator is responsible for the nature and quality of instruction given during flight.

(c) *Instructors.* (1) Sufficient classroom instructors must be available to prevent an excessive ratio of students to instructors. Any ratio in excess of 20 to 1 will be considered unsatisfactory.

(2) At least one ground instructor must hold a valid flight navigator certificate, and be utilized to coordinate instruction of ground school subjects.

(3) Each instructor who conducts flight training must hold a valid flight navigator certificate.

(d) *Revision of training course.* (1) Requests for revisions to course outlines, facilities, and equipment shall follow procedures for original approval of the course. Revisions should be submitted in such form that an entire page or pages of the approved outline can be removed and replaced by the revisions.

(2) The list of instructors may be revised at any time without request for approval, provided the minimum requirement of paragraph (e) of this section is maintained.

(e) *Credit for previous training and experience.* (1) Credit may be granted by an operator to students for previous training and experience which is provable and comparable to portions of the approved curriculum. When granting such credit, the approved course operator should be fully cognizant of the fact that he is responsible for the proficiency of his graduates in accordance with subdivision (i) of paragraph (3) of this section.

(2) Where advanced credit is allowed, the operator shall evaluate the student's previous training and experience in accordance with the normal practices of accredited technical schools. Before credit is given for any ground school subject or portion thereof, the student must pass an appropriate examination given by the operator. The results of the examination, the basis for credit allowance, and the hours credited shall be incorporated as a part of the student's records.

(3) Credit up to a maximum of 50 hours toward the flight training requirement may be given to pilots who have logged at least 500 hours while a member of a flight crew which required a certificated flight navigator or the Armed Forces equivalent. A similar credit may also be given to a licensed deck officer of the Maritime Service who has served as such for at least one year on ocean-going vessels. One-half of the flight time credited under the terms of this paragraph may be applied toward the 50 hours of flight training required at night.

(f) *Students records and reports.* Approval of a course shall not be continued in effect unless the course operator keeps an accurate record of each student, including a chronological log of all instruction, subjects covered and course examinations and grades, and unless he prepares and transmits to the local Flight Standards District Office not later than January 31 of each year, a report containing the following information for the previous calendar year:

(1) The names of all students graduated, together with their school grades for ground and flight subjects.

(2) The names of all students failed or dropped, together with their school grades and reasons for dropping.

(g) *Quality of instruction.* Approval of a course shall not be continued in effect unless at least 80 percent of the students who apply within 90 days after graduation are able to qualify on the first attempt for certification as flight navigators.

(h) *Statement of graduation.* Each student who successfully completes an approved flight navigator course shall be given a statement of graduation.

(i) *Inspections.* Approved course operations will be inspected by authorized representatives of the Administrator as often as deemed necessary to insure that instruction is maintained at the required standards, but the period between inspections shall not exceed 12 months.

(j) *Change of ownership, name, or location*—(1) *Change of ownership.* Approval of a flight navigator course shall not be continued in effect after the course has changed ownership. The new owner must obtain a new approval by following the procedure prescribed for original approval.

(2) *Change in name.* An approved course changed in name but not changed in ownership shall remain valid if the change is reported by the approved course operator to the local Flight Standards District Office. A letter of approval under the new name will be issued by the regional office.

(3) *Change in location.* An approved course shall remain in effect even though the approved course operator changes location if the change is reported without delay by the operator to the local Flight Standards District Office, which will inspect the facilities to be used. If they are found to be adequate, a letter of approval showing the new location will be issued by the regional office.

(k) *Cancellation of approval.* (1) Failure to meet or maintain any of the requirements set forth in this section for the approval or operation of an approved flight navigator course shall be considered sufficient reason for cancellation of the approval.

(2) If an operator should desire voluntary cancellation of his approved course, he should submit the effective letter of approval and a written request for cancellation to the Administrator through the local Flight Standards District Office.

(l) *Duration.* The authority to operate an approved flight navigator course shall expire 24 months after the last day of the month of issuance.

(m) *Renewal.* Application for renewal of authority to operate an approved flight navigator course may be made by letter to the local Flight Standards District Office at any time within 60 days before to the expiration date. Renewal of approval will depend upon the course operator meeting the current conditions for approval and having a satisfactory record as an operator.

[Doc. No. 1179, 27 FR 7970, Aug. 10, 1962, as amended by Amdt. 63–6, 31 FR 9211, July 6, 1966; Amdt. 63–28, 54 FR 39291, Sept. 25, 1989]

## APPENDIX C TO PART 63—FLIGHT ENGINEER TRAINING COURSE REQUIREMENTS

(a) *Training course outline*—(1) *Format.* The ground course outline and the flight course outline are independent. Each must be contained in a looseleaf binder to include a table of contents. If an applicant desires approval of both a ground school course and a flight school course, they must be combined in one looseleaf binder that includes a separate table of contents for each course. Separate course outlines are required for each type of airplane.

(2) *Ground course outline.* (i) It is not mandatory that the subject headings be arranged exactly as listed in this paragraph. Any arrangement of subjects is satisfactory if all the subject material listed here is included and at least the minimum programmed hours are assigned to each subject. Each general subject must be broken down into detail showing the items to be covered.

(ii) If any course operator desires to include additional subjects in the ground course curriculum, such as international law, flight hygiene, or others that are not required, the hours allotted these additional subjects may not be included in the minimum programmed classroom hours.

(iii) The following subjects and classroom hours are the minimum programmed coverage for the initial approval of a ground training course for flight engineers. Subsequent to initial approval of a ground training course an applicant may apply to the Administrator for a reduction in the programmed hours. Approval of a reduction in the approved programmed hours is based on improved training effectiveness due to improvements in methods, training aids, quality of instruction, or any combination thereof.

| Subject | Classroom hours |
|---|---|
| Federal Aviation Regulations | 10 |
| To include the regulations of this chapter that apply to flight engineers | |
| Theory of Flight and Aerodynamics | 10 |
| Airplane Familiarization | 90 |
| To include as appropriate: | |
| Specifications. | |
| Construction features. | |
| Flight controls. | |
| Hydraulic systems. | |
| Pneumatic systems. | |
| Electrical systems. | |
| Anti-icing and de-icing systems. | |
| Pressurization and air-conditioning systems. | |
| Vacuum systems. | |
| Pilot static systems. | |
| Instrument systems. | |
| Fuel and oil systems. | |
| Emergency equipment. | |
| Engine Familiarization | 45 |
| To include as appropriate: | |
| Specifications. | |
| Construction features. | |
| Lubrication. | |
| Ignition. | |
| Carburetor and induction, supercharging and fuel control systems | |
| Accessories. | |
| Propellers. | |
| Instrumentation. | |
| Emergency equipment. | |
| Normal Operations (Ground and Flight) | 50 |
| To include as appropriate: | |
| Servicing methods and procedures. | |
| Operation of all the airplane systems. | |
| Operation of all the engine systems. | |
| Loading and center of gravity computations. | |
| Cruise control (normal, long range, maximum endurance) | |
| Power and fuel computation. | |
| Meteorology as applicable to engine operation | |
| Emergency Operations | 80 |
| To include as appropriate: | |
| Landing gear, brakes, flaps, speed brakes, and leading edge devices | |
| Pressurization and air-conditioning. | |
| Portable fire extinguishers. | |
| Fuselage fire and smoke control. | |
| Loss of electrical power. | |
| Engine fire control. | |
| Engine shut-down and restart. | |
| Oxygen. | |
| Total (exclusive of final tests) | 235 |

The above subjects, except Theory of Flight and Aerodynamics, and Regulations must apply to the same type of airplane in which the student flight engineer is to receive flight training.

(3) Flight Course Outline. (i) The flight training curriculum must include at least 10 hours of flight instruction in an airplane specified in §63.37(a). The flight time required for the practical test may not be credited as part of the required flight instruction.

(ii) All of the flight training must be given in the same type airplane.

(iii) As appropriate to the airplane type, the following subjects must be taught in the flight training course:

SUBJECT

NORMAL DUTIES, PROCEDURES AND OPERATIONS

To include as appropriate:
Airplane preflight.
Engine starting, power checks, pretakeoff, postlanding and shut-down procedures.
Power control.
Temperature control.
Engine operation analysis.
Operation of all systems.
Fuel management.
Logbook entries.
Pressurization and air conditioning.

RECOGNITION AND CORRECTION OF IN-FLIGHT MALFUNCTIONS

To include:
Analysis of abnormal engine operation.
Analysis of abnormal operation of all systems.
Corrective action.

EMERGENCY OPERATIONS IN FLIGHT

To include as appropriate:
Engine fire control.
Fuselage fire control.
Smoke control.
Loss of power or pressure in each system.
Engine overspeed.
Fuel dumping.
Landing gear, spoilers, speed brakes, and flap extension and retraction.
Engine shut-down and restart.
Use of oxygen.

(iv) If the Administrator finds a simulator or flight engineer training device to accurately reproduce the design, function, and control characteristics, as pertaining to the duties and responsibilities of a flight engineer on the type of airplane to be flown, the flight training time may be reduced by a ratio of 1 hour of flight time to 2 hours of airplane simulator time, or 3 hours of flight engineer training device time, as the case may be, subject to the following limitations:

(*a*) Except as provided in subdivision (*b*) of this paragraph, the required flight instruction time in an airplane may not be less than 5 hours.

(*b*) As to a flight engineer student holding at least a commercial pilot certificate with an instrument rating, airplane simulator or a combination of airplane simulator and flight engineer training device time may be submitted for up to all 10 hours of the required flight instruction time in an airplane. However, not more than 15 hours of flight engineer training device time may be substituted for flight instruction time.

(v) To obtain credit for flight training time, airplane simulator time, or flight engineer training device time, the student must

occupy the flight engineer station and operate the controls.

(b) *Classroom equipment.* Classroom equipment should consist of systems and procedural training devices, satisfactory to the Administrator, that duplicate the operation of the systems of the airplane in which the student is to receive his flight training.

(c) *Contracts or agreements.* (1) An approved flight engineer course operator may contract with other persons to obtain suitable airplanes, airplane simulators, or other training devices or equipment.

(2) An operator who is approved to conduct both the flight engineer ground course and the flight engineer flight course may contract with others to conduct one course or the other in its entirety but may not contract with others to conduct both courses for the same airplane type.

(3) An operator who has approval to conduct a flight engineer ground course or flight course for a type of airplane, but not both courses, may not contract with another person to conduct that course in whole or in part.

(4) An operator who contracts with another to conduct a flight engineer course may not authorize or permit the course to be conducted in whole or in part by a third person.

(5) In all cases, the course operator who is approved to operate the course is responsible for the nature and quality of the instruction given.

(6) A copy of each contract authorized under this paragraph must be attached to each of the 3 copies of the course outline submitted for approval.

(d) *Instructors.* (1) Only certificated flight engineers may give the flight instruction required by this appendix in an airplane, simulator, or flight engineer training device.

(2) There must be a sufficient number of qualified instructors available to prevent an excess ratio of students to instructors.

(e) *Revisions.* (1) Requests for revisions of the course outlines, facilities or equipment must follow the procedures for original approval of the course. Revisions must be submitted in such form that an entire page or pages of the approved outline can be removed and replaced by the revisions.

(2) The list of instructors may be revised at any time without request for approval, if the requirements of paragraph (d) of this appendix are maintained.

(f) *Ground school credits.* (1) Credit may be granted a student in the ground school course by the course operator for comparable previous training or experience that the student can show by written evidence: however, the course operator must still meet the quality of instruction as described in paragraph (h) of this appendix.

(2) Before credit for previous training or experience may be given, the student must pass a test given by the course operator on the subject for which the credit is to be given. The course operator shall incorporate results of the test, the basis for credit allowance, and the hours credited as part of the student's records.

(g) *Records and reports.* (1) The course operator must maintain, for at least two years after a student graduates, fails, or drops from a course, a record of the student's training, including a chronological log of the subject course, attendance examinations, and grades.

(2) Except as provided in paragraph (3) of this section, the course operator must submit to the Administrator, not later than January 31 of each year, a report for the previous calendar year's training, to include:

(i) Name, enrollment and graduation date of each student;

(ii) Ground school hours and grades of each student;

(iii) Flight, airplane simulator, flight engineer training device hours, and grades of each student; and

(iv) Names of students failed or dropped, together with their school grades and reasons for dropping.

(3) Upon request, the Administrator may waive the reporting requirements of paragraph (2) of this section for an approved flight engineer course that is part of an approved training course under subpart N of part 121 of this chapter.

(h) *Quality of instruction.* (1) Approval of a ground course is discontinued whenever less than 80 percent of the students pass the FAA written test on the first attempt.

(2) Approval of a flight course is discontinued whenever less than 80 percent of the students pass the FAA practical test on the first attempt.

(3) Notwithstanding paragraphs (1) and (2) of this section, approval of a ground or flight course may be continued when the Administrator finds—

(i) That the failure rate was based on less than a representative number of students; or

(ii) That the course operator has taken satisfactory means to improve the effectiveness of the training.

(i) *Time limitation.* Each student must apply for the written test and the flight test within 90 days after completing the ground school course.

(j) *Statement of course completion.* (1) The course operator shall give to each student who successfully completes an approved flight engineer ground school training course, and passes the FAA written test, a statement of successful completion of the course that indicates the date of training, the type of airplane on which the ground course training was based, and the number of hours received in the ground school course.

(2) The course operator shall give each student who successfully completes an approved flight engineer flight course, and passed the

FAA practical test, a statement of successful completion of the flight course that indicates the dates of the training, the type of airplane used in the flight course, and the number of hours received in the flight course.

(3) A course operator who is approved to conduct both the ground course and the flight course may include both courses in a single statement of course completion if the provisions of paragraphs (1) and (2) of this section are included.

(4) The requirements of this paragraph do not apply to an air carrier or commercial operator with an approved training course under part 121 of this chapter providing the student receives a flight engineer certificate upon completion of that course.

(k) *Inspections.* Each course operator shall allow the Administrator at any time or place, to make any inspection necessary to ensure that the quality and effectiveness of the instruction are maintained at the required standards.

(l) *Change of ownership, name, or location.* (1) Approval of a flight engineer ground course or flight course is discontinued if the ownership of the course changes. The new owner must obtain a new approval by following the procedure prescribed for original approval.

(2) Approval of a flight engineer ground course or flight course does not terminate upon a change in the name of the course that is reported to the Administrator within 30 days. The Administrator issues a new letter of approval, using the new name, upon receipt of notice within that time.

(3) Approval of a flight engineer ground course or flight course does not terminate upon a change in location of the course that is reported to the Administrator within 30 days. The Administrator issues a new letter of approval, showing the new location, upon receipt of notice within that time, if he finds the new facilities to be adequate.

(m) *Cancellation of approval.* (1) Failure to meet or maintain any of the requirements of this appendix for the approval of a flight engineer ground course or flight course is reason for cancellation of the approval.

(2) If a course operator desires to voluntarily terminate the course, he should notify the Administrator in writing and return the last letter of approval.

(n) *Duration.* Except for a course operated as part of an approved training course under subpart N of part 121 of this chapter, the approval to operate a flight engineer ground course or flight course terminates 24 months after the last day of the month of issue.

(o) *Renewal.* (1) Renewal of approval to operate a flight engineer ground course or flight course is conditioned upon the course operator's meeting the requirements of this appendix.

(2) Application for renewal may be made to the Administrator at any time after 60 days before the termination date.

(p) *Course operator approvals.* An applicant for approval of a flight engineer ground course, or flight course, or both, must meet all of the requirements of this appendix concerning application, approval, and continuing approval of that course or courses.

(q) *Practical test eligibility.* An applicant for a flight engineer certificate and class rating under the provisions of §63.37(b)(6) is not eligible to take the practical test unless he has successfully completed an approved flight engineer ground school course in the same type of airplane for which he has completed an approved flight engineer flight course.

[Doc. No. 6458, 30 FR 14560, Nov. 23, 1965, as amended by Amdt. 63–15, 37 FR 9758, May 17, 1972]

# PART 65—CERTIFICATION: AIRMEN OTHER THAN FLIGHT CREWMEMBERS

SPECIAL FEDERAL AVIATION REGULATION NO. 100–2 [NOTE]

SPECIAL FEDERAL AVIATION REGULATION NO. 103

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AUTHORITY: 49 U.S.C. 106(f), 106(g). 40113, 44701–44703, 44707, 44709–44711, 45102–45103, 45301–45302.

SOURCE: Docket No. 1179, 27 FR 7973, Aug. 10, 1962, unless otherwise noted.

## SPECIAL FEDERAL AVIATION REGULATION NO. 100–2

EDITORIAL NOTE: For the text of SFAR No. 100–2, see part 61 of this chapter.

## SPECIAL FEDERAL AVIATION REGULATION NO. 103—PROCESS FOR REQUESTING WAIVER OF MANDATORY SEPARATION AGE FOR A FEDERAL AVIATION ADMINISTRATION AIR TRAFFIC CONTROL SPECIALIST IN FLIGHT SERVICE STATIONS, ENROUTE OR TERMINAL FACILITIES, AND THE DAVID J. HURLEY AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER

1. *To whom does this SFAR apply?* This Special Federal Aviation Regulation (SFAR) applies to you if you are an air traffic control specialist (ATCS) employed by the FAA in flight service stations, enroute facilities, terminal facilities, or at the David J. Hurley Air Traffic Control System Command Center who wishes to obtain a waiver of the mandatory separation age as provided by 5 U.S.C. section 8335(a).

2. *When must I file for a waiver?* No earlier than the beginning of the twelfth month before, but no later than the beginning of the sixth month before, the month in which you turn 56, your official chain-of-command must receive your written request asking for a waiver of mandatory separation.

3. *What if I do not file a request before six months before the month in which I turn 56?* If your official chain-of-command does not receive your written request for a waiver of mandatory separation before the beginning of the sixth month before the month in which you turn 56, your request will be denied.

4. *How will the FAA determine if my request meets the filing time requirements of this SFAR?*

a. We consider your request to be filed in a timely manner under this SFAR if your official chain-of-command receives it or it is postmarked:

i. After 12 a.m. on the first day of the twelfth month before the month in which you turn 56; and

ii. Before 12 a.m. of the first day of the sixth month before the month in which you turn 56.

b. If you file your request by mail and the postmark is not legible, we will consider it to comply with paragraph a.2 of this section if we receive it by 12 p.m. of the fifth day of the sixth month before the month in which you turn 56.

c. If the last day of the time period specified in paragraph a.2 or paragraph b falls on a Saturday, Sunday, or Federal holiday, we will consider the time period to end at 12 p.m. of the next business day.

5. *Where must I file my request for waiver and what must it include?*

a. You must file your request for waiver of mandatory separation in writing with the Air Traffic Manager in flight service stations, enroute facilities, terminal facilities, or the David J. Hurley Air Traffic Control System Command Center in which you are employed.

b. Your request for waiver must include all of the following:

i. Your name.

ii. Your current facility.

iii. Your starting date at the facility.

iv. A list of positions at the facility that you are certified in and how many hours it took to achieve certification at the facility.

v. Your area of specialty at the facility.

vi. Your shift schedule.

vii. [Reserved]

viii. A list of all facilities where you have worked as a certified professional controller (CPC) including facility level and dates at each facility;

ix. Evidence of your exceptional skills and experience as a controller; and

x. Your signature.

6. *How will my waiver request be reviewed?*

a. Upon receipt of your request for waiver, the Air Traffic Manager of your facility will make a written recommendation that the Administrator either approve or deny your request. If the manager recommends approval of your request, he or she will certify in writing the accuracy of the information you provided as evidence of your exceptional skills and experience as a controller.

b. The Air Traffic Manager will then forward the written recommendation with a copy of your request to the senior executive manager in the Air Traffic Manager's regional chain-of-command.

c. The senior executive manager in the regional chain-of-command will make a written recommendation that the Administrator either approve or deny your request. If the senior executive manager recommends approval of your request, he or she will certify in writing the accuracy of the information you have provided as evidence of exceptional skills and experience.

d. The senior executive manager in the regional chain-of-command will then forward his or her recommendation with a copy of your request to the appropriate Vice President at FAA Headquarters. Depending on the facility in which you are employed, the request will be forwarded to either the Vice President for Flight Services, the Vice President for Enroute and Oceanic Services, the Vice President for Terminal Services or the Vice President for Systems Operations. For example, if you work at a flight service station at the time that you request a waiver, the request will be forwarded to the Vice President for Flight Services.

e. The appropriate Vice President will review your request and make a written recommendation that the Administrator either approve or deny your request, which will be forwarded to the Administrator.

f. The Administrator will issue the final decision on your request.

7. *If I am granted a waiver, when will it expire?*

a. Waivers will be granted for a period of one year.

b. No later than 90-days prior to expiration of a waiver, you may request that the waiver be extended using the same process identified in section 6.

c. If you timely request an extension of the waiver and it is denied, you will receive a 60-day advance notice of your separation date simultaneously with notification of the denial.

d. If you do not request an extension of the waiver granted, you will receive a 60-day advance notice of your separation date.

e. Action to separate you from your covered position becomes effective on the last day of the month in which the 60-day notice expires.

8. *Under what circumstances may my waiver be terminated?*

a. The FAA/DOT may terminate your waiver under the following circumstances:

i. The needs of the FAA; or

ii. If you are identified as a primary contributor to an operational error/deviation or runway incursion.

b. If the waiver is terminated for either of the reasons identified in paragraph 1 of this section, the air traffic control specialist will receive a 60-day advance notice.

c. Action to separate you from your covered position becomes effective on the last day of the month in which the 60-day notice expires.

9. *Appeal of denial or termination of waiver request:* The denial or termination of a waiver of mandatory separation request is neither appealable nor grievable.

[Doc. No. FAA–2004–17334, 70 FR 1636, Jan. 7, 2005, as amended by Amdt. 65–55, 76 FR 12, Jan. 3, 2011]

## Subpart A—General

### § 65.1 Applicability.

This part prescribes the requirements for issuing the following certificates and associated ratings and the general operating rules for the holders of those certificates and ratings:

(a) Air-traffic control-tower operators.

(b) Aircraft dispatchers.

(c) Mechanics.

(d) Repairmen.

(e) Parachute riggers.

### § 65.3 Certification of foreign airmen other than flight crewmembers.

A person who is neither a U.S. citizen nor a resident alien is issued a certificate under subpart D of this part, outside the United States, only when the Administrator finds that the certificate is needed for the operation or continued airworthiness of a U.S.-registered civil aircraft.

[Doc. No. 65–28, 47 FR 35693, Aug. 16, 1982]

### § 65.11 Application and issue.

(a) Application for a certificate and appropriate class rating, or for an additional rating, under this part must be made on a form and in a manner prescribed by the Administrator. Each person who applies for airmen certification services to be administered outside the United States or for any certificate or rating issued under this part must show evidence that the fee prescribed in appendix A of part 187 of this chapter has been paid.

(b) Except for FAA Credential holders with tower ratings, an applicant who meets the requirements of this part is entitled to an appropriate certificate and rating.

(c) Unless authorized by the Administrator, a person whose air traffic control tower operator, mechanic, or parachute rigger certificate is suspended may not apply for any rating to be added to that certificate during the period of suspension.

(d) Unless the order of revocation provides otherwise—

(1) A person whose air traffic control tower operator, aircraft dispatcher, or parachute rigger certificate is revoked may not apply for the same kind of certificate for 1 year after the date of revocation; and

(2) A person whose mechanic or repairman certificate is revoked may not apply for either of those kinds of certificates for 1 year after the date of revocation.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–9, 31 FR 13524, Oct. 20, 1966; Amdt. 65–28, 47 FR 35693, Aug. 16, 1982; Amdt. 65–49, 72 FR 18559, Apr. 12, 2007; Amdt. 65–56, 79 FR 74611, Dec. 16, 2014]

### § 65.12 Offenses involving alcohol or drugs.

(a) A conviction for the violation of any Federal or state statute relating to the growing, processing, manufacture, sale, disposition, possession, transportation, or importation of narcotic drugs, marihuana, or depressant or stimulant drugs or substances is grounds for—

(1) Denial of an application for any certificate or rating issued under this part for a period of up to 1 year after the date of final conviction; or

(2) Suspension or revocation of any certificate or rating issued under this part.

(b) The commission of an act prohibited by § 91.19(a) of this chapter is grounds for—

(1) Denial of an application for a certificate or rating issued under this part for a period of up to 1 year after the date of that act; or

(2) Suspension or revocation of any certificate or rating issued under this part.

[Doc. No. 21956, 50 FR 15379, Apr. 17, 1985, as amended by Amdt. 65–34, 54 FR 34330, Aug. 18, 1989]

### § 65.13 Temporary certificate.

A certificate and ratings effective for a period of not more than 120 days may be issued to a qualified applicant, pending review of his application and supplementary documents and the issue of

the certificate and ratings for which he applied.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–23, 43 FR 22640, May 25, 1978]

### § 65.14 Security disqualification.

(a) *Eligibility standard.* No person is eligible to hold a certificate, rating, or authorization issued under this part when the Transportation Security Administration (TSA) has notified the FAA in writing that the person poses a security threat.

(b) *Effect of the issuance by the TSA of an Initial Notification of Threat Assessment.* (1) The FAA will hold in abeyance pending the outcome of the TSA's final threat assessment review an application for any certificate, rating, or authorization under this part by any person who has been issued an Initial Notification of Threat Assessment by the TSA.

(2) The FAA will suspend any certificate, rating, or authorization issued under this part after the TSA issues to the holder an Initial Notification of Threat Assessment.

(c) *Effect of the issuance by the TSA of a Final Notification of Threat Assessment.* (1) The FAA will deny an application for any certificate, rating, or authorization under this part to any person who has been issued a Final Notification of Threat Assessment.

(2) The FAA will revoke any certificate, rating, or authorization issued under this part after the TSA has issued to the holder a Final Notification of Threat Assessment.

[Doc. No. FAA–2003–14293, 68 FR 3775, Jan. 24, 2003]

### § 65.15 Duration of certificates.

(a) Except for repairman certificates, a certificate or rating issued under this part is effective until it is surrendered, suspended, or revoked.

(b) Unless it is sooner surrendered, suspended, or revoked, a repairman certificate is effective until the holder is relieved from the duties for which the holder was employed and certificated.

(c) The holder of a certificate issued under this part that is suspended, revoked, or no longer effective shall return it to the Administrator.

(d) Except for temporary certificates issued under § 65.13, the holder of a paper certificate issued under this part may not exercise the privileges of that certificate after March 31, 2013.

[Doc. No. 22052, 47 FR 35693, Aug. 16, 1982, as amended by Amdt. 65–51, 73 FR 10668, Feb. 28, 2008]

### § 65.16 Change of name: Replacement of lost or destroyed certificate.

(a) An application for a change of name on a certificate issued under this part must be accompanied by the applicant's current certificate and the marriage license, court order, or other document verifying the change. The documents are returned to the applicant after inspection.

(b) An application for a replacement of a lost or destroyed certificate is made by letter to the Department of Transportation, Federal Aviation Administration, Airman Certification Branch, Post Office Box 25082, Oklahoma City, OK 73125. The letter must—

(1) Contain the name in which the certificate was issued, the permanent mailing address (including zip code), social security number (if any), and date and place of birth of the certificate holder, and any available information regarding the grade, number, and date of issue of the certificate, and the ratings on it; and

(2) Be accompanied by a check or money order for $2, payable to the Federal Aviation Administration.

(c) An application for a replacement of a lost or destroyed medical certificate is made by letter to the Department of Transportation, Federal Aviation Administration, Aerospace Medical Certification Division, Post Office Box 26200, Oklahoma City, OK 73125, accompanied by a check or money order for $2.00.

(d) A person whose certificate issued under this part or medical certificate, or both, has been lost may obtain a telegram from the FAA confirming that it was issued. The telegram may be carried as a certificate for a period not to exceed 60 days pending his receiving a duplicate certificate under

paragraph (b) or (c) of this section, unless he has been notified that the certificate has been suspended or revoked. The request for such a telegram may be made by prepaid telegram, stating the date upon which a duplicate certificate was requested, or including the request for a duplicate and a money order for the necessary amount. The request for a telegraphic certificate should be sent to the office prescribed in paragraph (b) or (c) of this section, as appropriate. However, a request for both at the same time should be sent to the office prescribed in paragraph (b) of this section.

[Doc. No. 7258, 31 FR 13524, Oct. 20, 1966, as amended by Doc. No. 8084, 32 FR 5769, Apr. 11, 1967; Amdt. 65–16, 35 FR 14075, Sept. 4, 1970; Amdt. 65–17, 36 FR 2865, Feb. 11, 1971; Amdt. 65–52, 73 FR 43065, July 24, 2008]

### § 65.17 Tests: General procedure.

(a) Tests prescribed by or under this part are given at times and places, and by persons, designated by the Administrator.

(b) The minimum passing grade for each test is 70 percent.

### § 65.18 Written tests: Cheating or other unauthorized conduct.

(a) Except as authorized by the Administrator, no person may—

(1) Copy, or intentionally remove, a written test under this part;

(2) Give to another, or receive from another, any part or copy of that test;

(3) Give help on that test to, or receive help on that test from, any person during the period that test is being given;

(4) Take any part of that test in behalf of another person;

(5) Use any material or aid during the period that test is being given; or

(6) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) No person who commits an act prohibited by paragraph (a) of this section is eligible for any airman or ground instructor certificate or rating under this chapter for a period of 1 year after the date of that act. In addition, the commission of that act is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

[Doc. No. 4086, 30 FR 2196, Feb. 18, 1965]

### § 65.19 Retesting after failure.

An applicant for a written, oral, or practical test for a certificate and rating, or for an additional rating under this part, may apply for retesting—

(a) After 30 days after the date the applicant failed the test; or

(b) Before the 30 days have expired if the applicant presents a signed statement from an airman holding the certificate and rating sought by the applicant, certifying that the airman has given the applicant additional instruction in each of the subjects failed and that the airman considers the applicant ready for retesting.

[Doc. No. 16383, 43 FR 22640, May 25, 1978]

### § 65.20 Applications, certificates, logbooks, reports, and records: Falsification, reproduction, or alteration.

(a) No person may make or cause to be made—

(1) Any fraudulent or intentionally false statement on any application for a certificate or rating under this part;

(2) Any fraudulent or intentionally false entry in any logbook, record, or report that is required to be kept, made, or used, to show compliance with any requirement for any certificate or rating under this part;

(3) Any reproduction, for fraudulent purpose, of any certificate or rating under this part; or

(4) Any alteration of any certificate or rating under this part.

(b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

[Doc. No. 4086, 30 FR 2196, Feb. 18, 1965]

### § 65.21 Change of address.

Within 30 days after any change in his permanent mailing address, the holder of a certificate issued under this part shall notify the Department of Transportation, Federal Aviation Administration, Airman Certification

Branch, Post Office Box 25082, Oklahoma City, OK 73125, in writing, of his new address.

[Doc. No. 10536, 35 FR 14075, Sept. 4, 1970]

**§ 65.23 [Reserved]**

## Subpart B—Air Traffic Control Tower Operators

SOURCE: Docket No. 10193, 35 FR 12326, Aug. 1, 1970, unless otherwise noted.

**§ 65.31 Required credentials, certificates, and ratings or qualifications.**

No person may act as an air traffic control tower operator at an air traffic control tower in connection with civil aircraft unless he or she—

(a) Holds an FAA Credential with a tower rating or an air traffic control tower operator certificate issued under this subpart;

(b) Holds a facility rating for that control tower issued under this subpart, or has qualified for the operating position at which he or she acts and is under the supervision of the holder of a facility rating for that control tower; and

(c) Except for a person employed by the FAA or employed by, or on active duty with, the Department of the Air Force, Army, or Navy or the Coast Guard, holds at least a second-class medical certificate issued under part 67 of this chapter.

[Doc. No. 10193, 35 FR 12326, Aug. 1, 1970, as amended by Amdt. 65–25, 45 FR 18911, Mar. 24, 1980; Amdt. 65–31, 52 FR 17518, May 8, 1987; Amdt. 65–56, 79 FR 74611, Dec. 16, 2014]

**§ 65.33 Eligibility requirements: General.**

To be eligible for an air traffic control tower operator certificate a person must—

(a) Be at least 18 years of age;

(b) Be of good moral character;

(c) Be able to read, write, and understand the English language and speak it without accent or impediment of speech that would interfere with two-way radio conversation;

(d) Except for a person employed by the FAA or employed by, or on active duty with, the Department of the Air Force, Army, or Navy or the Coast Guard, hold at least a second-class medical certificate issued under part 67 of this chapter within the 12 months before the date application is made; and

(e) Comply with § 65.35.

[Doc. No. 10193, 35 FR 12326, Aug. 1, 1970, as amended by Amdt. 65–25, 45 FR 18911, Mar. 24, 1980; Amdt. 65–31, 52 FR 17518, May 8, 1987]

**§ 65.35 Knowledge requirements.**

Each applicant for an air traffic control tower operator certificate must pass a written test on—

(a) The flight rules in part 91 of this chapter:

(b) Airport traffic control procedures, and this subpart:

(c) En route traffic control procedures;

(d) Communications operating procedures;

(e) Flight assistance service;

(f) Air navigation, and aids to air navigation; and

(g) Aviation weather.

**§ 65.37 Skill requirements: Operating positions.**

No person may act as an air traffic control tower operator at any operating position unless he has passed a practical test on—

(a) Control tower equipment and its use;

(b) Weather reporting procedures and use of reports;

(c) Notices to Airmen, and use of the Airman's Information Manual;

(d) Use of operational forms;

(e) Performance of noncontrol operational duties; and

(f) Each of the following procedures that is applicable to that operating position and is required by the person performing the examination:

(1) The airport, including rules, equipment, runways, taxiways, and obstructions.

(2) The terrain features, visual checkpoints, and obstructions within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for the airport.

(3) Traffic patterns and associated procedures for use of preferential runways and noise abatement.

(4) Operational agreements.

(5) The center, alternate airports, and those airways, routes, reporting points, and air navigation aids used for terminal air traffic control.

(6) Search and rescue procedures.

(7) Terminal air traffic control procedures and phraseology.

(8) Holding procedures, prescribed instrument approach, and departure procedures.

(9) Radar alignment and technical operation.

(10) The application of the prescribed radar and nonradar separation standard, as appropriate.

[Doc. No. 10193, 35 FR 12326, Aug. 1, 1991, as amended by Amdt. 65–36, 56 FR 65653, Dec. 17, 1991]

### § 65.39 Practical experience requirements: Facility rating.

Each applicant for a facility rating at any air traffic control tower must have satisfactorily served—

(a) As an air traffic control tower operator at that control tower without a facility rating for at least 6 months; or

(b) As an air traffic control tower operator with a facility rating at a different control tower for at least 6 months before the date he applies for the rating.

However, an applicant who is a member of an Armed Force of the United States meets the requirements of this section if he has satisfactorily served as an air traffic control tower operator for at least 6 months.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–19, 36 FR 21280, Nov. 5, 1971]

### § 65.41 Skill requirements: Facility ratings.

Each applicant for a facility rating at an air traffic control tower must have passed a practical test on each item listed in § 65.37 of this part that is applicable to each operating position at the control tower at which the rating is sought.

### § 65.43 [Reserved]

### § 65.45 Performance of duties.

(a) An air traffic control tower operator shall perform his duties in accordance with the limitations on his certificate and the procedures and practices prescribed in air traffic control manuals of the FAA, to provide for the safe, orderly, and expeditious flow of air traffic.

(b) An operator with a facility rating may control traffic at any operating position at the control tower at which he holds a facility rating. However, he may not issue an air traffic clearance for IFR flight without authorization from the appropriate facility exercising IFR control at that location.

(c) An operator who does not hold a facility rating for a particular control tower may act at each operating position for which he has qualified, under the supervision of an operator holding a facility rating for that control tower.

[Doc. No. 10193, 35 FR 12326, Aug. 1, 1970, as amended by Amdt. 65–16, 35 FR 14075, Sept. 4, 1970]

### §§ 65.46–65.46b [Reserved]

### § 65.47 Maximum hours.

Except in an emergency, a certificated air traffic control tower operator must be relieved of all duties for at least 24 consecutive hours at least once during each 7 consecutive days. Such an operator may not serve or be required to serve—

(a) For more than 10 consecutive hours; or

(b) For more than 10 hours during a period of 24 consecutive hours, unless he has had a rest period of at least 8 hours at or before the end of the 10 hours of duty.

### § 65.49 General operating rules.

(a) Except for a person employed by the FAA or employed by, or on active duty with, the Department of the Air Force, Army, or Navy, or the Coast Guard, no person may act as an air traffic control tower operator under a certificate issued to him or her under this part unless he or she has in his or her personal possession an appropriate current medical certificate issued under part 67 of this chapter.

(b) Each person holding an air traffic control tower operator certificate shall keep it readily available when performing duties in an air traffic control tower, and shall present that certificate or his medical certificate or both for inspection upon the request of the

Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

(c) A certificated air traffic control tower operator who does not hold a facility rating for a particular control tower may not act at any operating position at the control tower concerned unless there is maintained at that control tower, readily available to persons named in paragraph (b) of this section, a current record of the operating positions at which he has qualified.

(d) An air traffic control tower operator may not perform duties under his certificate during any period of known physical deficiency that would make him unable to meet the physical requirements for his current medical certificate. However, if the deficiency is temporary, he may perform duties that are not affected by it whenever another certificated and qualified operator is present and on duty.

(e) A certificated air traffic control tower operator may not control air traffic with equipment that the Administrator has found to be inadequate.

(f) The holder of an air traffic control tower operator certificate, or an applicant for one, shall, upon the reasonable request of the Administrator, cooperate fully in any test that is made of him.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–31, 52 FR 17519, May 8, 1987]

### § 65.50 Currency requirements.

The holder of an air traffic control tower operator certificate may not perform any duties under that certificate unless—

(a) He has served for at least three of the preceding 6 months as an air traffic control tower operator at the control tower to which his facility rating applies, or at the operating positions for which he has qualified; or

(b) He has shown that he meets the requirements for his certificate and facility rating at the control tower concerned, or for operating at positions for which he has previously qualified.

## Subpart C—Aircraft Dispatchers

SOURCE: Docket No. FAA–1998–4553, 64 FR 68923, Dec. 8, 1999, unless otherwise noted.

### § 65.51 Certificate required.

(a) No person may act as an aircraft dispatcher (exercising responsibility with the pilot in command in the operational control of a flight) in connection with any civil aircraft in air commerce unless that person has in his or her personal possession an aircraft dispatcher certificate issued under this subpart.

(b) Each person who holds an aircraft dispatcher certificate must present it for inspection upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

### § 65.53 Eligibility requirements: General.

(a) To be eligible to take the aircraft dispatcher knowledge test, a person must be at least 21 years of age.

(b) To be eligible for an aircraft dispatcher certificate, a person must—

(1) Be at least 23 years of age;

(2) Be able to read, speak, write, and understand the English language;

(3) Pass the required knowledge test prescribed by § 65.55 of this part;

(4) Pass the required practical test prescribed by § 65.59 of this part; and

(5) Comply with the requirements of § 65.57 of this part.

### § 65.55 Knowledge requirements.

(a) A person who applies for an aircraft dispatcher certificate must pass a knowledge test on the following aeronautical knowledge areas:

(1) Applicable Federal Aviation Regulations of this chapter that relate to airline transport pilot privileges, limitations, and flight operations;

(2) Meteorology, including knowledge of and effects of fronts, frontal characteristics, cloud formations, icing, and upper-air data;

(3) General system of weather and NOTAM collection, dissemination, interpretation, and use;

(4) Interpretation and use of weather charts, maps, forecasts, sequence reports, abbreviations, and symbols;

(5) National Weather Service functions as they pertain to operations in the National Airspace System;

(6) Windshear and microburst awareness, identification, and avoidance;

(7) Principles of air navigation under instrument meteorological conditions in the National Airspace System;

(8) Air traffic control procedures and pilot responsibilities as they relate to enroute operations, terminal area and radar operations, and instrument departure and approach procedures;

(9) Aircraft loading, weight and balance, use of charts, graphs, tables, formulas, and computations, and their effect on aircraft performance;

(10) Aerodynamics relating to an aircraft's flight characteristics and performance in normal and abnormal flight regimes;

(11) Human factors;

(12) Aeronautical decision making and judgment; and

(13) Crew resource management, including crew communication and coordination.

(b) The applicant must present documentary evidence satisfactory to the administrator of having passed an aircraft dispatcher knowledge test within the preceding 24 calendar months.

### § 65.57 Experience or training requirements.

An applicant for an aircraft dispatcher certificate must present documentary evidence satisfactory to the Administrator that he or she has the experience prescribed in paragraph (a) of this section or has accomplished the training described in paragraph (b) of this section as follows:

(a) A total of at least 2 years experience in the 3 years before the date of application, in any one or in any combination of the following areas:

(1) In military aircraft operations as a—

(i) Pilot;

(ii) Flight navigator; or

(iii) Meteorologist.

(2) In aircraft operations conducted under part 121 of this chapter as—

(i) An assistant in dispatching air carrier aircraft, under the direct supervision of a dispatcher certificated under this subpart;

(ii) A pilot;

(iii) A flight engineer; or

(iv) A meteorologist.

(3) In aircraft operations as—

(i) An Air Traffic Controller; or

(ii) A Flight Service Specialist.

(4) In aircraft operations, performing other duties that the Administrator finds provide equivalent experience.

(b) A statement of graduation issued or revalidated in accordance with § 65.70(b) of this part, showing that the person has successfully completed an approved aircraft dispatcher course.

### § 65.59 Skill requirements.

An applicant for an aircraft dispatcher certificate must pass a practical test given by the Administrator, with respect to any one type of large aircraft used in air carrier operations. The practical test must be based on the aircraft dispatcher practical test standards, as published by the FAA, on the items outlined in appendix A of this part.

### § 65.61 Aircraft dispatcher certification courses: Content and minimum hours.

(a) An approved aircraft dispatcher certification course must:

(1) Provide instruction in the areas of knowledge and topics listed in appendix A of this part;

(2) Include a minimum of 200 hours of instruction.

(b) An applicant for approval of an aircraft dispatcher course must submit an outline that describes the major topics and subtopics to be covered and the number of hours proposed for each.

(c) Additional subject headings for an aircraft dispatcher certification course may also be included, however the hours proposed for any subjects not listed in appendix A of this part must be in addition to the minimum 200 course hours required in paragraph (a) of this section.

(d) For the purpose of completing an approved course, a student may substitute previous experience or training for a portion of the minimum 200 hours of training. The course operator determines the number of hours of credit based on an evaluation of the experience or training to determine if it is comparable to portions of the approved course curriculum. The credit allowed,

including the total hours and the basis for it, must be placed in the student's record required by § 65.70(a) of this part.

### § 65.63 Aircraft dispatcher certification courses: Application, duration, and other general requirements.

(a) *Application.* Application for original approval of an aircraft dispatcher certification course or the renewal of approval of an aircraft dispatcher certification course under this part must be:

(1) Made in writing to the Administrator;

(2) Accompanied by two copies of the course outline required under § 65.61(b) of this part, for which approval is sought;

(3) Accompanied by a description of the equipment and facilities to be used; and

(4) Accompanied by a list of the instructors and their qualifications.

(b) *Duration.* Unless withdrawn or canceled, an approval of an aircraft dispatcher certification course of study expires:

(1) On the last day of the 24th month from the month the approval was issued; or

(2) Except as provided in paragraph (f) of this section, on the date that any change in ownership of the school occurs.

(c) *Renewal.* Application for renewal of an approved aircraft dispatcher certification course must be made within 30 days preceding the month the approval expires, provided the course operator meets the following requirements:

(1) At least 80 percent of the graduates from that aircraft dispatcher certification course, who applied for the practical test required by § 65.59 of this part, passed the practical test on their first attempt; and

(2) The aircraft dispatcher certification course continues to meet the requirements of this subpart for course approval.

(d) *Course revisions.* Requests for approval of a revision of the course outline, facilities, or equipment must be in accordance with paragraph (a) of this section. Proposed revisions of the course outline or the description of facilities and equipment must be submitted in a format that will allow an entire page or pages of the approved outline or description to be removed and replaced by any approved revision. The list of instructors may be revised at any time without request for approval, provided the minimum requirements of § 65.67 of this part are maintained and the Administrator is notified in writing.

(e) *Withdrawal or cancellation of approval.* Failure to continue to meet the requirements of this subpart for the approval or operation of an approved aircraft dispatcher certification course is grounds for withdrawal of approval of the course. A course operator may request cancellation of course approval by a letter to the Administrator. The operator must forward any records to the FAA as requested by the Administrator.

(f) *Change in ownership.* A change in ownership of a part 65, appendix A-approved course does not terminate that aircraft dispatcher certification course approval if, within 10 days after the date that any change in ownership of the school occurs:

(1) Application is made for an appropriate amendment to the approval; and

(2) No change in the facilities, personnel, or approved aircraft dispatcher certification course is involved.

(g) *Change in name or location.* A change in name or location of an approved aircraft dispatcher certification course does not invalidate the approval if, within 10 days after the date that any change in name or location occurs, the course operator of the part 65, appendix A-approved course notifies the Administrator, in writing, of the change.

### § 65.65 Aircraft dispatcher certification courses: Training facilities.

An applicant for approval of authority to operate an aircraft dispatcher course of study must have facilities, equipment, and materials adequate to provide each student the theoretical and practical aspects of aircraft dispatching. Each room, training booth, or other space used for instructional purposes must be temperature controlled, lighted, and ventilated to conform to local building, sanitation, and

health codes. In addition, the training facility must be so located that the students in that facility are not distracted by the instruction conducted in other rooms.

### § 65.67 Aircraft dispatcher certification courses: Personnel.

(a) Each applicant for an aircraft dispatcher certification course must meet the following personnel requirements:

(1) Each applicant must have adequate personnel, including one instructor who holds an aircraft dispatcher certificate and is available to coordinate all training course instruction.

(2) Each applicant must not exceed a ratio of 25 students for one instructor.

(b) The instructor who teaches the practical dispatch applications area of the appendix A course must hold an aircraft dispatchers certificate

### § 65.70 Aircraft dispatcher certification courses: Records.

(a) The operator of an aircraft dispatcher course must maintain a record for each student, including a chronological log of all instructors, subjects covered, and course examinations and results. The record must be retained for at least 3 years after graduation. The course operator also must prepare, for its records, and transmit to the Administrator not later than January 31 of each year, a report containing the following information for the previous year:

(1) The names of all students who graduated, together with the results of their aircraft dispatcher certification courses.

(2) The names of all the students who failed or withdrew, together with the results of their aircraft dispatcher certification courses or the reasons for their withdrawal.

(b) Each student who successfully completes the approved aircraft dispatcher certification course must be given a written statement of graduation, which is valid for 90 days. After 90 days, the course operator may revalidate the graduation certificate for an additional 90 days if the course operator determines that the student remains proficient in the subject areas listed in appendix A of this part.

## Subpart D—Mechanics

### § 65.71 Eligibility requirements: General.

(a) To be eligible for a mechanic certificate and associated ratings, a person must—

(1) Be at least 18 years of age;

(2) Be able to read, write, speak, and understand the English language, or in the case of an applicant who does not meet this requirement and who is employed outside of the United States by a U.S. air carrier, have his certificate endorsed ''Valid only outside the United States'';

(3) Have passed all of the prescribed tests within a period of 24 months; and

(4) Comply with the sections of this subpart that apply to the rating he seeks.

(b) A certificated mechanic who applies for an additional rating must meet the requirements of § 65.77 and, within a period of 24 months, pass the tests prescribed by §§ 65.75 and 65.79 for the additional rating sought.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–6, 31 FR 5950, Apr. 19, 1966]

### § 65.73 Ratings.

(a) The following ratings are issued under this subpart:

(1) Airframe.

(2) Powerplant.

(b) A mechanic certificate with an aircraft or aircraft engine rating, or both, that was issued before, and was valid on, June 15, 1952, is equal to a mechanic certificate with an airframe or powerplant rating, or both, as the case may be, and may be exchanged for such a corresponding certificate and rating or ratings.

### § 65.75 Knowledge requirements.

(a) Each applicant for a mechanic certificate or rating must, after meeting the applicable experience requirements of § 65.77, pass a written test covering the construction and maintenance of aircraft appropriate to the rating he seeks, the regulations in this subpart, and the applicable provisions of parts 43 and 91 of this chapter. The basic principles covering the installation and maintenance of propellers are included in the powerplant test.

(b) The applicant must pass each section of the test before applying for the oral and practical tests prescribed by § 65.79. A report of the written test is sent to the applicant.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–1, 27 FR 10410, Oct. 25, 1962; Amdt. 65–6, 31 FR 5950, Apr. 19, 1966]

### § 65.77 Experience requirements.

Each applicant for a mechanic certificate or rating must present either an appropriate graduation certificate or certificate of completion from a certificated aviation maintenance technician school or documentary evidence, satisfactory to the Administrator, of—

(a) At least 18 months of practical experience with the procedures, practices, materials, tools, machine tools, and equipment generally used in constructing, maintaining, or altering airframes, or powerplants appropriate to the rating sought; or

(b) At least 30 months of practical experience concurrently performing the duties appropriate to both the airframe and powerplant ratings.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–14, 35 FR 5533, Apr. 3, 1970]

### § 65.79 Skill requirements.

Each applicant for a mechanic certificate or rating must pass an oral and a practical test on the rating he seeks. The tests cover the applicant's basic skill in performing practical projects on the subjects covered by the written test for that rating. An applicant for a powerplant rating must show his ability to make satisfactory minor repairs to, and minor alterations of, propellers.

### § 65.80 Certificated aviation maintenance technician school students.

Whenever an aviation maintenance technician school certificated under part 147 of this chapter shows to an FAA inspector that any of its students has made satisfactory progress at the school and is prepared to take the oral and practical tests prescribed by § 65.79, that student may take those tests during the final subjects of his training in the approved curriculum, before he meets the applicable experience requirements of § 65.77 and before he passes each section of the written test prescribed by § 65.75.

[Doc. No. 9444, 35 FR 5533, Apr. 3, 1970]

### § 65.81 General privileges and limitations.

(a) A certificated mechanic may perform or supervise the maintenance, preventive maintenance or alteration of an aircraft or appliance, or a part thereof, for which he is rated (but excluding major repairs to, and major alterations of, propellers, and any repair to, or alteration of, instruments), and may perform additional duties in accordance with §§ 65.85, 65.87, and 65.95. However, he may not supervise the maintenance, preventive maintenance, or alteration of, or approve and return to service, any aircraft or appliance, or part thereof, for which he is rated unless he has satisfactorily performed the work concerned at an earlier date. If he has not so performed that work at an earlier date, he may show his ability to do it by performing it to the satisfaction of the Administrator or under the direct supervision of a certificated and appropriately rated mechanic, or a certificated repairman, who has had previous experience in the specific operation concerned.

(b) A certificated mechanic may not exercise the privileges of his certificate and rating unless he understands the current instructions of the manufacturer, and the maintenance manuals, for the specific operation concerned.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–2, 29 FR 5451, Apr. 23, 1964; Amdt. 65–26, 45 FR 46737, July 10, 1980]

### § 65.83 Recent experience requirements.

A certificated mechanic may not exercise the privileges of his certificate and rating unless, within the preceding 24 months—

(a) The Administrator has found that he is able to do that work; or

(b) He has, for at least 6 months—

(1) Served as a mechanic under his certificate and rating;

(2) Technically supervised other mechanics;

(3) Supervised, in an executive capacity, the maintenance or alteration of aircraft; or

(4) Been engaged in any combination of paragraph (b) (1), (2), or (3) of this section.

### § 65.85 Airframe rating; additional privileges.

(a) Except as provided in paragraph (b) of this section, a certificated mechanic with an airframe rating may approve and return to service an airframe, or any related part or appliance, after he has performed, supervised, or inspected its maintenance or alteration (excluding major repairs and major alterations). In addition, he may perform the 100-hour inspection required by part 91 of this chapter on an airframe, or any related part or appliance, and approve and return it to service.

(b) A certificated mechanic with an airframe rating can approve and return to service an airframe, or any related part or appliance, of an aircraft with a special airworthiness certificate in the light-sport category after performing and inspecting a major repair or major alteration for products that are not produced under an FAA approval provided the work was performed in accordance with instructions developed by the manufacturer or a person acceptable to the FAA.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–10, 32 FR 5770, Apr. 11, 1967; Amdt. 65–45, 69 FR 44879, July 27, 2004]

### § 65.87 Powerplant rating; additional privileges.

(a) Except as provided in paragraph (b) of this section, a certificated mechanic with a powerplant rating may approve and return to service a powerplant or propeller or any related part or appliance, after he has performed, supervised, or inspected its maintenance or alteration (excluding major repairs and major alterations). In addition, he may perform the 100-hour inspection required by part 91 of this chapter on a powerplant or propeller, or any part thereof, and approve and return it to service.

(b) A certificated mechanic with a powerplant rating can approve and return to service a powerplant or propeller, or any related part or appliance, of an aircraft with a special airworthiness certificate in the light-sport category after performing and inspecting a major repair or major alteration for products that are not produced under an FAA approval, provided the work was performed in accordance with instructions developed by the manufacturer or a person acceptable to the FAA.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–10, 32 FR 5770, Apr. 11, 1967; Amdt. 65–45, 69 FR 44879, July 27, 2004]

### § 65.89 Display of certificate.

Each person who holds a mechanic certificate shall keep it within the immediate area where he normally exercises the privileges of the certificate and shall present it for inspection upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

[Doc. No. 7258, 31 FR 13524, Oct. 20, 1966, as amended by Doc. No. 8084, 32 FR 5769, Apr. 11, 1967]

### § 65.91 Inspection authorization.

(a) An application for an inspection authorization is made on a form and in a manner prescribed by the Administrator.

(b) An applicant who meets the requirements of this section is entitled to an inspection authorization.

(c) To be eligible for an inspection authorization, an applicant must—

(1) Hold a currently effective mechanic certificate with both an airframe rating and a powerplant rating, each of which is currently effective and has been in effect for a total of at least 3 years;

(2) Have been actively engaged, for at least the 2-year period before the date he applies, in maintaining aircraft certificated and maintained in accordance with this chapter;

(3) Have a fixed base of operations at which he may be located in person or by telephone during a normal working week but it need not be the place where he will exercise his inspection authority;

(4) Have available to him the equipment, facilities, and inspection data necessary to properly inspect airframes, powerplants, propellers, or any related part or appliance; and

(5) Pass a written test on his ability to inspect according to safety standards for returning aircraft to service after major repairs and major alterations and annual and progressive inspections performed under part 43 of this chapter.

An applicant who fails the test prescribed in paragraph (c)(5) of this section may not apply for retesting until at least 90 days after the date he failed the test.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–5, 31 FR 3337, Mar. 3, 1966; Amdt. 65–22, 42 FR 46279, Sept. 15, 1977; Amdt. 65–30, 50 FR 15700, Apr. 19, 1985]

### § 65.92 Inspection authorization: Duration.

(a) Each inspection authorization expires on March 31 of each odd-numbered year. However, the holder may exercise the privileges of that authorization only while he holds a currently effective mechanic certificate with both a currently effective airframe rating and a currently effective powerplant rating.

(b) An inspection authorization ceases to be effective whenever any of the following occurs:

(1) The authorization is surrendered, suspended, or revoked.

(2) The holder no longer has a fixed base of operation.

(3) The holder no longer has the equipment, facilities, and inspection data required by § 65.91(c) (3) and (4) for issuance of his authorization.

(c) The holder of an inspection authorization that is suspended or revoked shall, upon the Administrator's request, return it to the Administrator.

[Doc. No. 12537, 42 FR 46279, Sept. 15, 1977, as amended by Amdt. 65–50, 72 FR 4404, Jan. 30, 2007]

### § 65.93 Inspection authorization: Renewal.

(a) To be eligible for renewal of an inspection authorization for a 2-year period an applicant must present evidence during the month of March of each odd-numbered year, at an FAA Flight Standards District Office or an International Field Office, that the applicant still meets the requirements of § 65.91(c) (1) through (4). In addition, during the time the applicant held the inspection authorization, the applicant must show completion of one of the activities in § 65.93(a) (1) through (5) below by March 31 of the first year of the 2-year inspection authorization period, and completion of one of the five activities during the second year of the 2-year period:

(1) Performed at least one annual inspection for each 90 days that the applicant held the current authority; or

(2) Performed at least two major repairs or major alterations for each 90 days that the applicant held the current authority; or

(3) Performed or supervised and approved at least one progressive inspection in accordance with standards prescribed by the Administrator; or

(4) Attended and successfully completed a refresher course, acceptable to the Administrator, of not less than 8 hours of instruction; or

(5) Passed an oral test by an FAA inspector to determine that the applicant's knowledge of applicable regulations and standards is current.

(b) The holder of an inspection authorization that has been in effect:

(1) for less than 90 days before the expiration date need not comply with paragraphs (a)(1) through (5) of this section.

(2) for less than 90 days before March 31 of an even-numbered year need not comply with paragraphs (a)(1) through (5) of this section for the first year of the 2-year inspection authorization period.

(c) An inspection authorization holder who does not complete one of the activities set forth in § 65.93(a) (1) through (5) of this section by March 31 of the first year of the 2-year inspection authorization period may not exercise inspection authorization privileges after March 31 of the first year. The inspection authorization holder may resume exercising inspection authorization privileges after passing an oral test from an FAA inspector to determine that the applicant's knowledge of the applicable regulations and standards is current. An inspection authorization holder who passes this oral test

is deemed to have completed the requirements of § 65.93(a) (1) through (5) by March 31 of the first year.

[Doc. No. FAA–2007–27108, 72 FR 4404, Jan. 30, 2007]

### § 65.95 Inspection authorization: Privileges and limitations.

(a) The holder of an inspection authorization may—

(1) Inspect and approve for return to service any aircraft or related part or appliance (except any aircraft maintained in accordance with a continuous airworthiness program under part 121 of this chapter) after a major repair or major alteration to it in accordance with part 43 [New] of this chapter, if the work was done in accordance with technical data approved by the Administrator; and

(2) Perform an annual, or perform or supervise a progressive inspection according to §§ 43.13 and 43.15 of this chapter.

(b) When he exercises the privileges of an inspection authorization the holder shall keep it available for inspection by the aircraft owner, the mechanic submitting the aircraft, repair, or alteration for approval (if any), and shall present it upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

(c) If the holder of an inspection authorization changes his fixed base of operation, he may not exercise the privileges of the authorization until he has notified the FAA Flight Standards District Office or International Field Office for the area in which the new base is located, in writing, of the change.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–2, 29 FR 5451, Apr. 23, 1964; Amdt. 65–4, 30 FR 3638, Mar. 14, 1965; Amdt. 65–5, 31 FR 3337, Mar. 3, 1966; Amdt. 65–9, 31 FR 13524, Oct. 20, 1966; 32 FR 5769, Apr. 11, 1967; Amdt. 65–35, 54 FR 39292, Sept. 25, 1989; Amdt. 65–41, 66 FR 21066, Apr. 27, 2001]

## Subpart E—Repairmen

### § 65.101 Eligibility requirements: General.

(a) To be eligible for a repairman certificate a person must—

(1) Be at least 18 years of age;

(2) Be specially qualified to perform maintenance on aircraft or components thereof, appropriate to the job for which he is employed;

(3) Be employed for a specific job requiring those special qualifications by a certificated repair station, or by a certificated commercial operator or certificated air carrier, that is required by its operating certificate or approved operations specifications to provide a continuous airworthiness maintenance program according to its maintenance manuals;

(4) Be recommended for certification by his employer, to the satisfaction of the Administrator, as able to satisfactorily maintain aircraft or components, appropriate to the job for which he is employed;

(5) Have either—

(i) At least 18 months of practical experience in the procedures, practices, inspection methods, materials, tools, machine tools, and equipment generally used in the maintenance duties of the specific job for which the person is to be employed and certificated; or

(ii) Completed formal training that is acceptable to the Administrator and is specifically designed to qualify the applicant for the job on which the applicant is to be employed; and

(6) Be able to read, write, speak, and understand the English language, or, in the case of an applicant who does not meet this requirement and who is employed outside the United States by a certificated repair station, a certificated U.S. commercial operator, or a certificated U.S. air carrier, described in paragraph (a)(3) of this section, have this certificate endorsed ''Valid only outside the United States.''

(b) This section does not apply to the issuance of a repairman certificate (experimental aircraft builder) under § 65.104 or to a repairman certificate (light-sport aircraft) under § 65.107.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–11, 32 FR 13506, Sept. 27, 1967; Amdt. 65–24, 44 FR 46781, Aug. 9, 1979; Amdt. 65–27, 47 FR 13316, Mar. 29, 1982; Amdt. 65–45, 69 FR 44879, July 27, 2004; 72 FR 7739, Feb. 20, 2007]

### § 65.103 Repairman certificate: Privileges and limitations.

(a) A certificated repairman may perform or supervise the maintenance, preventive maintenance, or alteration of aircraft or aircraft components appropriate to the job for which the repairman was employed and certificated, but only in connection with duties for the certificate holder by whom the repairman was employed and recommended.

(b) A certificated repairman may not perform or supervise duties under the repairman certificate unless the repairman understands the current instructions of the certificate holder by whom the repairman is employed and the manufacturer's instructions for continued airworthiness relating to the specific operations concerned.

(c) This section does not apply to the holder of a repairman certificate (light-sport aircraft) while that repairman is performing work under that certificate.

[Doc. No. 18241, 45 FR 46738, July 10, 1980, as amended by Amdt. 65–45, 69 FR 44879, July 27, 2004]

### § 65.104 Repairman certificate—experimental aircraft builder—Eligibility, privileges and limitations.

(a) To be eligible for a repairman certificate (experimental aircraft builder), an individual must—

(1) Be at least 18 years of age;

(2) Be the primary builder of the aircraft to which the privileges of the certificate are applicable;

(3) Show to the satisfaction of the Administrator that the individual has the requisite skill to determine whether the aircraft is in a condition for safe operations; and

(4) Be a citizen of the United States or an individual citizen of a foreign country who has lawfully been admitted for permanent residence in the United States.

(b) The holder of a repairman certificate (experimental aircraft builder) may perform condition inspections on the aircraft constructed by the holder in accordance with the operating limitations of that aircraft.

(c) Section 65.103 does not apply to the holder of a repairman certificate (experimental aircraft builder) while performing under that certificate.

[Doc. No. 18739, 44 FR 46781, Aug. 9, 1979]

### § 65.105 Display of certificate.

Each person who holds a repairman certificate shall keep it within the immediate area where he normally exercises the privileges of the certificate and shall present it for inspection upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

[Doc. No. 7258, 31 FR 13524, Oct. 20, 1966, as amended by Doc. No. 8084, 32 FR 5769, Apr. 11, 1967]

### § 65.107 Repairman certificate (light-sport aircraft): Eligibility, privileges, and limits.

(a) Use the following table to determine your eligibility for a repairman certificate (light-sport aircraft) and appropriate rating:

| To be eligible for | You must |
|---|---|
| (1) A repairman certificate (light-sport aircraft). | (i) Be at least 18 years old,<br>(ii) Be able to read, speak, write, and understand English. If for medical reasons you cannot meet one of these requirements, the FAA may place limits on your repairman certificate necessary to safely perform the actions authorized by the certificate and rating,<br>(iii) Demonstrate the requisite skill to determine whether a light-sport aircraft is in a condition for safe operation, and<br>(iv) Be a citizen of the United States, or a citizen of a foreign country who has been lawfully admitted for permanent residence in the United States. |
| (2) A repairman certificate (light-sport aircraft) with an inspection rating. | (i) Meet the requirements of paragraph (a)(1) of this section, and<br>(ii) Complete a 16-hour training course acceptable to the FAA on inspecting the particular class of experimental light-sport aircraft for which you intend to exercise the privileges of this rating. |
| (3) A repairman certificate (light-sport aircraft) with a maintenance rating | (i) Meet the requirements of paragraph (a)(1) of this section, and |

| To be eligible for | You must |
|---|---|
| | (ii) Complete a training course acceptable to the FAA on maintaining the particular class of light-sport aircraft for which you intend to exercise the privileges of this rating. The training course must, at a minimum, provide the following number of hours of instruction:<br>(A) For airplane class privileges—120-hours,<br>(B) For weight-shift control aircraft class privileges—104 hours,<br>(C) For powered parachute class privileges—104 hours,<br>(D) For lighter than air class privileges—80 hours,<br>(E) For glider class privileges—80 hours. |

(b) The holder of a repairman certificate (light-sport aircraft) with an inspection rating may perform the annual condition inspection on a light-sport aircraft:

(1) That is owned by the holder;

(2) That has been issued an experimental certificate for operating a light-sport aircraft under §21.191(i) of this chapter; and

(3) That is in the same class of light-sport-aircraft for which the holder has completed the training specified in paragraph (a)(2)(ii) of this section.

(c) The holder of a repairman certificate (light-sport aircraft) with a maintenance rating may—

(1) Approve and return to service an aircraft that has been issued a special airworthiness certificate in the light-sport category under §21.190 of this chapter, or any part thereof, after performing or inspecting maintenance (to include the annual condition inspection and the 100-hour inspection required by §91.327 of this chapter), preventive maintenance, or an alteration (excluding a major repair or a major alteration on a product produced under an FAA approval);

(2) Perform the annual condition inspection on a light-sport aircraft that has been issued an experimental certificate for operating a light-sport aircraft under §21.191(i) of this chapter; and

(3) Only perform maintenance, preventive maintenance, and an alteration on a light-sport aircraft that is in the same class of light-sport aircraft for which the holder has completed the training specified in paragraph (a)(3)(ii) of this section. Before performing a major repair, the holder must complete additional training acceptable to the FAA and appropriate to the repair performed.

(d) The holder of a repairman certificate (light-sport aircraft) with a maintenance rating may not approve for return to service any aircraft or part thereof unless that person has previously performed the work concerned satisfactorily. If that person has not previously performed that work, the person may show the ability to do the work by performing it to the satisfaction of the FAA, or by performing it under the direct supervision of a certificated and appropriately rated mechanic, or a certificated repairman, who has had previous experience in the specific operation concerned. The repairman may not exercise the privileges of the certificate unless the repairman understands the current instructions of the manufacturer and the maintenance manuals for the specific operation concerned.

[Doc. No. FAA–2001–11133, 69 FR 44879, July 27, 2004]

## Subpart F—Parachute Riggers

### § 65.111 Certificate required.

(a) No person may pack, maintain, or alter any personnel-carrying parachute intended for emergency use in connection with civil aircraft of the United States (including the reserve parachute of a dual parachute system to be used for intentional parachute jumping) unless that person holds an appropriate current certificate and type rating issued under this subpart and complies with §§65.127 through 65.133.

(b) No person may pack any main parachute of a dual-parachute system to be used for intentional parachute jumping in connection with civil aircraft of the United States unless that person—

(1) Has an appropriate current certificate issued under this subpart;

(2) Is under the supervision of a current certificated parachute rigger;

(3) Is the person making the next parachute jump with that parachute in

accordance with § 105.43(a) of this chapter; or

(4) Is the parachutist in command making the next parachute jump with that parachute in a tandem parachute operation conducted under § 105.45(b)(1) of this chapter.

(c) No person may maintain or alter any main parachute of a dual-parachute system to be used for intentional parachute jumping in connection with civil aircraft of the United States unless that person—

(1) Has an appropriate current certificate issued under this subpart; or

(2) Is under the supervision of a current certificated parachute rigger;

(d) Each person who holds a parachute rigger certificate shall present it for inspection upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

(e) The following parachute rigger certificates are issued under this part:

(1) Senior parachute rigger.

(2) Master parachute rigger.

(f) Sections 65.127 through 65.133 do not apply to parachutes packed, maintained, or altered for the use of the armed forces.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–9, 31 FR 13524, Oct. 20, 1966; 32 FR 5769, Apr. 11, 1967; Amdt. 65–42, 66 FR 23553, May 9, 2001; Amdt. 65–54, 75 FR 31285, June 3, 2010]

### § 65.113 Eligibility requirements: General.

(a) To be eligible for a parachute rigger certificate, a person must—

(1) Be at least 18 years of age;

(2) Be able to read, write, speak, and understand the English language, or, in the case of a citizen of Puerto Rico, or a person who is employed outside of the United States by a U.S. air carrier, and who does not meet this requirement, be issued a certificate that is valid only in Puerto Rico or while he is employed outside of the United States by that air carrier, as the case may be; and

(3) Comply with the sections of this subpart that apply to the certificate and type rating he seeks.

(b) Except for a master parachute rigger certificate, a parachute rigger certificate that was issued before, and was valid on, October 31, 1962, is equal to a senior parachute rigger certificate, and may be exchanged for such a corresponding certificate.

### § 65.115 Senior parachute rigger certificate: Experience, knowledge, and skill requirements.

Except as provided in § 65.117, an applicant for a senior parachute rigger certificate must—

(a) Present evidence satisfactory to the Administrator that he has packed at least 20 parachutes of each type for which he seeks a rating, in accordance with the manufacturer's instructions and under the supervision of a certificated parachute rigger holding a rating for that type or a person holding an appropriate military rating;

(b) Pass a written test, with respect to parachutes in common use, on—

(1) Their construction, packing, and maintenance;

(2) The manufacturer's instructions;

(3) The regulations of this subpart; and

(c) Pass an oral and practical test showing his ability to pack and maintain at least one type of parachute in common use, appropriate to the type rating he seeks.

[Doc. No. 10468, 37 FR 13251, July 6, 1972]

### § 65.117 Military riggers or former military riggers: Special certification rule.

In place of the procedure in § 65.115, an applicant for a senior parachute rigger certificate is entitled to it if he passes a written test on the regulations of this subpart and presents satisfactory documentary evidence that he—

(a) Is a member or civilian employee of an Armed Force of the United States, is a civilian employee of a regular armed force of a foreign country, or has, within the 12 months before he applies, been honorably discharged or released from any status covered by this paragraph;

(b) Is serving, or has served within the 12 months before he applies, as a parachute rigger for such an Armed Force; and

(c) Has the experience required by § 65.115(a).

### § 65.119 Master parachute rigger certificate: Experience, knowledge, and skill requirements.

An applicant for a master parachute rigger certificate must meet the following requirements:

(a) Present evidence satisfactory to the Administrator that he has had at least 3 years of experience as a parachute rigger and has satisfactorily packed at least 100 parachutes of each of two types in common use, in accordance with the manufacturer's instructions—

(1) While a certificated and appropriately rated senior parachute rigger; or

(2) While under the supervision of a certificated and appropriately rated parachute rigger or a person holding appropriate military ratings.

An applicant may combine experience specified in paragraphs (a) (1) and (2) of this section to meet the requirements of this paragraph.

(b) If the applicant is not the holder of a senior parachute rigger certificate, pass a written test, with respect to parachutes in common use, on—

(1) Their construction, packing, and maintenance;

(2) The manufacturer's instructions; and

(3) The regulations of this subpart.

(c) Pass an oral and practical test showing his ability to pack and maintain two types of parachutes in common use, appropriate to the type ratings he seeks.

[Doc. No. 10468, 37 FR 13252, July 6, 1972]

### § 65.121 Type ratings.

(a) The following type ratings are issued under this subpart:

(1) Seat.

(2) Back.

(3) Chest.

(4) Lap.

(b) The holder of a senior parachute rigger certificate who qualifies for a master parachute rigger certificate is entitled to have placed on his master parachute rigger certificate the ratings that were on his senior parachute rigger certificate.

### § 65.123 Additional type ratings: Requirements.

A certificated parachute rigger who applies for an additional type rating must—

(a) Present evidence satisfactory to the Administrator that he has packed at least 20 parachutes of the type for which he seeks a rating, in accordance with the manufacturer's instructions and under the supervision of a certificated parachute rigger holding a rating for that type or a person holding an appropriate military rating; and

(b) Pass a practical test, to the satisfaction of the Administrator, showing his ability to pack and maintain the type of parachute for which he seeks a rating.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–20, 37 FR 13251, July 6, 1972]

### § 65.125 Certificates: Privileges.

(a) A certificated senior parachute rigger may—

(1) Pack or maintain (except for major repair) any type of parachute for which he is rated; and

(2) Supervise other persons in packing any type of parachute for which that person is rated in accordance with § 105.43(a) or § 105.45(b)(1) of this chapter.

(b) A certificated master parachute rigger may—

(1) Pack, maintain, or alter any type of parachute for which he is rated; and

(2) Supervise other persons in packing, maintaining, or altering any type of parachute for which the certificated parachute rigger is rated in accordance with § 105.43(a) or § 105.45(b)(1) of this chapter.

(c) A certificated parachute rigger need not comply with §§ 65.127 through 65.133 (relating to facilities, equipment, performance standards, records, recent experience, and seal) in packing, maintaining, or altering (if authorized) the main parachute of a dual parachute pack to be used for intentional jumping.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–20, 37 FR 13252, July 6, 1972; Amdt. 65–42, 66 FR 23553, May 9, 2001]

### § 65.127 Facilities and equipment.

No certificated parachute rigger may exercise the privileges of his certificate unless he has at least the following facilities and equipment available to him:

(a) A smooth top table at least three feet wide by 40 feet long.

(b) Suitable housing that is adequately heated, lighted, and ventilated for drying and airing parachutes.

(c) Enough packing tools and other equipment to pack and maintain the types of parachutes that he services.

(d) Adequate housing facilities to perform his duties and to protect his tools and equipment.

[Doc. No. 1179, 27 FR 7973, Aug. 10, 1962, as amended by Amdt. 65–27, 47 FR 13316, Mar. 29, 1982]

### § 65.129 Performance standards.

No certificated parachute rigger may—

(a) Pack, maintain, or alter any parachute unless he is rated for that type;

(b) Pack a parachute that is not safe for emergency use;

(c) Pack a parachute that has not been thoroughly dried and aired;

(d) Alter a parachute in a manner that is not specifically authorized by the Administrator or the manufacturer;

(e) Pack, maintain, or alter a parachute in any manner that deviates from procedures approved by the Administrator or the manufacturer of the parachute; or

(f) Exercise the privileges of his certificate and type rating unless he understands the current manufacturer's instructions for the operation involved and has—

(1) Performed duties under his certificate for at least 90 days within the preceding 12 months; or

(2) Shown the Administrator that he is able to perform those duties.

### § 65.131 Records.

(a) Each certificated parachute rigger shall keep a record of the packing, maintenance, and alteration of parachutes performed or supervised by him. He shall keep in that record, with respect to each parachute worked on, a statement of—

(1) Its type and make;

(2) Its serial number;

(3) The name and address of its owner;

(4) The kind and extent of the work performed;

(5) The date when and place where the work was performed; and

(6) The results of any drop tests made with it.

(b) Each person who makes a record under paragraph (a) of this section shall keep it for at least 2 years after the date it is made.

(c) Each certificated parachute rigger who packs a parachute shall write, on the parachute packing record attached to the parachute, the date and place of the packing and a notation of any defects he finds on inspection. He shall sign that record with his name and the number of his certificate.

### § 65.133 Seal.

Each certificated parachute rigger must have a seal with an identifying mark prescribed by the Administrator, and a seal press. After packing a parachute he shall seal the pack with his seal in accordance with the manufacturer's recommendation for that type of parachute.

## APPENDIX A TO PART 65—AIRCRAFT DISPATCHER COURSES

*Overview*

This appendix sets forth the areas of knowledge necessary to perform dispatcher functions. The items listed below indicate the minimum set of topics that must be covered in a training course for aircraft dispatcher certification. The order of coverage is at the discretion of the approved school. For the latest technological advancements refer to the Practical Test Standards as published by the FAA.

I. Regulations
- A. Subpart C of this part;
- B. Parts 1, 25, 61, 71, 91, 121, 139, and 175, of this chapter;
- C. 49 CFR part 830;
- D. General Operating Manual.

II. Meteorology
- A. Basic Weather Studies
  - (1) The earth's motion and its effects on weather.
  - (2) Analysis of the following regional weather types, characteristics, and structures, or combinations thereof:
    - (a) Maritime.
    - (b) Continental.

(c) Polar.
(d) Tropical.
(3) Analysis of the following local weather types, characteristics, and structures or combinations thereof:
(a) Coastal.
(b) Mountainous.
(c) Island.
(d) Plains.
(4) The following characteristics of the atmosphere:
(a) Layers.
(b) Composition.
(c) Global Wind Patterns.
(d) Ozone.
(5) Pressure:
(a) Units of Measure.
(b) Weather Systems Characteristics.
(c) Temperature Effects on Pressure.
(d) Altimeters.
(e) Pressure Gradient Force.
(f) Pressure Pattern Flying Weather.
(6) Wind:
(a) Major Wind Systems and Coriolis Force.
(b) Jetstreams and their Characteristics.
(c) Local Wind and Related Terms.
(7) States of Matter:
(a) Solids, Liquid, and Gases.
(b) Causes of change of state.
(8) Clouds:
(a) Composition, Formation, and Dissipation.
(b) Types and Associated Precipitation.
(c) Use of Cloud Knowledge in Forecasting.
(9) Fog:
(a) Causes, Formation, and Dissipation.
(b) Types.
(10) Ice:
(a) Causes, Formation, and Dissipation.
(b) Types.
(11) Stability/Instability:
(a) Temperature Lapse Rate, Convection.
(b) Adiabatic Processes.
(c) Lifting Processes.
(d) Divergence.
(e) Convergence.
(12) Turbulence:
(a) Jetstream Associated.
(b) Pressure Pattern Recognition.
(c) Low Level Windshear.
(d) Mountain Waves.
(e) Thunderstorms.
(f) Clear Air Turbulence.
(13) Airmasses:
(a) Classification and Characteristics.
(b) Source Regions.
(c) Use of Airmass Knowledge in Forecasting.
(14) Fronts:
(a) Structure and Characteristics, Both Vertical and Horizontal.
(b) Frontal Types.
(c) Frontal Weather Flying.
(15) Theory of Storm Systems:
(a) Thunderstorms.
(b) Tornadoes.
(c) Hurricanes and Typhoons.
(d) Microbursts.
(e) Causes, Formation, and Dissipation.
B. Weather, Analysis, and Forecasts
(1) Observations:
(a) Surface Observations.
(i) Observations made by certified weather observer.
(ii) Automated Weather Observations.
(b) Terminal Forecasts.
(c) Significant En route Reports and Forecasts.
(i) Pilot Reports.
(ii) Area Forecasts.
(iii) Sigmets, Airmets.
(iv) Center Weather Advisories.
(d) Weather Imagery.
(i) Surface Analysis.
(ii) Weather Depiction.
(iii) Significant Weather Prognosis.
(iv) Winds and Temperature Aloft.
(v) Tropopause Chart.
(vi) Composite Moisture Stability Chart.
(vii) Surface Weather Prognostic Chart.
(viii) Radar Meteorology.
(ix) Satellite Meteorology.
(x) Other charts as applicable.
(e) Meteorological Information Data Collection Systems.
(2) Data Collection, Analysis, and Forecast Facilities.
(3) Service Outlets Providing Aviation Weather Products.
C. Weather Related Aircraft Hazards
(1) Crosswinds and Gusts.
(2) Contaminated Runways.
(3) Restrictions to Surface Visibility.
(4) Turbulence and Windshear.
(5) Icing.
(6) Thunderstorms and Microburst.
(7) Volcanic Ash.
III. Navigation
A. Study of the Earth
(1) Time reference and location (0 Longitude, UTC).
(2) Definitions.
(3) Projections.
(4) Charts.
B. Chart Reading, Application, and Use.
C. National Airspace Plan.
D. Navigation Systems.
E. Airborne Navigation Instruments.
F. Instrument Approach Procedures.
(1) Transition Procedures.
(2) Precision Approach Procedures.
(3) Non-precision Approach Procedures.
(4) Minimums and the relationship to weather.
G. Special Navigation and Operations.
(1) North Atlantic.
(2) Pacific.
(3) Global Differences.
IV. AIRCRAFT
A. Aircraft Flight Manual.
B. Systems Overview.
(1) Flight controls.
(2) Hydraulics.

(3) Electrical.
(4) Air Conditioning and Pressurization.
(5) Ice and Rain protection.
(6) Avionics, Communication, and Navigation.
(7) Powerplants and Auxiliary Power Units.
(8) Emergency and Abnormal Procedures.
(9) Fuel Systems and Sources.
C. Minimum Equipment List/Configuration Deviation List (MEL/CDL) and Applications.
D. Performance.
(1) Aircraft in general.
(2) Principles of flight:
(a) Group one aircraft.
(b) Group two aircraft.
(3) Aircraft Limitations.
(4) Weight and Balance.
(5) Flight instrument errors.
(6) Aircraft performance:
(a) Take-off performance.
(b) En route performance.
(c) Landing performance.
V. Communications
A. Regulatory requirements.
B. Communication Protocol.
C. Voice and Data Communications.
D. Notice to Airmen (NOTAMS).
E. Aeronautical Publications.
F. Abnormal Procedures.
VI. Air Traffic Control
A. Responsibilities.
B. Facilities and Equipment.
C. Airspace classification and route structure.
D. Flight Plans.
(1) Domestic.
(2) International.
E. Separation Minimums.
F. Priority Handling.
G. Holding Procedures.
H. Traffic Management.
VII. Emergency and Abnormal Procedures
A. Security measures on the ground.
B. Security measures in the air.
C. FAA responsibility and services.
D. Collection and dissemination of information on overdue or missing aircraft.
E. Means of declaring an emergency.
F. Responsibility for declaring an emergency.
G. Required reporting of an emergency.
H. NTSB reporting requirements.
VIII. Practical Dispatch Applications
A. Human Factors.
(1) Decisionmaking:
(a) Situation Assessment.
(b) Generation and Evaluation of Alternatives.
(i) Tradeoffs and Prioritization.
(ii) Contingency Planning.
(c) Support Tools and Technologies.
(2) Human Error:
(a) Causes.
(i) Individual and Organizational Factors.
(ii) Technology-Induced Error.
(b) Prevention.
(c) Detection and Recovery.
(3) Teamwork:
(a) Communication and Information Exchange.
(b) Cooperative and Distributed Problem-Solving.
(c) Resource Management.
(i) Air Traffic Control (ATC) activities and workload.
(ii) Flightcrew activities and workload.
(iii) Maintenance activities and workload.
(iv) Operations Control Staff activities and workload.
B. Applied Dispatching.
(1) Briefing techniques, Dispatcher, Pilot.
(2) Preflight:
(a) Safety.
(b) Weather Analysis.
(i) Satellite imagery.
(ii) Upper and lower altitude charts.
(iii) Significant en route reports and forecasts.
(iv) Surface charts.
(v) Surface observations.
(vi) Terminal forecasts and orientation to Enhanced Weather Information System (EWINS).
(c) NOTAMS and airport conditions.
(d) Crew.
(i) Qualifications.
(ii) Limitations.
(e) Aircraft.
(i) Systems.
(ii) Navigation instruments and avionics systems.
(iii) Flight instruments.
(iv) Operations manuals and MEL/CDL.
(v) Performance and limitations.
(f) Flight Planning.
(i) Route of flight.
1. Standard Instrument Departures and Standard Terminal Arrival Routes.
2. En route charts.
3. Operational altitude.
4. Departure and arrival charts.
(ii) Minimum departure fuel.
1. Climb.
2. Cruise.
3. Descent.
(g) Weight and balance.
(h) Economics of flight overview (Performance, Fuel Tankering).
(i) Decision to operate the flight.
(j) ATC flight plan filing.
(k) Flight documentation.
(i) Flight plan.
(ii) Dispatch release.
(3) Authorize flight departure with concurrence of pilot in command.
(4) In-flight operational control:
(a) Current situational awareness.
(b) Information exchange.
(c) Amend original flight release as required.
(5) Post-Flight:
(a) Arrival verification.

(b) Weather debrief.
(c) Flight irregularity reports as required.

[Doc. No. FAA–1998–4553, 64 FR 68925, Dec. 8, 1999]

# PART 67—MEDICAL STANDARDS AND CERTIFICATION

## Subpart A—General

Sec.
67.1 Applicability.
67.3 Issue.
67.4 Application.
67.7 Access to the National Driver Register.

## Subpart B—First-Class Airman Medical Certificate

67.101 Eligibility.
67.103 Eye.
67.105 Ear, nose, throat, and equilibrium.
67.107 Mental.
67.109 Neurologic.
67.111 Cardiovascular.
67.113 General medical condition.
67.115 Discretionary issuance.

## Subpart C—Second-Class Airman Medical Certificate

67.201 Eligibility.
67.203 Eye.
67.205 Ear, nose, throat, and equilibrium.
67.207 Mental.
67.209 Neurologic.
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## Subpart A—General

### § 67.1 Applicability.

This part prescribes the medical standards and certification procedures for issuing medical certificates for airmen and for remaining eligible for a medical certificate.

### § 67.3 Issue.

A person who meets the medical standards prescribed in this part, based on medical examination and evaluation of the person's history and condition, is entitled to an appropriate medical certificate.

[Doc. No. FAA–2007–27812, 73 FR 43065, July 24, 2008]

### § 67.4 Application.

An applicant for first-, second- and third-class medical certification must:

(a) Apply on a form and in a manner prescribed by the Administrator;

(b) Be examined by an aviation medical examiner designated in accordance with part 183 of this chapter. An applicant may obtain a list of aviation medical examiners from the FAA Office of Aerospace Medicine homepage on the FAA Web site, from any FAA Regional Flight Surgeon, or by contacting the Manager of the Aerospace Medical Education Division, P.O. Box 26200, Oklahoma City, Oklahoma 73125.

(c) Show proof of age and identity by presenting a government-issued photo identification (such as a valid U.S. driver's license, identification card issued by a driver's license authority, military identification, or passport). If an applicant does not have government-issued identification, he or she may use non-photo, government-issued identification (such as a birth certificate or voter registration card) in conjunction with photo identification

(such as a work identification card or a student identification card).

[Doc. No. FAA–2007–27812, 73 FR 43065, July 24, 2008]

### § 67.7 Access to the National Driver Register.

At the time of application for a certificate issued under this part, each person who applies for a medical certificate shall execute an express consent form authorizing the Administrator to request the chief driver licensing official of any state designated by the Administrator to transmit information contained in the National Driver Register about the person to the Administrator. The Administrator shall make information received from the National Driver Register, if any, available on request to the person for review and written comment.

## Subpart B—First-Class Airman Medical Certificate

### § 67.101 Eligibility.

To be eligible for a first-class airman medical certificate, and to remain eligible for a first-class airman medical certificate, a person must meet the requirements of this subpart.

### § 67.103 Eye.

Eye standards for a first-class airman medical certificate are:

(a) Distant visual acuity of 20/20 or better in each eye separately, with or without corrective lenses. If corrective lenses (spectacles or contact lenses) are necessary for 20/20 vision, the person may be eligible only on the condition that corrective lenses are worn while exercising the privileges of an airman certificate.

(b) Near vision of 20/40 or better, Snellen equivalent, at 16 inches in each eye separately, with or without corrective lenses. If age 50 or older, near vision of 20/40 or better, Snellen equivalent, at both 16 inches and 32 inches in each eye separately, with or without corrective lenses.

(c) Ability to perceive those colors necessary for the safe performance of airman duties.

(d) Normal fields of vision.

(e) No acute or chronic pathological condition of either eye or adnexa that interferes with the proper function of an eye, that may reasonably be expected to progress to that degree, or that may reasonably be expected to be aggravated by flying.

(f) Bifoveal fixation and vergence-phoria relationship sufficient to prevent a break in fusion under conditions that may reasonably be expected to occur in performing airman duties. Tests for the factors named in this paragraph are not required except for persons found to have more than 1 prism diopter of hyperphoria, 6 prism diopters of esophoria, or 6 prism diopters of exophoria. If any of these values are exceeded, the Federal Air Surgeon may require the person to be examined by a qualified eye specialist to determine if there is bifoveal fixation and an adequate vergence-phoria relationship. However, if otherwise eligible, the person is issued a medical certificate pending the results of the examination.

### § 67.105 Ear, nose, throat, and equilibrium.

Ear, nose, throat, and equilibrium standards for a first-class airman medical certificate are:

(a) The person shall demonstrate acceptable hearing by at least one of the following tests:

(1) Demonstrate an ability to hear an average conversational voice in a quiet room, using both ears, at a distance of 6 feet from the examiner, with the back turned to the examiner.

(2) Demonstrate an acceptable understanding of speech as determined by audiometric speech discrimination testing to a score of at least 70 percent obtained in one ear or in a sound field environment.

(3) Provide acceptable results of pure tone audiometric testing of unaided hearing acuity according to the following table of worst acceptable thresholds, using the calibration standards of the American National Standards Institute, 1969 (11 West 42d Street, New York, NY 10036):

| Frequency (Hz) | 500 Hz | 1000 Hz | 2000 Hz | 3000 Hz |
|---|---|---|---|---|
| Better ear (Db) | 35 | 30 | 30 | 40 |

| Frequency (Hz) | 500 Hz | 1000 Hz | 2000 Hz | 3000 Hz |
|---|---|---|---|---|
| Poorer ear (Db) | 35 | 50 | 50 | 60 |

(b) No disease or condition of the middle or internal ear, nose, oral cavity, pharynx, or larynx that—

(1) Interferes with, or is aggravated by, flying or may reasonably be expected to do so; or

(2) Interferes with, or may reasonably be expected to interfere with, clear and effective speech communication.

(c) No disease or condition manifested by, or that may reasonably be expected to be manifested by, vertigo or a disturbance of equilibrium.

### § 67.107 Mental.

Mental standards for a first-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) A personality disorder that is severe enough to have repeatedly manifested itself by overt acts.

(2) A psychosis. As used in this section, ''psychosis'' refers to a mental disorder in which:

(i) The individual has manifested delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition; or

(ii) The individual may reasonably be expected to manifest delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition.

(3) A bipolar disorder.

(4) Substance dependence, except where there is established clinical evidence, satisfactory to the Federal Air Surgeon, of recovery, including sustained total abstinence from the substance(s) for not less than the preceding 2 years. As used in this section—

(i) ''Substance'' includes: Alcohol; other sedatives and hypnotics; anxiolytics; opioids; central nervous system stimulants such as cocaine, amphetamines, and similarly acting sympathomimetics; hallucinogens; phencyclidine or similarly acting arylcyclohexylamines; cannabis; inhalants; and other psychoactive drugs and chemicals; and

(ii) ''Substance dependence'' means a condition in which a person is dependent on a substance, other than tobacco or ordinary xanthine-containing (e.g., caffeine) beverages, as evidenced by—

(A) Increased tolerance;

(B) Manifestation of withdrawal symptoms;

(C) Impaired control of use; or

(D) Continued use despite damage to physical health or impairment of social, personal, or occupational functioning.

(b) No substance abuse within the preceding 2 years defined as:

(1) Use of a substance in a situation in which that use was physically hazardous, if there has been at any other time an instance of the use of a substance also in a situation in which that use was physically hazardous;

(2) A verified positive drug test result, an alcohol test result of 0.04 or greater alcohol concentration, or a refusal to submit to a drug or alcohol test required by the U.S. Department of Transportation or an agency of the U.S. Department of Transportation; or

(3) Misuse of a substance that the Federal Air Surgeon, based on case history and appropriate, qualified medical judgment relating to the substance involved, finds—

(i) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(ii) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(c) No other personality disorder, neurosis, or other mental condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform

those duties or exercise those privileges.

[Doc. No. 27940, 61 FR 11256, Mar. 19, 1996, as amended by Amdt. 67–19, 71 FR 35764, June 21, 2006]

### § 67.109 Neurologic.

Neurologic standards for a first-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) Epilepsy;

(2) A disturbance of consciousness without satisfactory medical explanation of the cause; or

(3) A transient loss of control of nervous system function(s) without satisfactory medical explanation of the cause.

(b) No other seizure disorder, disturbance of consciousness, or neurologic condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

### § 67.111 Cardiovascular.

Cardiovascular standards for a first-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) Myocardial infarction;

(2) Angina pectoris;

(3) Coronary heart disease that has required treatment or, if untreated, that has been symptomatic or clinically significant;

(4) Cardiac valve replacement;

(5) Permanent cardiac pacemaker implantation; or

(6) Heart replacement;

(b) A person applying for first-class medical certification must demonstrate an absence of myocardial infarction and other clinically significant abnormality on electrocardiographic examination:

(1) At the first application after reaching the 35th birthday; and

(2) On an annual basis after reaching the 40th birthday.

(c) An electrocardiogram will satisfy a requirement of paragraph (b) of this section if it is dated no earlier than 60 days before the date of the application it is to accompany and was performed and transmitted according to acceptable standards and techniques.

### § 67.113 General medical condition.

The general medical standards for a first-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of diabetes mellitus that requires insulin or any other hypoglycemic drug for control.

(b) No other organic, functional, or structural disease, defect, or limitation that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(c) No medication or other treatment that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the medication or other treatment involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

### § 67.115 Discretionary issuance.

A person who does not meet the provisions of §§ 67.103 through 67.113 may

apply for the discretionary issuance of a certificate under § 67.401.

## Subpart C—Second-Class Airman Medical Certificate

### § 67.201 Eligibility.

To be eligible for a second-class airman medical certificate, and to remain eligible for a second-class airman medical certificate, a person must meet the requirements of this subpart.

### § 67.203 Eye.

Eye standards for a second-class airman medical certificate are:

(a) Distant visual acuity of 20/20 or better in each eye separately, with or without corrective lenses. If corrective lenses (spectacles or contact lenses) are necessary for 20/20 vision, the person may be eligible only on the condition that corrective lenses are worn while exercising the privileges of an airman certificate.

(b) Near vision of 20/40 or better, Snellen equivalent, at 16 inches in each eye separately, with or without corrective lenses. If age 50 or older, near vision of 20/40 or better, Snellen equivalent, at both 16 inches and 32 inches in each eye separately, with or without corrective lenses.

(c) Ability to perceive those colors necessary for the safe performance of airman duties.

(d) Normal fields of vision.

(e) No acute or chronic pathological condition of either eye or adnexa that interferes with the proper function of an eye, that may reasonably be expected to progress to that degree, or that may reasonably be expected to be aggravated by flying.

(f) Bifoveal fixation and vergence-phoria relationship sufficient to prevent a break in fusion under conditions that may reasonably be expected to occur in performing airman duties. Tests for the factors named in this paragraph are not required except for persons found to have more than 1 prism diopter of hyperphoria, 6 prism diopters of esophoria, or 6 prism diopters of exophoria. If any of these values are exceeded, the Federal Air Surgeon may require the person to be examined by a qualified eye specialist to determine if there is bifoveal fixation and an adequate vergence-phoria relationship. However, if otherwise eligible, the person is issued a medical certificate pending the results of the examination.

### § 67.205 Ear, nose, throat, and equilibrium.

Ear, nose, throat, and equilibrium standards for a second-class airman medical certificate are:

(a) The person shall demonstrate acceptable hearing by at least one of the following tests:

(1) Demonstrate an ability to hear an average conversational voice in a quiet room, using both ears, at a distance of 6 feet from the examiner, with the back turned to the examiner.

(2) Demonstrate an acceptable understanding of speech as determined by audiometric speech discrimination testing to a score of at least 70 percent obtained in one ear or in a sound field environment.

(3) Provide acceptable results of pure tone audiometric testing of unaided hearing acuity according to the following table of worst acceptable thresholds, using the calibration standards of the American National Standards Institute, 1969:

| Frequency (Hz) | 500 Hz | 1000 Hz | 2000 Hz | 3000 Hz |
|---|---|---|---|---|
| Better ear (Db) | 35 | 30 | 30 | 40 |
| Poorer ear (Db) | 35 | 50 | 50 | 60 |

(b) No disease or condition of the middle or internal ear, nose, oral cavity, pharynx, or larynx that—

(1) Interferes with, or is aggravated by, flying or may reasonably be expected to do so; or

(2) Interferes with, or may reasonably be expected to interfere with, clear and effective speech communication.

(c) No disease or condition manifested by, or that may reasonably be expected to be manifested by, vertigo or a disturbance of equilibrium.

### § 67.207 Mental.

Mental standards for a second-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) A personality disorder that is severe enough to have repeatedly manifested itself by overt acts.

(2) A psychosis. As used in this section, ''psychosis'' refers to a mental disorder in which:

(i) The individual has manifested delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition; or

(ii) The individual may reasonably be expected to manifest delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition.

(3) A bipolar disorder.

(4) Substance dependence, except where there is established clinical evidence, satisfactory to the Federal Air Surgeon, of recovery, including sustained total abstinence from the substance(s) for not less than the preceding 2 years. As used in this section—

(i) ''Substance'' includes: Alcohol; other sedatives and hypnotics; anxiolytics; opioids; central nervous system stimulants such as cocaine, amphetamines, and similarly acting sympathomimetics; hallucinogens; phencyclidine or similarly acting arylcyclohexylamines; cannabis; inhalants; and other psychoactive drugs and chemicals; and

(ii) ''Substance dependence'' means a condition in which a person is dependent on a substance, other than tobacco or ordinary xanthine-containing (e.g., caffeine) beverages, as evidenced by—

(A) Increased tolerance;

(B) Manifestation of withdrawal symptoms;

(C) Impaired control of use; or

(D) Continued use despite damage to physical health or impairment of social, personal, or occupational functioning.

(b) No substance abuse within the preceding 2 years defined as:

(1) Use of a substance in a situation in which that use was physically hazardous, if there has been at any other time an instance of the use of a substance also in a situation in which that use was physically hazardous;

(2) A verified positive drug test result, an alcohol test result of 0.04 or greater alcohol concentration, or a refusal to submit to a drug or alcohol test required by the U.S. Department of Transportation or an agency of the U.S. Department of Transportation; or

(3) Misuse of a substance that the Federal Air Surgeon, based on case history and appropriate, qualified medical judgment relating to the substance involved, finds—

(i) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(ii) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(c) No other personality disorder, neurosis, or other mental condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

[Doc. No. 27940, 61 FR 11256, Mar. 19, 1996, as amended by Amdt. 67–19, 71 FR 35764, June 21, 2006]

### § 67.209 Neurologic.

Neurologic standards for a second-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) Epilepsy;

(2) A disturbance of consciousness without satisfactory medical explanation of the cause; or

(3) A transient loss of control of nervous system function(s) without satisfactory medical explanation of the cause;

(b) No other seizure disorder, disturbance of consciousness, or neurologic condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment

relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

### § 67.211 Cardiovascular.

Cardiovascular standards for a second-class medical certificate are no established medical history or clinical diagnosis of any of the following:

(a) Myocardial infarction;

(b) Angina pectoris;

(c) Coronary heart disease that has required treatment or, if untreated, that has been symptomatic or clinically significant;

(d) Cardiac valve replacement;

(e) Permanent cardiac pacemaker implantation; or

(f) Heart replacement.

### § 67.213 General medical condition.

The general medical standards for a second-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of diabetes mellitus that requires insulin or any other hypoglycemic drug for control.

(b) No other organic, functional, or structural disease, defect, or limitation that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(c) No medication or other treatment that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the medication or other treatment involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

### § 67.215 Discretionary issuance.

A person who does not meet the provisions of §§ 67.203 through 67.213 may apply for the discretionary issuance of a certificate under § 67.401.

## Subpart D—Third-Class Airman Medical Certificate

### § 67.301 Eligibility.

To be eligible for a third-class airman medical certificate, or to remain eligible for a third-class airman medical certificate, a person must meet the requirements of this subpart.

### § 67.303 Eye.

Eye standards for a third-class airman medical certificate are:

(a) Distant visual acuity of 20/40 or better in each eye separately, with or without corrective lenses. If corrective lenses (spectacles or contact lenses) are necessary for 20/40 vision, the person may be eligible only on the condition that corrective lenses are worn while exercising the privileges of an airman certificate.

(b) Near vision of 20/40 or better, Snellen equivalent, at 16 inches in each eye separately, with or without corrective lenses.

(c) Ability to perceive those colors necessary for the safe performance of airman duties.

(d) No acute or chronic pathological condition of either eye or adnexa that interferes with the proper function of an eye, that may reasonably be expected to progress to that degree, or that may reasonably be expected to be aggravated by flying.

### § 67.305 Ear, nose, throat, and equilibrium.

Ear, nose, throat, and equilibrium standards for a third-class airman medical certificate are:

(a) The person shall demonstrate acceptable hearing by at least one of the following tests:

(1) Demonstrate an ability to hear an average conversational voice in a quiet room, using both ears, at a distance of 6 feet from the examiner, with the back turned to the examiner.

(2) Demonstrate an acceptable understanding of speech as determined by audiometric speech discrimination testing to a score of at least 70 percent obtained in one ear or in a sound field environment.

(3) Provide acceptable results of pure tone audiometric testing of unaided hearing acuity according to the following table of worst acceptable thresholds, using the calibration standards of the American National Standards Institute, 1969:

| Frequency (Hz) | 500 Hz | 1000 Hz | 2000 Hz | 3000 Hz |
|---|---|---|---|---|
| Better ear (Db) | 35 | 30 | 30 | 40 |
| Poorer ear (Db) | 35 | 50 | 50 | 60 |

(b) No disease or condition of the middle or internal ear, nose, oral cavity, pharynx, or larynx that—

(1) Interferes with, or is aggravated by, flying or may reasonably be expected to do so; or

(2) Interferes with clear and effective speech communication.

(c) No disease or condition manifested by, or that may reasonably be expected to be manifested by, vertigo or a disturbance of equilibrium.

### § 67.307 Mental.

Mental standards for a third-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) A personality disorder that is severe enough to have repeatedly manifested itself by overt acts.

(2) A psychosis. As used in this section, ''psychosis'' refers to a mental disorder in which—

(i) The individual has manifested delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition; or

(ii) The individual may reasonably be expected to manifest delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition.

(3) A bipolar disorder.

(4) Substance dependence, except where there is established clinical evidence, satisfactory to the Federal Air Surgeon, of recovery, including sustained total abstinence from the substance(s) for not less than the preceding 2 years. As used in this section—

(i) ''Substance'' includes: alcohol; other sedatives and hypnotics; anxiolytics; opioids; central nervous system stimulants such as cocaine, amphetamines, and similarly acting sympathomimetics; hallucinogens; phencyclidine or similarly acting arylcyclohexylamines; cannabis; inhalants; and other psychoactive drugs and chemicals; and

(ii) ''Substance dependence'' means a condition in which a person is dependent on a substance, other than tobacco or ordinary xanthine-containing (e.g., caffeine) beverages, as evidenced by—

(A) Increased tolerance;

(B) Manifestation of withdrawal symptoms;

(C) Impaired control of use; or

(D) Continued use despite damage to physical health or impairment of social, personal, or occupational functioning.

(b) No substance abuse within the preceding 2 years defined as:

(1) Use of a substance in a situation in which that use was physically hazardous, if there has been at any other time an instance of the use of a substance also in a situation in which that use was physically hazardous;

(2) A verified positive drug test result, an alcohol test result of 0.04 or greater alcohol concentration, or a refusal to submit to a drug or alcohol test required by the U.S. Department of Transportation or an agency of the U.S. Department of Transportation; or

(3) Misuse of a substance that the Federal Air Surgeon, based on case history and appropriate, qualified medical judgment relating to the substance involved, finds—

(i) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(ii) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(c) No other personality disorder, neurosis, or other mental condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

[Doc. No. 27940, 61 FR 11256, Mar. 19, 1996, as amended by Amdt. 67–19, 71 FR 35764, June 21, 2006]

### § 67.309 Neurologic.

Neurologic standards for a third-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of any of the following:

(1) Epilepsy;

(2) A disturbance of consciousness without satisfactory medical explanation of the cause; or

(3) A transient loss of control of nervous system function(s) without satisfactory medical explanation of the cause.

(b) No other seizure disorder, disturbance of consciousness, or neurologic condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

### § 67.311 Cardiovascular.

Cardiovascular standards for a third-class airman medical certificate are no established medical history or clinical diagnosis of any of the following:

(a) Myocardial infarction;

(b) Angina pectoris;

(c) Coronary heart disease that has required treatment or, if untreated, that has been symptomatic or clinically significant;

(d) Cardiac valve replacement;

(e) Permanent cardiac pacemaker implantation; or

(f) Heart replacement.

### § 67.313 General medical condition.

The general medical standards for a third-class airman medical certificate are:

(a) No established medical history or clinical diagnosis of diabetes mellitus that requires insulin or any other hypoglycemic drug for control.

(b) No other organic, functional, or structural disease, defect, or limitation that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(c) No medication or other treatment that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the medication or other treatment involved, finds—

(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or

(2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

### § 67.315 Discretionary issuance.

A person who does not meet the provisions of §§ 67.303 through 67.313 may apply for the discretionary issuance of a certificate under § 67.401.

## Subpart E—Certification Procedures

### § 67.401 Special issuance of medical certificates.

(a) At the discretion of the Federal Air Surgeon, an Authorization for Special Issuance of a Medical Certificate (Authorization), valid for a specified period, may be granted to a person who does not meet the provisions of subparts B, C, or D of this part if the person shows to the satisfaction of the Federal Air Surgeon that the duties authorized by the class of medical certificate applied for can be performed without endangering public safety during the period in which the Authorization would be in force. The Federal Air Surgeon may authorize a special medical flight test, practical test, or medical evaluation for this purpose. A medical certificate of the appropriate class may be issued to a person who does not meet the provisions of subparts B, C, or D of this part if that person possesses a valid Authorization and is otherwise eligible. An airman medical certificate issued in accordance with this section shall expire no later than the end of the validity period or upon the withdrawal of the Authorization upon which it is based. At the end of its specified validity period, for grant of a new Authorization, the person must again show to the satisfaction of the Federal Air Surgeon that the duties authorized by the class of medical certificate applied for can be performed without endangering public safety during the period in which the Authorization would be in force.

(b) At the discretion of the Federal Air Surgeon, a Statement of Demonstrated Ability (SODA) may be granted, instead of an Authorization, to a person whose disqualifying condition is static or nonprogressive and who has been found capable of performing airman duties without endangering public safety. A SODA does not expire and authorizes a designated aviation medical examiner to issue a medical certificate of a specified class if the examiner finds that the condition described on its face has not adversely changed.

(c) In granting an Authorization or SODA, the Federal Air Surgeon may consider the person's operational experience and any medical facts that may affect the ability of the person to perform airman duties including—

(1) The combined effect on the person of failure to meet more than one requirement of this part; and

(2) The prognosis derived from professional consideration of all available information regarding the person.

(d) In granting an Authorization or SODA under this section, the Federal Air Surgeon specifies the class of medical certificate authorized to be issued and may do any or all of the following:

(1) Limit the duration of an Authorization;

(2) Condition the granting of a new Authorization on the results of subsequent medical tests, examinations, or evaluations;

(3) State on the Authorization or SODA, and any medical certificate based upon it, any operational limitation needed for safety; or

(4) Condition the continued effect of an Authorization or SODA, and any second- or third-class medical certificate based upon it, on compliance with a statement of functional limitations issued to the person in coordination with the Director of Flight Standards or the Director's designee.

(e) In determining whether an Authorization or SODA should be granted to an applicant for a third-class medical certificate, the Federal Air Surgeon considers the freedom of an airman, exercising the privileges of a private pilot certificate, to accept reasonable risks to his or her person and property that are not acceptable in the exercise of commercial or airline transport pilot privileges, and, at the same time, considers the need to protect the safety of persons and property in other aircraft and on the ground.

(f) An Authorization or SODA granted under the provisions of this section to a person who does not meet the applicable provisions of subparts B, C, or D of this part may be withdrawn, at

the discretion of the Federal Air Surgeon, at any time if—

(1) There is adverse change in the holder's medical condition;

(2) The holder fails to comply with a statement of functional limitations or operational limitations issued as a condition of certification under this section;

(3) Public safety would be endangered by the holder's exercise of airman privileges;

(4) The holder fails to provide medical information reasonably needed by the Federal Air Surgeon for certification under this section; or

(5) The holder makes or causes to be made a statement or entry that is the basis for withdrawal of an Authorization or SODA under § 67.403.

(g) A person who has been granted an Authorization or SODA under this section based on a special medical flight or practical test need not take the test again during later physical examinations unless the Federal Air Surgeon determines or has reason to believe that the physical deficiency has or may have degraded to a degree to require another special medical flight test or practical test.

(h) The authority of the Federal Air Surgeon under this section is also exercised by the Manager, Aeromedical Certification Division, and each Regional Flight Surgeon.

(i) If an Authorization or SODA is withdrawn under paragraph (f) of this section the following procedures apply:

(1) The holder of the Authorization or SODA will be served a letter of withdrawal, stating the reason for the action;

(2) By not later than 60 days after the service of the letter of withdrawal, the holder of the Authorization or SODA may request, in writing, that the Federal Air Surgeon provide for review of the decision to withdraw. The request for review may be accompanied by supporting medical evidence;

(3) Within 60 days of receipt of a request for review, a written final decision either affirming or reversing the decision to withdraw will be issued; and

(4) A medical certificate rendered invalid pursuant to a withdrawal, in accordance with paragraph (a) of this section, shall be surrendered to the Administrator upon request.

[Doc. No. 27940, 61 FR 11256, Mar. 19, 1996, as amended by Amdt. 67–20, 73 FR 43066, July 24, 2008; Amdt. 67–21, 77 FR 16668, Mar. 22, 2012]

### § 67.403 Applications, certificates, logbooks, reports, and records: Falsification, reproduction, or alteration; incorrect statements.

(a) No person may make or cause to be made—

(1) A fraudulent or intentionally false statement on any application for a medical certificate or on a request for any Authorization for Special Issuance of a Medical Certificate (Authorization) or Statement of Demonstrated Ability (SODA) under this part;

(2) A fraudulent or intentionally false entry in any logbook, record, or report that is kept, made, or used, to show compliance with any requirement for any medical certificate or for any Authorization or SODA under this part;

(3) A reproduction, for fraudulent purposes, of any medical certificate under this part; or

(4) An alteration of any medical certificate under this part.

(b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for—

(1) Suspending or revoking all airman, ground instructor, and medical certificates and ratings held by that person;

(2) Withdrawing all Authorizations or SODA's held by that person; and

(3) Denying all applications for medical certification and requests for Authorizations or SODA's.

(c) The following may serve as a basis for suspending or revoking a medical certificate; withdrawing an Authorization or SODA; or denying an application for a medical certificate or request for an authorization or SODA:

(1) An incorrect statement, upon which the FAA relied, made in support of an application for a medical certificate or request for an Authorization or SODA.

(2) An incorrect entry, upon which the FAA relied, made in any logbook, record, or report that is kept, made, or used to show compliance with any requirement for a medical certificate or an Authorization or SODA.

### § 67.405 Medical examinations: Who may perform?

(a) *First-class.* Any aviation medical examiner who is specifically designated for the purpose may perform examinations for the first-class medical certificate.

(b) *Second- and third-class.* Any aviation medical examiner may perform examinations for the second-or third-class medical certificate.

[Doc. No. FAA–2007–27812, 73 FR 43066, July 24, 2008]

### § 67.407 Delegation of authority.

(a) The authority of the Administrator under 49 U.S.C. 44703 to issue or deny medical certificates is delegated to the Federal Air Surgeon to the extent necessary to—

(1) Examine applicants for and holders of medical certificates to determine whether they meet applicable medical standards; and

(2) Issue, renew, and deny medical certificates, and issue, renew, deny, and withdraw Authorizations for Special Issuance of a Medical Certificate and Statements of Demonstrated Ability to a person based upon meeting or failing to meet applicable medical standards.

(b) Subject to limitations in this chapter, the delegated functions of the Federal Air Surgeon to examine applicants for and holders of medical certificates for compliance with applicable medical standards and to issue, renew, and deny medical certificates are also delegated to aviation medical examiners and to authorized representatives of the Federal Air Surgeon within the FAA.

(c) The authority of the Administrator under 49 U.S.C. 44702, to reconsider the action of an aviation medical examiner is delegated to the Federal Air Surgeon; the Manager, Aeromedical Certification Division; and each Regional Flight Surgeon. Where the person does not meet the standards of §§ 67.107(b)(3) and (c), 67.109(b), 67.113(b) and (c), 67.207(b)(3) and (c), 67.209(b), 67.213(b) and (c), 67.307(b)(3) and (c), 67.309(b), or 67.313(b) and (c), any action taken under this paragraph other than by the Federal Air Surgeon is subject to reconsideration by the Federal Air Surgeon. A certificate issued by an aviation medical examiner is considered to be affirmed as issued unless an FAA official named in this paragraph (authorized official) reverses that issuance within 60 days after the date of issuance. However, if within 60 days after the date of issuance an authorized official requests the certificate holder to submit additional medical information, an authorized official may reverse the issuance within 60 days after receipt of the requested information.

(d) The authority of the Administrator under 49 U.S.C. 44709 to re-examine any civil airman to the extent necessary to determine an airman's qualification to continue to hold an airman medical certificate, is delegated to the Federal Air Surgeon and his or her authorized representatives within the FAA.

### § 67.409 Denial of medical certificate.

(a) Any person who is denied a medical certificate by an aviation medical examiner may, within 30 days after the date of the denial, apply in writing and in duplicate to the Federal Air Surgeon, Attention: Manager, Aeromedical Certification Division, AAM–300, Federal Aviation Administration, P.O. Box 26080, Oklahoma City, Oklahoma 73126, for reconsideration of that denial. If the person does not ask for reconsideration during the 30-day period after the date of the denial, he or she is considered to have withdrawn the application for a medical certificate.

(b) The denial of a medical certificate—

(1) By an aviation medical examiner is not a denial by the Administrator under 49 U.S.C. 44703.

(2) By the Federal Air Surgeon is considered to be a denial by the Administrator under 49 U.S.C. 44703.

(3) By the Manager, Aeromedical Certification Division, or a Regional Flight Surgeon is considered to be a denial by the Administrator under 49 U.S.C. 44703 except where the person does not meet the standards of §§ 67.107(b)(3) and (c), 67.109(b), or 67.113(b) and (c); 67.207(b)(3) and (c), 67.209(b), or 67.213(b) and (c); or 67.307(b)(3) and (c), 67.309(b), or 67.313(b) and (c).

(c) Any action taken under § 67.407(c) that wholly or partly reverses the issue of a medical certificate by an aviation medical examiner is the denial of a medical certificate under paragraph (b) of this section.

(d) If the issue of a medical certificate is wholly or partly reversed by the Federal Air Surgeon; the Manager, Aeromedical Certification Division; or a Regional Flight Surgeon, the person holding that certificate shall surrender it, upon request of the FAA.

### § 67.411 [Reserved]

### § 67.413 Medical records.

(a) Whenever the Administrator finds that additional medical information or history is necessary to determine whether you meet the medical standards required to hold a medical certificate, you must:

(1) Furnish that information to the FAA; or

(2) Authorize any clinic, hospital, physician, or other person to release to the FAA all available information or records concerning that history.

(b) If you fail to provide the requested medical information or history or to authorize its release, the FAA may suspend, modify, or revoke your medical certificate or, in the case of an applicant, deny the application for a medical certificate.

(c) If your medical certificate is suspended, modified, or revoked under paragraph (b) of this section, that suspension or modification remains in effect until you provide the requested information, history, or authorization to the FAA and until the FAA determines that you meet the medical standards set forth in this part.

[Doc. No. FAA–2007–27812, 73 FR 43066, July 24, 2008]

### § 67.415 Return of medical certificate after suspension or revocation.

The holder of any medical certificate issued under this part that is suspended or revoked shall, upon the Administrator's request, return it to the Administrator.

# SUBCHAPTER E—AIRSPACE

## PART 71—DESIGNATION OF CLASS A, B, C, D, AND E AIRSPACE AREAS; AIR TRAFFIC SERVICE ROUTES; AND REPORTING POINTS

Sec.

SPECIAL FEDERAL AVIATION REGULATION NO. 97 [NOTE]
71.1 Applicability.
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71.9 Overlapping airspace designations.
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71.13 Classification of Air Traffic Service (ATS) routes.
71.15 Designation of jet routes and VOR Federal airways.

**Subpart A—Class A Airspace**

71.31 Class A airspace.
71.33 Class A airspace areas.

**Subpart B—Class B Airspace**

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**Subpart C—Class C Airspace**

71.51 Class C airspace.

**Subpart D—Class D Airspace**

71.61 Class D airspace.

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71.71 Class E airspace.

**Subparts F–G [Reserved]**

**Subpart H—Reporting Points**

71.901 Applicability.

AUTHORITY: 49 U.S.C. 106(f), 106(g), 40103, 40113, 40120, E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

SOURCE: Amdt. 71–14, 56 FR 65654, Dec. 17, 1991, unless otherwise noted.

### SPECIAL FEDERAL AVIATION REGULATION NO. 97

EDITORIAL NOTE: For the text of SFAR No. 97, see part 91 of this chapter.

### § 71.1 Applicability.

A listing for Class A, B, C, D, and E airspace areas; air traffic service routes; and reporting points can be found in FAA Order 7400.9Z, Airspace Designations and Reporting Points, dated August 6, 2015. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. The approval to incorporate by reference FAA Order 7400.9Z is effective September 15, 2015, through September 15, 2016. During the incorporation by reference period, proposed changes to the listings of Class A, B, C, D, and E airspace areas; air traffic service routes; and reporting points will be published in full text as proposed rule documents in the FEDERAL REGISTER. Amendments to the listings of Class A, B, C, D, and E airspace areas; air traffic service routes; and reporting points will be published in full text as final rules in the FEDERAL REGISTER. Periodically, the final rule amendments will be integrated into a revised edition of the Order and submitted to the Director of the Federal Register for approval for incorporation by reference in this section. Copies of FAA Order 7400.9Z may be obtained from Airspace Policy and Regulations Group, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591, (202) 267–8783. An electronic version of the Order is available on the FAA Web site at *http://www.faa.gov/air_traffic/publications*. Copies of FAA Order 7400.9Z may be inspected in Docket No. FAA–2015–3375; Amendment No. 71–47 on *http://www.regulations.gov*. A copy of FAA Order 7400.9Z may be inspected at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal-register/cfr/ibr-locations.html*.

[Doc. No. FAA–2015–3375, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.1 was revised, effective Sept. 15, 2015 through Sept. 15, 2016.

### § 71.3 [Reserved]

### § 71.5 Reporting points.

The reporting points listed in subpart H of FAA Order 7400.9Z (incorporated by reference, see § 71.1) consist of geographic locations at which the position of an aircraft must be reported in accordance with part 91 of this chapter.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55268, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.5 was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

### § 71.7 Bearings, radials, and mileages.

All bearings and radials in this part are true and are applied from point of origin and all mileages in this part are stated as nautical miles.

### § 71.9 Overlapping airspace designations.

(a) When overlapping airspace designations apply to the same airspace, the operating rules associated with the more restrictive airspace designation apply.

(b) For the purpose of this section—

(1) Class A airspace is more restrictive than Class B, Class C, Class D, Class E, or Class G airspace;

(2) Class B airspace is more restrictive than Class C, Class D, Class E, or Class G airspace;

(3) Class C airspace is more restrictive than Class D, Class E, or Class G airspace;

(4) Class D airspace is more restrictive than Class E or Class G airspace; and

(5) Class E is more restrictive than Class G airspace.

### § 71.11 Air Traffic Service (ATS) routes.

Unless otherwise specified, the following apply:

(a) An Air Traffic Service (ATS) route is based on a centerline that extends from one navigation aid, fix, or intersection, to another navigation aid, fix, or intersection (or through several navigation aids, fixes, or intersections) specified for that route.

(b) An ATS route does not include the airspace of a prohibited area.

[Doc. No. FAA–2003–14698, 68 FR 16947, Apr. 8, 2003, as amended by Amdt. 71–33, 70 FR 23004, May 3, 2005]

### § 71.13 Classification of Air Traffic Service (ATS) routes.

Unless otherwise specified, ATS routes are classified as follows:

(a) In subpart A of this part:

(1) Jet routes.

(2) Area navigation (RNAV) routes.

(b) In subpart E of this part:

(1) VOR Federal airways.

(2) Colored Federal airways.

(i) Green Federal airways.

(ii) Amber Federal airways.

(iii) Red Federal airways.

(iv) Blue Federal airways.

(3) Area navigation (RNAV) routes.

[Doc. No. FAA–2003–14698, 68 FR 16947, Apr. 8, 2003]

### § 71.15 Designation of jet routes and VOR Federal airways.

Unless otherwise specified, the place names appearing in the descriptions of airspace areas designated as jet routes in subpart A of FAA Order 7400.9Z, and as VOR Federal airways in subpart E of FAA Order 7400.9Z, are the names of VOR or VORTAC navigation aids. FAA Order 7400.9Z is incorporated by reference in § 71.1.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55268, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.15 was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

## Subpart A—Class A Airspace

### § 71.31 Class A airspace.

The airspace descriptions contained in § 71.33 and the routes contained in subpart A of FAA Order 7400.9Z (incorporated by reference, see § 71.1) are designated as Class A airspace within which all pilots and aircraft are subject to the rating requirements, operating rules, and equipment requirements of part 91 of this chapter.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55268, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.31 was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

### § 71.33 Class A airspace areas.

(a) That airspace of the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States, from 18,000 feet MSL to and including FL600 excluding the states of Alaska and Hawaii, Santa Barbara Island, Farallon Island, and the airspace south of latitude 25°04′00″ North.

(b) That airspace of the State of Alaska, including that airspace overlying the waters within 12 nautical miles of the coast, from 18,000 feet MSL to and including FL600 but not including the airspace less than 1,500 feet above the surface of the earth and the Alaska Peninsula west of longitude 160°00′00″ West.

(c) The airspace areas listed as offshore airspace areas in subpart A of FAA Order 7400.9Z (incorporated by reference, see § 71.1) that are designated in international airspace within areas of domestic radio navigational signal or ATC radar coverage, and within which domestic ATC procedures are applied.

[Amdt. 71–14, 56 FR 65654, Dec. 17, 1991]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 71.33, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.33(c) was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

## Subpart B—Class B Airspace

### § 71.41 Class B airspace.

The Class B airspace areas listed in subpart B of FAA Order 7400.9Z (incorporated by reference, see § 71.1) consist of specified airspace within which all aircraft operators are subject to the minimum pilot qualification requirements, operating rules, and aircraft equipment requirements of part 91 of this chapter. Each Class B airspace area designated for an airport in subpart B of FAA Order 7400.9Z (incorporated by reference, see § 71.1) contains at least one primary airport around which the airspace is designated.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55268, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.41 was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

## Subpart C—Class C Airspace

### § 71.51 Class C airspace.

The Class C airspace areas listed in subpart C of FAA Order 7400.9Z (incorporated by reference, see § 71.1) consist of specified airspace within which all aircraft operators are subject to operating rules and equipment requirements specified in part 91 of this chapter. Each Class C airspace area designated for an airport in subpart C of FAA Order 7400.9Z (incorporated by reference, see § 71.1) contains at least one

primary airport around which the airspace is designated.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55269, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.51 was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

## Subpart D—Class D Airspace

### § 71.61 Class D airspace.

The Class D airspace areas listed in subpart D of FAA Order 7400.9Z (incorporated by reference, see § 71.1) consist of specified airspace within which all aircraft operators are subject to operating rules and equipment requirements specified in part 91 of this chapter. Each Class D airspace area designated for an airport in subpart D of FAA Order 7400.9Z (incorporated by reference, see § 71.1) contains at least one primary airport around which the airspace is designated.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55269, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, § 71.61 was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

## Subpart E—Class E Airspace

### § 71.71 Class E airspace.

Class E Airspace consists of:

(a) The airspace of the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous states and Alaska, extending upward from 14,500 feet MSL up to, but not including 18,000 feet MSL, and the airspace above FL600, excluding—

(1) The Alaska peninsula west of longitude 160°00′00″ W.; and

(2) The airspace below 1,500 feet above the surface of the earth.

(b) The airspace areas designated for an airport in subpart E of FAA Order 7400.9Z (incorporated by reference, see § 71.1) within which all aircraft operators are subject to the operating rules specified in part 91 of this chapter.

(c) The airspace areas listed as domestic airspace areas in subpart E of FAA Order 7400.9Z (incorporated by reference, see § 71.1) which extend upward from 700 feet or more above the surface of the earth when designated in conjunction with an airport for which an approved instrument approach procedure has been prescribed, or from 1,200 feet or more above the surface of the earth for the purpose of transitioning to or from the terminal or en route environment. When such areas are designated in conjunction with airways or routes, the extent of such designation has the lateral extent identical to that of a Federal airway and extends upward from 1,200 feet or higher. Unless otherwise specified, the airspace areas in the paragraph extend upward from 1,200 feet or higher above the surface to, but not including, 14,500 feet MSL.

(d) The Federal airways described in subpart E of FAA Order 7400.9Z (incorporated by reference, see § 71.1).

(e) The airspace areas listed as en route domestic airspace areas in subpart E of FAA Order 7400.9Z (incorporated by reference, see § 71.1). Unless otherwise specified, each airspace area has a lateral extent identical to that of a Federal airway and extends upward from 1,200 feet above the surface of the earth to the overlying or adjacent controlled airspace.

(f) The airspace areas listed as offshore airspace areas in subpart E of FAA Order 7400.9Z (incorporated by reference, see § 71.1) that are designated in international airspace within areas of domestic radio navigational signal or ATC radar coverage, and within which domestic ATC procedures are applied.

Unless otherwise specified, each airspace area extends upward from a specified altitude up to, but not including, 18,000 feet MSL.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55269, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, §71.71(b), (c), (d), (e), and (f) were amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

## Subparts F–G [Reserved]

## Subpart H—Reporting Points

### § 71.901 Applicability.

Unless otherwise designated:

(a) Each reporting point listed in subpart H of FAA Order 7400.9Z (incorporated by reference, see §71.1) applies to all directions of flight. In any case where a geographic location is designated as a reporting point for less than all airways passing through that point, or for a particular direction of flight along an airway only, it is so indicated by including the airways or direction of flight in the designation of geographical location.

(b) Place names appearing in the reporting point descriptions indicate VOR or VORTAC facilities identified by those names.

[Doc. No. 29334, 73 FR 54495, Sept. 22, 2008, as amended by Amdt. 71–40, 73 FR 60940, Oct. 15, 2008; Amdt. 71–41, 74 FR 46490, Sept. 10, 2009; Amdt. 71–42, 75 FR 55269, Sept. 10, 2010; Amdt. 71–43, 76 FR 53329, Aug. 26, 2011; Amdt. 71–44, 77 FR 50908, Aug. 23, 2012; Amdt. 71–45, 78 FR 52848, Aug. 27, 2013; Amdt. 71–46, 79 FR 51888, Sept. 2, 2014; Amdt. 71–47, 80 FR 51937, Aug. 27, 2015]

EFFECTIVE DATE NOTE: By Amdt. 71–47, 80 FR 51937, Aug. 27, 2015, §71.901(a) was amended by removing the words ''FAA Order 7400.9Y'' and adding, in their place, the words ''FAA Order 7400.9Z'', effective Sept. 15, 2015 through Sept. 15, 2016.

# PART 73—SPECIAL USE AIRSPACE

### Subpart A—General

Sec.
73.1 Applicability.
73.3 Special use airspace.
73.5 Bearings; radials; miles.

### Subpart B—Restricted Areas

73.11 Applicability.
73.13 Restrictions.
73.15 Using agency.
73.17 Controlling agency.
73.19 Reports by using agency.

### Subpart C—Prohibited Areas

73.81 Applicability.
73.83 Restrictions.
73.85 Using agency.

AUTHORITY: 49 U.S.C. 106(f), 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

SOURCE: 46 FR 779, Jan. 2, 1981, unless otherwise noted.

## Subpart A—General

### § 73.1 Applicability.

The airspace that is described in subpart B and subpart C of this part is designated as special use airspace. These parts prescribe the requirements for the use of that airspace.

### § 73.3 Special use airspace.

(a) Special use airspace consists of airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both.

(b) The vertical limits of special use airspace are measured by designated altitude floors and ceilings expressed as flight levels or as feet above mean sea level. Unless otherwise specified, the word ''to'' (an altitude or flight level) means ''to and including'' (that altitude or flight level).

(c) The horizontal limits of special use airspace are measured by boundaries described by geographic coordinates or other appropriate references that clearly define their perimeter.

(d) The period of time during which a designation of special use airspace is in effect is stated in the designation.

### § 73.5 Bearings; radials; miles.

(a) All bearings and radials in this part are true from point of origin.

(b) Unless otherwise specified, all mileages in this part are stated as statute miles.

## Subpart B—Restricted Areas

### § 73.11 Applicability.

This subpart designates restricted areas and prescribes limitations on the operation of aircraft within them.

### § 73.13 Restrictions.

No person may operate an aircraft within a restricted area between the designated altitudes and during the time of designation, unless he has the advance permission of

(a) The using agency described in § 73.15; or

(b) The controlling agency described in § 73.17.

### § 73.15 Using agency.

(a) For the purposes of this subpart, the following are using agencies;

(1) The agency, organization, or military command whose activity within a restricted area necessitated the area being so designated.

(b) Upon the request of the FAA, the using agency shall execute a letter establishing procedures for joint use of a restricted area by the using agency and the controlling agency, under which the using agency would notify the controlling agency whenever the controlling agency may grant permission for transit through the restricted area in accordance with the terms of the letter.

(c) The using agency shall—

(1) Schedule activities within the restricted area;

(2) Authorize transit through, or flight within, the restricted area as feasible; and

(3) Contain within the restricted area all activities conducted therein in accordance with the purpose for which it was designated.

### § 73.17 Controlling agency.

For the purposes of this part, the controlling agency is the FAA facility that may authorize transit through or flight within a restricted area in accordance with a joint-use letter issued under § 73.15.

### § 73.19 Reports by using agency.

(a) Each using agency shall prepare a report on the use of each restricted area assigned thereto during any part of the preceding 12-month period ended September 30, and transmit it by the following January 31 of each year to the Manager, Air Traffic Division in the regional office of the Federal Aviation Administration having jurisdiction over the area in which the restricted area is located, with a copy to the Program Director for Air Traffic Airspace Management, Federal Aviation Administration, Washington, DC 20591.

(b) In the report under this section the using agency shall:

(1) State the name and number of the restricted area as published in this part, and the period covered by the report.

(2) State the activities (including average daily number of operations if appropriate) conducted in the area, and any other pertinent information concerning current and future electronic monitoring devices.

(3) State the number of hours daily, the days of the week, and the number of weeks during the year that the area was used.

(4) For restricted areas having a joint-use designation, also state the number of hours daily, the days of the week, and the number of weeks during the year that the restricted area was released to the controlling agency for public use.

(5) State the mean sea level altitudes or flight levels (whichever is appropriate) used in aircraft operations and the maximum and average ordinate of surface firing (expressed in feet, mean sea level altitude) used on a daily, weekly, and yearly basis.

(6) Include a chart of the area (of optional scale and design) depicting, if used, aircraft operating areas, flight patterns, ordnance delivery areas, surface firing points, and target, fan, and

impact areas. After once submitting an appropriate chart, subsequent annual charts are not required unless there is a change in the area, activity or altitude (or flight levels) used, which might alter the depiction of the activities originally reported. If no change is to be submitted, a statement indicating ''no change'' shall be included in the report.

(7) Include any other information not otherwise required under this part which is considered pertinent to activities carried on in the restricted area.

(c) If it is determined that the information submitted under paragraph (b) of this section is not sufficient to evaluate the nature and extent of the use of a restricted area, the FAA may request the using agency to submit supplementary reports. Within 60 days after receiving a request for additional information, the using agency shall submit such information as the Program Director for Air Traffic Airspace Management considers appropriate. Supplementary reports must be sent to the FAA officials designated in paragraph (a) of this section.

(Secs. 307 and 313(a), Federal Aviation Act of 1958 (49 U.S.C. 1348 and 1354(a)))

[Doc. No. 15379, 42 FR 54798, Oct. 11, 1977, as amended by Amdt. 73–5, 54 FR 39292, Sept. 25, 1989; Amdt. 73–6, 58 FR 42001, Aug. 6, 1993; Amdt. 73–8, 61 FR 26435, May 28, 1996; Amdt. 73–8, 63 FR 16890, Apr. 7, 1998]

EDITORIAL NOTE: The restricted areas formerly carried as §§ 608.21 to 608.72 of this title were transferred to part 73 as §§ 73.21 to 73.72 under subpart B but are not carried in the Code of Federal Regulations. For FEDERAL REGISTER citations affecting these restricted areas, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

## Subpart C—Prohibited Areas

### § 73.81 Applicability.

This subpart designates prohibited areas and prescribes limitations on the operation of aircraft therein.

### § 73.83 Restrictions.

No person may operate an aircraft within a prohibited area unless authorization has been granted by the using agency.

### § 73.85 Using agency.

For the purpose of this subpart, the using agency is the agency, organization or military command that established the requirements for the prohibited area.

EDITORIAL NOTE: Sections 73.87 through 73.99 are reserved for descriptions of designated prohibited areas. For FEDERAL REGISTER citations affecting these prohibited areas, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

# PART 75 [RESERVED]

# PART 77—SAFE, EFFICIENT USE, AND PRESERVATION OF THE NAVIGABLE AIRSPACE

### Subpart A—General

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### Subpart E—Petitions for Discretionary Review

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AUTHORITY: 49 U.S.C. 106 (g), 40103, 40113–40114, 44502, 44701, 44718, 46101–46102, 46104.

SOURCE: Docket No. FAA–2006–25002, 75 FR 42303, July 21, 2010, unless otherwise noted.

## Subpart A—General

### § 77.1 Purpose.

This part establishes:

(a) The requirements to provide notice to the FAA of certain proposed construction, or the alteration of existing structures;

(b) The standards used to determine obstructions to air navigation, and navigational and communication facilities;

(c) The process for aeronautical studies of obstructions to air navigation or navigational facilities to determine the effect on the safe and efficient use of navigable airspace, air navigation facilities or equipment; and

(d) The process to petition the FAA for discretionary review of determinations, revisions, and extensions of determinations.

### § 77.3 Definitions.

For the purpose of this part:

*Non-precision instrument runway* means a runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance, or area type navigation equipment, for which a straight-in non-precision instrument approach procedure has been approved, or planned, and for which no precision approach facilities are planned, or indicated on an FAA planning document or military service military airport planning document.

*Planned or proposed airport* is an airport that is the subject of at least one of the following documents received by the FAA:

(1) Airport proposals submitted under 14 CFR part 157.

(2) Airport Improvement Program requests for aid.

(3) Notices of existing airports where prior notice of the airport construction or alteration was not provided as required by 14 CFR part 157.

(4) Airport layout plans.

(5) DOD proposals for airports used only by the U.S. Armed Forces.

(6) DOD proposals on joint-use (civil-military) airports.

(7) Completed airport site selection feasibility study.

*Precision instrument runway* means a runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS), or a Precision Approach Radar (PAR). It also means a runway for which a precision approach system is planned and is so indicated by an FAA-approved airport layout plan; a military service approved military airport layout plan; any other FAA planning document, or military service military airport planning document.

*Public use airport* is an airport available for use by the general public without a requirement for prior approval of the airport owner or operator.

*Seaplane base* is considered to be an airport only if its sea lanes are outlined by visual markers.

*Utility runway* means a runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less.

*Visual runway* means a runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA-approved airport layout plan, a military service approved military airport layout plan, or by any planning document submitted to the FAA by competent authority.

## Subpart B—Notice Requirements

### § 77.5 Applicability.

(a) If you propose any construction or alteration described in § 77.9, you must provide adequate notice to the FAA of that construction or alteration.

(b) If requested by the FAA, you must also file supplemental notice before the start date and upon completion of certain construction or alterations that are described in § 77.9.

(c) Notice received by the FAA under this subpart is used to:

(1) Evaluate the effect of the proposed construction or alteration on

safety in air commerce and the efficient use and preservation of the navigable airspace and of airport traffic capacity at public use airports;

(2) Determine whether the effect of proposed construction or alteration is a hazard to air navigation;

(3) Determine appropriate marking and lighting recommendations, using FAA Advisory Circular 70/7460–1, Obstruction Marking and Lighting;

(4) Determine other appropriate measures to be applied for continued safety of air navigation; and

(5) Notify the aviation community of the construction or alteration of objects that affect the navigable airspace, including the revision of charts, when necessary.

### § 77.7 Form and time of notice.

(a) If you are required to file notice under §77.9, you must submit to the FAA a completed FAA Form 7460–1, Notice of Proposed Construction or Alteration. FAA Form 7460–1 is available at FAA regional offices and on the Internet.

(b) You must submit this form at least 45 days before the start date of the proposed construction or alteration or the date an application for a construction permit is filed, whichever is earliest.

(c) If you propose construction or alteration that is also subject to the licensing requirements of the Federal Communications Commission (FCC), you must submit notice to the FAA on or before the date that the application is filed with the FCC.

(d) If you propose construction or alteration to an existing structure that exceeds 2,000 ft. in height above ground level (AGL), the FAA presumes it to be a hazard to air navigation that results in an inefficient use of airspace. You must include details explaining both why the proposal would not constitute a hazard to air navigation and why it would not cause an inefficient use of airspace.

(e) The 45-day advance notice requirement is waived if immediate construction or alteration is required because of an emergency involving essential public services, public health, or public safety. You may provide notice to the FAA by any available, expeditious means. You must file a completed FAA Form 7460–1 within 5 days of the initial notice to the FAA. Outside normal business hours, the nearest flight service station will accept emergency notices.

### § 77.9 Construction or alteration requiring notice.

If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA of:

(a) Any construction or alteration that is more than 200 ft. AGL at its site.

(b) Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

(1) 100 to 1 for a horizontal distance of 20,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 ft. in actual length, excluding heliports.

(2) 50 to 1 for a horizontal distance of 10,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 ft. in actual length, excluding heliports.

(3) 25 to 1 for a horizontal distance of 5,000 ft. from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

(c) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

(d) Any construction or alteration on any of the following airports and heliports:

(1) A public use airport listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications;

(2) A military airport under construction, or an airport under construction that will be available for public use;

(3) An airport operated by a Federal agency or the DOD.

(4) An airport or heliport with at least one FAA-approved instrument approach procedure.

(e) You do not need to file notice for construction or alteration of:

(1) Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation;

(2) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose;

(3) Any construction or alteration for which notice is required by any other FAA regulation.

(4) Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

### § 77.11 Supplemental notice requirements.

(a) You must file supplemental notice with the FAA when:

(1) The construction or alteration is more than 200 feet in height AGL at its site; or

(2) Requested by the FAA.

(b) You must file supplemental notice on a prescribed FAA form to be received within the time limits specified in the FAA determination. If no time limit has been specified, you must submit supplemental notice of construction to the FAA within 5 days after the structure reaches its greatest height.

(c) If you abandon a construction or alteration proposal that requires supplemental notice, you must submit notice to the FAA within 5 days after the project is abandoned.

(d) If the construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

## Subpart C—Standards for Determining Obstructions to Air Navigation or Navigational Aids or Facilities

### § 77.13 Applicability.

This subpart describes the standards used for determining obstructions to air navigation, navigational aids, or navigational facilities. These standards apply to the following:

(a) Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used and any permanent or temporary apparatus.

(b) The alteration of any permanent or temporary existing structure by a change in its height, including appurtenances, or lateral dimensions, including equipment or material used therein.

### § 77.15 Scope.

(a) This subpart describes standards used to determine obstructions to air navigation that may affect the safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities. Such facilities include air navigation aids, communication equipment, airports, Federal airways, instrument approach or departure procedures, and approved off-airway routes.

(b) Objects that are considered obstructions under the standards described in this subpart are presumed hazards to air navigation unless further aeronautical study concludes that the object is not a hazard. Once further aeronautical study has been initiated, the FAA will use the standards in this subpart, along with FAA policy and

guidance material, to determine if the object is a hazard to air navigation.

(c) The FAA will apply these standards with reference to an existing airport facility, and airport proposals received by the FAA, or the appropriate military service, before it issues a final determination.

(d) For airports having defined runways with specially prepared hard surfaces, the primary surface for each runway extends 200 feet beyond each end of the runway. For airports having defined strips or pathways used regularly for aircraft takeoffs and landings, and designated runways, without specially prepared hard surfaces, each end of the primary surface for each such runway shall coincide with the corresponding end of the runway. At airports, excluding seaplane bases, having a defined landing and takeoff area with no defined pathways for aircraft takeoffs and landings, a determination must be made as to which portions of the landing and takeoff area are regularly used as landing and takeoff pathways. Those determined pathways must be considered runways, and an appropriate primary surface as defined in §77.19 will be considered as longitudinally centered on each such runway. Each end of that primary surface must coincide with the corresponding end of that runway.

(e) The standards in this subpart apply to construction or alteration proposals on an airport (including heliports and seaplane bases with marked lanes) if that airport is one of the following before the issuance of the final determination:

(1) Available for public use and is listed in the Airport/Facility Directory, Supplement Alaska, or Supplement Pacific of the U.S. Government Flight Information Publications; or

(2) A planned or proposed airport or an airport under construction of which the FAA has received actual notice, except DOD airports, where there is a clear indication the airport will be available for public use; or,

(3) An airport operated by a Federal agency or the DOD; or,

(4) An airport that has at least one FAA-approved instrument approach.

**§ 77.17 Obstruction standards.**

(a) An existing object, including a mobile object, is, and a future object would be an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

(1) A height of 499 feet AGL at the site of the object.

(2) A height that is 200 feet AGL, or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile from the airport up to a maximum of 499 feet.

(3) A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.

(4) A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.

(5) The surface of a takeoff and landing area of an airport or any imaginary surface established under §77.19, 77.21, or 77.23. However, no part of the takeoff or landing area itself will be considered an obstruction.

(b) Except for traverse ways on or near an airport with an operative ground traffic control service furnished by an airport traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:

(1) 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.

(2) 15 feet for any other public roadway.

(3) 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.

(4) 23 feet for a railroad.

(5) For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

### § 77.19 Civil airport imaginary surfaces.

The following civil airport imaginary surfaces are established with relation to the airport and to each runway. The size of each such imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway. The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach procedure existing or planned for that runway end.

(a) *Horizontal surface.* A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by SW.inging arcs of a specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is:

(1) 5,000 feet for all runways designated as utility or visual;

(2) 10,000 feet for all other runways. The radius of the arc specified for each end of a runway will have the same arithmetical value. That value will be the highest determined for either end of the runway. When a 5,000-foot arc is encompassed by tangents connecting two adjacent 10,000-foot arcs, the 5,000-foot arc shall be disregarded on the construction of the perimeter of the horizontal surface.

(b) *Conical surface.* A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

(c) *Primary surface.* A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway; but when the runway has no specially prepared hard surface, the primary surface ends at each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of the primary surface is:

(1) 250 feet for utility runways having only visual approaches.

(2) 500 feet for utility runways having non-precision instrument approaches.

(3) For other than utility runways, the width is:

(i) 500 feet for visual runways having only visual approaches.

(ii) 500 feet for non-precision instrument runways having visibility minimums greater than three-fourths statute mile.

(iii) 1,000 feet for a non-precision instrument runway having a non-precision instrument approach with visibility minimums as low as three-fourths of a statute mile, and for precision instrument runways.

(iv) The width of the primary surface of a runway will be that width prescribed in this section for the most precise approach existing or planned for either end of that runway.

(d) *Approach surface.* A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end.

(1) The inner edge of the approach surface is the same width as the primary surface and it expands uniformly to a width of:

(i) 1,250 feet for that end of a utility runway with only visual approaches;

(ii) 1,500 feet for that end of a runway other than a utility runway with only visual approaches;

(iii) 2,000 feet for that end of a utility runway with a non-precision instrument approach;

(iv) 3,500 feet for that end of a non-precision instrument runway other than utility, having visibility minimums greater that three-fourths of a statute mile;

(v) 4,000 feet for that end of a non-precision instrument runway, other than utility, having a non-precision instrument approach with visibility

minimums as low as three-fourths statute mile; and

(vi) 16,000 feet for precision instrument runways.

(2) The approach surface extends for a horizontal distance of:

(i) 5,000 feet at a slope of 20 to 1 for all utility and visual runways;

(ii) 10,000 feet at a slope of 34 to 1 for all non-precision instrument runways other than utility; and

(iii) 10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1 for all precision instrument runways.

(3) The outer width of an approach surface to an end of a runway will be that width prescribed in this subsection for the most precise approach existing or planned for that runway end.

(e) *Transitional surface.* These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

### § 77.21 Department of Defense (DOD) airport imaginary surfaces.

(a) *Related to airport reference points.* These surfaces apply to all military airports. For the purposes of this section, a military airport is any airport operated by the DOD.

(1) *Inner horizontal surface.* A plane that is oval in shape at a height of 150 feet above the established airfield elevation. The plane is constructed by scribing an arc with a radius of 7,500 feet about the centerline at the end of each runway and interconnecting these arcs with tangents.

(2) *Conical surface.* A surface extending from the periphery of the inner horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation.

(3) *Outer horizontal surface.* A plane, located 500 feet above the established airfield elevation, extending outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.

(b) *Related to runways.* These surfaces apply to all military airports.

(1) *Primary surface.* A surface located on the ground or water longitudinally centered on each runway with the same length as the runway. The width of the primary surface for runways is 2,000 feet. However, at established bases where substantial construction has taken place in accordance with a previous lateral clearance criteria, the 2,000-foot width may be reduced to the former criteria.

(2) *Clear zone surface.* A surface located on the ground or water at each end of the primary surface, with a length of 1,000 feet and the same width as the primary surface.

(3) *Approach clearance surface.* An inclined plane, symmetrical about the runway centerline extended, beginning 200 feet beyond each end of the primary surface at the centerline elevation of the runway end and extending for 50,000 feet. The slope of the approach clearance surface is 50 to 1 along the runway centerline extended until it reaches an elevation of 500 feet above the established airport elevation. It then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The width of this surface at the runway end is the same as the primary surface, it flares uniformly, and the width at 50,000 is 16,000 feet.

(4) *Transitional surfaces.* These surfaces connect the primary surfaces, the first 200 feet of the clear zone surfaces, and the approach clearance surfaces to the inner horizontal surface, conical surface, outer horizontal surface or other transitional surfaces. The slope of the transitional surface is 7 to 1 outward and upward at right angles to the runway centerline.

### § 77.23 Heliport imaginary surfaces.

(a) *Primary surface.* The area of the primary surface coincides in size and shape with the designated take-off and landing area. This surface is a horizontal plane at the elevation of the established heliport elevation.

(b) *Approach surface.* The approach surface begins at each end of the heliport primary surface with the same width as the primary surface, and extends outward and upward for a horizontal distance of 4,000 feet where its width is 500 feet. The slope of the approach surface is 8 to 1 for civil heliports and 10 to 1 for military heliports.

(c) *Transitional surfaces.* These surfaces extend outward and upward from the lateral boundaries of the primary surface and from the approach surfaces at a slope of 2 to 1 for a distance of 250 feet measured horizontally from the centerline of the primary and approach surfaces.

## Subpart D—Aeronautical Studies and Determinations

### § 77.25 Applicability.

(a) This subpart applies to any aeronautical study of a proposed construction or alteration for which notice to the FAA is required under § 77.9.

(b) The purpose of an aeronautical study is to determine whether the aeronautical effects of the specific proposal and, where appropriate, the cumulative impact resulting from the proposed construction or alteration when combined with the effects of other existing or proposed structures, would constitute a hazard to air navigation.

(c) The obstruction standards in subpart C of this part are supplemented by other manuals and directives used in determining the effect on the navigable airspace of a proposed construction or alteration. When the FAA needs additional information, it may circulate a study to interested parties for comment.

### § 77.27 Initiation of studies.

The FAA will conduct an aeronautical study when:

(a) Requested by the sponsor of any proposed construction or alteration for which a notice is submitted; or

(b) The FAA determines a study is necessary.

### § 77.29 Evaluating aeronautical effect.

(a) The FAA conducts an aeronautical study to determine the impact of a proposed structure, an existing structure that has not yet been studied by the FAA, or an alteration of an existing structure on aeronautical operations, procedures, and the safety of flight. These studies include evaluating:

(1) The impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules;

(2) The impact on arrival, departure, and en route procedures for aircraft operating under instrument flight rules;

(3) The impact on existing and planned public use airports;

(4) Airport traffic capacity of existing public use airports and public use airport development plans received before the issuance of the final determination;

(5) Minimum obstacle clearance altitudes, minimum instrument flight rules altitudes, approved or planned instrument approach procedures, and departure procedures;

(6) The potential effect on ATC radar, direction finders, ATC tower line-of-sight visibility, and physical or electromagnetic effects on air navigation, communication facilities, and other surveillance systems;

(7) The aeronautical effects resulting from the cumulative impact of a proposed construction or alteration of a structure when combined with the effects of other existing or proposed structures.

(b) If you withdraw the proposed construction or alteration or revise it so that it is no longer identified as an obstruction, or if no further aeronautical study is necessary, the FAA may terminate the study.

### § 77.31 Determinations.

(a) The FAA will issue a determination stating whether the proposed construction or alteration would be a hazard to air navigation, and will advise all known interested persons.

(b) The FAA will make determinations based on the aeronautical study findings and will identify the following:

(1) The effects on VFR/IFR aeronautical departure/arrival operations, air traffic procedures, minimum flight altitudes, and existing, planned, or proposed airports listed in § 77.15(e) of

which the FAA has received actual notice prior to issuance of a final determination.

(2) The extent of the physical and/or electromagnetic effect on the operation of existing or proposed air navigation facilities, communication aids, or surveillance systems.

(c) The FAA will issue a Determination of Hazard to Air Navigation when the aeronautical study concludes that the proposed construction or alteration will exceed an obstruction standard and would have a substantial aeronautical impact.

(d) A Determination of No Hazard to Air Navigation will be issued when the aeronautical study concludes that the proposed construction or alteration will exceed an obstruction standard but would not have a substantial aeronautical impact to air navigation. A Determination of No Hazard to Air Navigation may include the following:

(1) Conditional provisions of a determination.

(2) Limitations necessary to minimize potential problems, such as the use of temporary construction equipment.

(3) Supplemental notice requirements, when required.

(4) Marking and lighting recommendations, as appropriate.

(e) The FAA will issue a Determination of No Hazard to Air Navigation when a proposed structure does not exceed any of the obstruction standards and would not be a hazard to air navigation.

### § 77.33 Effective period of determinations.

(a) The effective date of a determination not subject to discretionary review under 77.37(b) is the date of issuance. The effective date of all other determinations for a proposed or existing structure is 40 days from the date of issuance, provided a valid petition for review has not been received by the FAA. If a valid petition for review is filed, the determination will not become final, pending disposition of the petition.

(b) Unless extended, revised, or terminated, each Determination of No Hazard to Air Navigation issued under this subpart expires 18 months after the effective date of the determination, or on the date the proposed construction or alteration is abandoned, whichever is earlier.

(c) A Determination of Hazard to Air Navigation has no expiration date.

[Doc. No. FAA–2006–25002, 75 FR 42303, July 21, 2010, as amended by Amdt. 77–13–A, 76 FR 2802, Jan. 18, 2011]

### § 77.35 Extensions, terminations, revisions and corrections.

(a) You may petition the FAA official that issued the Determination of No Hazard to Air Navigation to revise or reconsider the determination based on new facts or to extend the effective period of the determination, provided that:

(1) Actual structural work of the proposed construction or alteration, such as the laying of a foundation, but not including excavation, has not been started; and

(2) The petition is submitted at least 15 days before the expiration date of the Determination of No Hazard to Air Navigation.

(b) A Determination of No Hazard to Air Navigation issued for those construction or alteration proposals not requiring an FCC construction permit may be extended by the FAA one time for a period not to exceed 18 months.

(c) A Determination of No Hazard to Air Navigation issued for a proposal requiring an FCC construction permit may be granted extensions for up to 18 months, provided that:

(1) You submit evidence that an application for a construction permit/license was filed with the FCC for the associated site within 6 months of issuance of the determination; and

(2) You submit evidence that additional time is warranted because of FCC requirements; and

(3) Where the FCC issues a construction permit, a final Determination of No Hazard to Air Navigation is effective until the date prescribed by the FCC for completion of the construction. If an extension of the original FCC completion date is needed, an extension of the FAA determination must be requested from the Obstruction Evaluation Service (OES).

(4) If the Commission refuses to issue a construction permit, the final determination expires on the date of its refusal.

## Subpart E—Petitions for Discretionary Review

### § 77.37 General.

(a) If you are the sponsor, provided a substantive aeronautical comment on a proposal in an aeronautical study, or have a substantive aeronautical comment on the proposal but were not given an opportunity to state it, you may petition the FAA for a discretionary review of a determination, revision, or extension of a determination issued by the FAA.

(b) You may not file a petition for discretionary review for a Determination of No Hazard that is issued for a temporary structure, marking and lighting recommendation, or when a proposed structure or alteration does not exceed obstruction standards contained in subpart C of this part.

### § 77.39 Contents of a petition.

(a) You must file a petition for discretionary review in writing and it must be received by the FAA within 30 days after the issuance of a determination under § 77.31, or a revision or extension of the determination under § 77.35.

(b) The petition must contain a full statement of the aeronautical basis on which the petition is made, and must include new information or facts not previously considered or presented during the aeronautical study, including valid aeronautical reasons why the determination, revisions, or extension made by the FAA should be reviewed.

(c) In the event that the last day of the 30-day filing period falls on a weekend or a day the Federal government is closed, the last day of the filing period is the next day that the government is open.

(d) The FAA will inform the petitioner or sponsor (if other than the petitioner) and the FCC (whenever an FCC-related proposal is involved) of the filing of the petition and that the determination is not final pending disposition of the petition.

### § 77.41 Discretionary review results.

(a) If discretionary review is granted, the FAA will inform the petitioner and the sponsor (if other than the petitioner) of the issues to be studied and reviewed. The review may include a request for comments and a review of all records from the initial aeronautical study.

(b) If discretionary review is denied, the FAA will notify the petitioner and the sponsor (if other than the petitioner), and the FCC, whenever a FCC-related proposal is involved, of the basis for the denial along with a statement that the determination is final.

(c) After concluding the discretionary review process, the FAA will revise, affirm, or reverse the determination.

# SUBCHAPTER F—AIR TRAFFIC AND GENERAL OPERATING RULES

## PART 91—GENERAL OPERATING AND FLIGHT RULES


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SPECIAL FEDERAL AVIATION REGULATION NO. 79
SPECIAL FEDERAL AVIATION REGULATION NO. 97
SPECIAL FEDERAL AVIATION REGULATION NO. 104
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AUTHORITY: 49 U.S.C. 106(f), 106(g), 1155, 40101, 40103, 40105, 40113, 40120, 44101, 44111, 44701, 44704, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506–46507, 47122, 47508, 47528–47531, 47534, articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11).

## SPECIAL FEDERAL AVIATION REGULATION NO. 50–2—SPECIAL FLIGHT RULES IN THE VICINITY OF THE GRAND CANYON NATIONAL PARK, AZ

*Section 1. Applicability.* This rule prescribes special operating rules for all persons operating aircraft in the following airspace, designated as the Grand Canyon National Park Special Flight Rules Area:

That airspace extending upward from the surface up to but not including 14,500 feet MSL within an area bounded by a line beginning at lat. 36°09′30″ N., long. 114°03′00″ W.; northeast to lat. 36°14′00″ N., long. 113°09′50″ W.; thence northeast along the boundary of the Grand Canyon National Park to lat. 36°24′47″ N., long. 112°52′00″ W.; to lat. 36°30′30″ N., long. 112°36′15″ W. to lat. 36°21′30″ N., long. 112°00′00″ W. to lat. 36°35′30″ N., long. 111°53′10″ W., to lat. 36°53′00″ N., long. 111°36′45″ W. to lat. 36°53′00″ N., long. 111°33′00″ W.; to lat. 36°19′00″ N., long. 111°50′50″ W.; to lat. 36°17′00″ N., long. 111°42′00″ W.; to lat. 35°59′30″ N., long. 111°42′00″ W.; to lat. 35°57′30″ N., long. 112°03′55″ W.; thence counterclockwise via the 5 statute mile radius of the Grand Canyon Airport airport reference point (lat. 35°57′09″ N., long. 112°08′47″ W.) to lat. 35°57′30″ N., long. 112°14′00″ W.; to lat. 35°57′30″ N., long. 113°11′00″ W.; to lat. 35°42′30″ N., long. 113°11′00″ W.; to 35°38′30″ N.; long. 113°27′30″ W.; thence counterclockwise via the 5 statute mile radius of the Peach Springs VORTAC to lat. 35°41′20″ N., long. 113°36′00″ W.; to lat. 35°55′25″ N., long. 113°49′10″ W.; to lat. 35°57′45″ N., 113°45′20″ W.; thence northwest along the park boundary to lat. 36°02′20″ N., long. 113°50′15″ W.; to 36°00′10″ N., long. 113°53′45″ W.; thence to the point of beginning.

*Section 3. Aircraft operations: general.* Except in an emergency, no person may operate an aircraft in the Special Flight Rules, Area under VFR on or after September 22, 1988, or under IFR on or after April 6, 1989, unless the operation—(a) Is conducted in accordance with the following procedures:

NOTE: The following procedures do not relieve the pilot from see-and-avoid responsibility or compliance with FAR 91.119.

(1) Unless necessary to maintain a safe distance from other aircraft or terrain—

(i) Remain clear of the areas described in Section 4; and

(ii) Remain at or above the following altitudes in each sector of the canyon:

Eastern section from Lees Ferry to North Canyon and North Canyon to Boundary Ridge: as prescribed in Section 5.

Boundary Ridge to Supai Point (Yumtheska Point): 10,000 feet MSL.

Western section from Diamond Creek to the Grant Wash Cliffs: 8,000 feet MSL.

(2) Proceed through the four flight corridors describe in Section 4 at the following altitudes unless otherwise authorized in writing by the Flight Standards District Office:

*Northbound*

11,500 or
13,500 feet MSL

*Southbound*

>10,500 or
>12,500 feet MSL

(b) Is authorized in writing by the Flight Standards District Office and is conducted in compliance with the conditions contained in that authorization. Normally authorization will be granted for operation in the areas described in Section 4 or below the altitudes listed in Section 5 only for operations of aircraft necessary for law enforcement, firefighting, emergency medical treatment/evacuation of persons in the vicinity of the Park; for support of Park maintenance or activities; or for aerial access to and maintenance of other property located within the Special Flight Rules Area. Authorization may be issued on a continuing basis.

(c)(1) Prior to November 1, 1988, is conducted in accordance with a specific authorization to operate in that airspace incorporated in the operator's part 135 operations specifications in accordance with the provisions of SFAR 50–1, notwithstanding the provisions of Sections 4 and 5; and

(2) On or after November 1, 1988, is conducted in accordance with a specific authorization to operate in that airspace incorporated in the operated in the operator's operations specifications and approved by the

Flight Standards District Office in accordance with the provisions of SFAR 50–2.

(d) Is a search and rescue mission directed by the U.S. Air Force Rescue Coordination Center.

(e) Is conducted within 3 nautical miles of Whitmore Airstrip, Pearce Ferry Airstrip, North Rim Airstrip, Cliff Dwellers Airstrip, or Marble Canyon Airstrip at an altitudes less than 3,000 feet above airport elevation, for the purpose of landing at or taking off from that facility. Or

(f) Is conducted under an IFR clearance and the pilot is acting in accordance with ATC instructions. An IFR flight plan may not be filed on a route or at an altitude that would require operation in an area described in Section 4.

*Section 4. Flight-free zones.* Except in an emergency or if otherwise necessary for safety of flight, or unless otherwise authorized by the Flight Standards District Office for a purpose listed in Section 3(b), no person may operate an aircraft in the Special Flight Rules Area within the following areas:

(a) Desert View Flight-Free Zone. Within an area bounded by a line beginning at Lat. 35°59′30″ N., Long. 111°46′20″ W. to 35°59′30″ N., Long. 111°52′45″ W.; to Lat. 36°04′50″ N., Long. 111°52′00″ W.; to Lat. 36°06′00″ N., Long. 111°46′20″ W.; to the point of origin; but not including the airspace at and above 10,500 feet MSL within 1 mile of the western boundary of the zone. The area between the Desert View and Bright Angel Flight-Free Zones is designated the ''Zuni Point Corridor.''

(b) Bright Angel Flight-Free Zone. Within an area bounded by a line beginning at Lat. 35°59′30″ N., Long. 111°55′30″ W.; to Lat. 35°59′30″ N., Long. 112°04′00″ W.; thence counterclockwise via the 5 statute mile radius of the Grand Canyon Airport point (Lat. 35°57′09″ N., Long. 112°08′47″ W.) to Lat. 36°01′30″ N., Long. 112°11′00″ W.; to Lat. 36°06′15″ N., Long. 112°12′50″ W.; to Lat. 36°14′40″ N., Long. 112°08′50″ W.; to Lat. 36°14′40″ N., Long. 111°57′30″ W.; to Lat. 36°12′30″ N., Long. 111°53′50″ W.; to the point of origin; but not including the airspace at and above 10,500 feet MSL within 1 mile of the eastern boundary between the southern boundary and Lat. 36°04′50″ N. or the airspace at and above 10,500 feet MSL within 2 miles of the northwest boundary. The area bounded by the Bright Angel and Shinumo Flight-Free Zones is designated the ''Dragon Corridor.''

(c) Shinumo Flight-Free Zone. Within an area bounded by a line beginning at Lat. 36°04′00″ N., Long. 112°16′40″ W.; northwest along the park boundary to a point at Lat. 36°12′47″ N., Long. 112°30′53″ W.; to Lat. 36°21′15″ N., Long. 112°20′20″ W.; east along the park boundary to Lat. 36°21′15″ N., Long. 112°13′55″ W.; to Lat. 36°14′40″ N., Long. 112°11′25″ W.; to the point of origin. The area between the Thunder River/Toroweap and Shinumo Flight Free Zones is designated the ''Fossil Canyon Corridor.''

(d) Toroweap/Thunder River Flight-Free Zone. Within an area bounded by a line beginning at Lat. 36°22′45″ N., Long. 112°20′35″ W.; thence northwest along the boundary of the Grand Canyon National Park to Lat. 36°17′48″ N., Long. 113°03′15″ W.; to Lat. 36°15′00″ N., Long. 113°07′10″ W.; to Lat. 36°10′30″ N., Long. 113°07′10″ W.; thence east along the Colorado River to the confluence of Havasu Canyon (Lat. 36°18′40″ N., Long. 112°45′45″ W.;) including that area within a 1.5 nautical mile radius of Toroweap Overlook (Lat. 36°12′45″ N., Long. 113°03′30″ W.); to the point of origin; but not including the following airspace designated as the ''Tuckup Corridor'': at or above 10,500 feet MSL within 2 nautical miles either side of a line extending between Lat. 36°24′47″ N., Long. 112°48′50″ W. and Lat. 36°17′10″ N., Long. 112°48′50″ W.; to the point of origin.

*Section 5. Minimum flight altitudes.* Except in an emergency or if otherwise necessary for safety of flight, or unless otherwise authorized by the Flight Standards District Office for a purpose listed in Section 3(b), no person may operate an aircraft in the Special Flight Rules Area at an altitude lower than the following:

(a) Eastern section from Lees Ferry to North Canyon: 5,000 feet MSL.

(b) Eastern section from North Canyon to Boundary Ridge: 6,000 feet MSL.

(c) Boundary Ridge to Supai (Yumtheska) Point: 7,500 feet MSL.

(d) Supai Point to Diamond Creek: 6,500 feet MSL.

(e) Western section from Diamond Creek to the Grand Wash Cliffs: 5,000 feet MSL.

*Section 9. Termination date.* Section 1. Applicability, Section 4, Flight-free zones, and Section 5. Minimum flight altitudes, expire on April 19, 2001.

NOTE: [Removed]

[66 FR 1003, Jan. 4, 2001, as amended at 66 FR 16584, Mar. 26, 2001; 72 FR 9846, Mar. 6, 2007]

## SPECIAL FEDERAL AVIATION REGULATION NO. 60—AIR TRAFFIC CONTROL SYSTEM EMERGENCY OPERATION

1. Each person shall, before conducting any operation under the Federal Aviation Regulations (14 CFR chapter I), be familiar with all available information concerning that operation, including Notices to Airmen issued under §91.139 and, when activated, the provisions of the National Air Traffic Reduced Complement Operations Plan available for inspection at operating air traffic facilities and Regional air traffic division offices, and the General Aviation Reservation Program. No operator may change the designated airport of intended operation for any flight contained in the October 1, 1990, OAG.

2. Notwithstanding any provision of the Federal Aviation Regulations to the contrary, no person may operate an aircraft in the Air Traffic Control System:

a. Contrary to any restriction, prohibition, procedure or other action taken by the Director of the Office of Air Traffic Systems Management (Director) pursuant to paragraph 3 of this regulation and announced in a Notice to Airmen pursuant to §91.139 of the Federal Aviation Regulations.

b. When the National Air Traffic Reduced Complement Operations Plan is activated pursuant to paragraph 4 of this regulation, except in accordance with the pertinent provisions of the National Air Traffic Reduced Complement Operations Plan.

3. Prior to or in connection with the implementation of the RCOP, and as conditions warrant, the Director is authorized to:

a. Restrict, prohibit, or permit VFR and/or IFR operations at any airport, Class B airspace area, Class C airspace area, or other class of controlled airspace.

b. Give priority at any airport to flights that are of military necessity, or are medical emergency flights, Presidential flights, and flights transporting critical Government employees.

c. Implement, at any airport, traffic management procedures, that may include reduction of flight operations. Reduction of flight operations will be accomplished, to the extent practical, on a pro rata basis among and between air carrier, commercial operator, and general aviation operations. Flights cancelled under this SFAR at a high density traffic airport will be considered to have been operated for purposes of part 93 of the Federal Aviation Regulations.

4. The Director may activate the National Air Traffic Reduced Complement Operations Plan at any time he finds that it is necessary for the safety and efficiency of the National Airspace System. Upon activation of the RCOP and notwithstanding any provision of the FAR to the contrary, the Director is authorized to suspend or modify any airspace designation.

5. Notice of restrictions, prohibitions, procedures and other actions taken by the Director under this regulation with respect to the operation of the Air Traffic Control system will be announced in Notices to Airmen issued pursuant to §91.139 of the Federal Aviation Regulations.

6. The Director may delegate his authority under this regulation to the extent he considers necessary for the safe and efficient operation of the National Air Traffic Control System.

(Authority: 49 U.S.C. app. 1301(7), 1303, 1344, 1348, 1352 through 1355, 1401, 1421 through 1431, 1471, 1472, 1502, 1510, 1522, and 2121 through 2125; articles 12, 29, 31, and 32(a) of the Convention on International Civil Aviation (61 stat. 1180); 42 U.S.C. 4321 *et seq.;* E.O. 11514, 35 FR 4247, 3 CFR, 1966–1970 Comp., p. 902; 49 U.S.C. 106(g))

[Doc. No. 26351, 55 FR 40760, Oct. 4, 1990, as amended by Amdt. 91–227, 56 FR 65652, Dec. 17, 1991]

## SPECIAL FEDERAL AVIATION REGULATION NO. 79—PROHIBITION AGAINST CERTAIN FLIGHTS WITHIN THE FLIGHT INFORMATION REGION (FIR) OF THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA (DPRK)

1. *Applicability*. This rule applies to the following persons:

(a) All U.S. air carriers or commercial operators.

(b) All persons exercising the privileges of an airman certificate issued by the FAA, except such persons operating U.S.-registered aircraft for a foreign air carrier.

(c) All operators of aircraft registered in the United States except where the operator of such aircraft is a foreign air carrier.

2. *Flight Prohibition*. Except as provided in paragraphs 3 and 4 of this SFAR, no person described in paragraph 1 may conduct flight operations through the Pyongyang FIR west of 132 degrees east longitude.

3. *Permitted Operations*. This SFAR does not prohibit persons described in paragraph 1 from conducting flight operations within the Pyongyang FIR west of 132 degrees east longitude where such operations are authorized either by exemption issued by the Administrator or by another agency of the United States Government with FAA approval.

4. *Emergency situations*. In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command on an aircraft may deviate from this SFAR to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of 14 CFR parts 121, 125, or 135, each person who deviates from this rule shall, within ten (10) days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons therefore.

5. *Expiration*. This Special Federal Aviation Regulation No. 79 will remain in effect until further notice.

[Doc. No. 28831, 62 FR 20078, Apr. 24, 1997, as amended at 63 FR 8017, Feb. 17, 1998; 63 FR 19286, Apr. 17, 1998]

## SPECIAL FEDERAL AVIATION REGULATION NO. 97—SPECIAL OPERATING RULES FOR THE CONDUCT OF INSTRUMENT FLIGHT RULES (IFR) AREA NAVIGATION (RNAV) OPERATIONS USING GLOBAL POSITIONING SYSTEMS (GPS) IN ALASKA

Those persons identified in Section 1 may conduct IFR en route RNAV operations in the State of Alaska and its airspace on published air traffic routes using TSO C145a/C146a navigation systems as the only means of IFR navigation. Despite contrary provisions of parts 71, 91, 95, 121, 125, and 135 of this chapter, a person may operate aircraft in accordance with this SFAR if the following requirements are met.

Section 1. *Purpose, use, and limitations*

a. This SFAR permits TSO C145a/C146a GPS (RNAV) systems to be used for IFR en route operations in the United States airspace over and near Alaska (as set forth in paragraph c of this section) at Special Minimum En Route Altitudes (MEA) that are outside the operational service volume of ground-based navigation aids, if the aircraft operation also meets the requirements of sections 3 and 4 of this SFAR.

b. Certificate holders and part 91 operators may operate aircraft under this SFAR provided that they comply with the requirements of this SFAR.

c. Operations conducted under this SFAR are limited to United States Airspace within and near the State of Alaska as defined in the following area description:

From 62°00′00.000″ N, Long. 141°00′00.00″ W.; to Lat. 59°47′54.11″ N., Long. 135°28′38.34″ W.; to Lat. 56°00′04.11″ N., Long. 130°00′07.80″ W.; to Lat. 54°43′00.00″ N., Long. 130°37′00.00″ W.; to Lat. 51°24′00.00″ N., Long. 167°49′00.00″ W.; to Lat. 50°08′00.00″ N., Long. 176°34′00.00″ W.; to Lat. 45°42′00.00″ N., Long. −162°55′00.00″ E.; to Lat. 50°05′00.00″ N., Long. −159°00′00.00″ E.; to Lat. 54°00′00.00″ N., Long. −169°00′00.00″ E.; to Lat. 60°00 00.00″ N., Long. −180°00′ 00.00″ E; to Lat. 65°00′00.00″ N., Long. 168°58′23.00″ W.; to Lat. 90°00′00.00″ N., Long. 00°00′0.00″ W.; to Lat. 62°00′00.000″ N, Long. 141°00′00.00″ W.

(d) No person may operate an aircraft under IFR during the en route portion of flight below the standard MEA or at the special MEA unless the operation is conducted in accordance with sections 3 and 4 of this SFAR.

Section 2. *Definitions and abbreviations*

For the purposes of this SFAR, the following definitions and abbreviations apply.

*Area navigation (RNAV)*. RNAV is a method of navigation that permits aircraft operations on any desired flight path.

*Area navigation (RNAV) route*. RNAV route is a published route based on RNAV that can be used by suitably equipped aircraft.

*Certificate holder*. A certificate holder means a person holding a certificate issued under part 119 or part 125 of this chapter or holding operations specifications issued under part 129 of this chapter.

*Global Navigation Satellite System (GNSS)*. GNSS is a world-wide position and time determination system that uses satellite ranging signals to determine user location. It encompasses all satellite ranging technologies, including GPS and additional satellites. Components of the GNSS include GPS, the Global Orbiting Navigation Satellite System, and WAAS satellites.

*Global Positioning System (GPS)*. GPS is a satellite-based radio navigational, positioning, and time transfer system. The system provides highly accurate position and velocity information and precise time on a continuous global basis to properly equipped users.

*Minimum crossing altitude (MCA)*. The minimum crossing altitude (MCA) applies to the operation of an aircraft proceeding to a higher minimum en route altitude when crossing specified fixes.

*Required navigation system*. Required navigation system means navigation equipment that meets the performance requirements of TSO C145a/C146a navigation systems certified for IFR en route operations.

*Route segment*. Route segment is a portion of a route bounded on each end by a fix or NAVAID.

*Special MEA*. Special MEA refers to the minimum en route altitudes, using required navigation systems, on published routes outside the operational service volume of ground-based navigation aids and are depicted on the published Low Altitude and High Altitude En Route Charts using the color blue and with the suffix ''G.'' For example, a GPS MEA of 4000 feet MSL would be depicted using the color blue, as 4000G.

*Standard MEA*. Standard MEA refers to the minimum en route IFR altitude on published routes that uses ground-based navigation aids and are depicted on the published Low Altitude and High Altitude En Route Charts using the color black.

*Station referenced*. Station referenced refers to radio navigational aids or fixes that are referenced by ground based navigation facilities such as VOR facilities.

*Wide Area Augmentation System (WAAS)*. WAAS is an augmentation to GPS that calculates GPS integrity and correction data on

the ground and uses geo-stationary satellites to broadcast GPS integrity and correction data to GPS/WAAS users and to provide ranging signals. It is a safety critical system consisting of a ground network of reference and integrity monitor data processing sites to assess current GPS performance, as well as a space segment that broadcasts that assessment to GNSS users to support en route through precision approach navigation. Users of the system include all aircraft applying the WAAS data and ranging signal.

Section 3. *Operational Requirements*

To operate an aircraft under this SFAR, the following requirements must be met:

a. Training and qualification for operations and maintenance personnel on required navigation equipment used under this SFAR.

b. Use authorized procedures for normal, abnormal, and emergency situations unique to these operations, including degraded navigation capabilities, and satellite system outages.

c. For certificate holders, training of flight crewmembers and other personnel authorized to exercise operational control on the use of those procedures specified in paragraph b of this section.

d. Part 129 operators must have approval from the State of the operator to conduct operations in accordance with this SFAR.

e. In order to operate under this SFAR, a certificate holder must be authorized in operations specifications.

Section 4. *Equipment Requirements*

a. The certificate holder must have properly installed, certificated, and functional dual required navigation systems as defined in section 2 of this SFAR for the en route operations covered under this SFAR.

b. When the aircraft is being operated under part 91, the aircraft must be equipped with at least one properly installed, certificated, and functional required navigation system as defined in section 2 of this SFAR for the en route operations covered under this SFAR.

Section 5. *Expiration date*

This Special Federal Aviation Regulation will remain in effect until rescinded.

[Doc. No. FAA–2003–14305, 68 FR 14077, Mar. 21, 2003]

## SPECIAL FEDERAL AVIATION REGULATION NO. 104—PROHIBITION AGAINST CERTAIN FLIGHTS BY SYRIAN AIR CARRIERS TO THE UNITED STATES

1. *Applicability*. This Special Federal Aviation Regulation (SFAR) No. 104 applies to any air carrier owned or controlled by Syria that is engaged in scheduled international air services.

2. *Special flight restrictions*. Except as provided in paragraphs 3 and 4 of this SFAR No. 104, no air carrier described in paragraph 1 may take off from or land in the territory of the United States.

3. *Permitted operations*. This SFAR does not prohibit overflights of the territory of the United States by any air carrier described in paragraph 1.

4. *Emergency situations*. In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft of any air carrier described in paragraph 1 may deviate from this SFAR to the extent required by that emergency. Each person who deviates from this rule must, within 10 days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office a complete report of the operations or the aircraft involved in the deviation, including a description of the deviation and the reasons therefor.

5. *Duration*. This SFAR No. 104 will remain in effect until further notice.

[Doc. No. FAA–2004–17763, 69 FR 31719, June 4, 2004]

## SPECIAL FEDERAL AVIATION REGULATION NO. 107—PROHIBITION AGAINST CERTAIN FLIGHTS WITHIN THE TERRITORY AND AIRSPACE OF SOMALIA

1. *Applicability*. This rule applies to the following persons:

(a) All U.S. air carriers or commercial operators;

(b) All persons exercising the privileges of an airman certificate issued by the FAA except such persons operating U.S.-registered aircraft for a foreign air carrier; and

(c) All operators of aircraft registered in the United States except where the operator of such aircraft is a foreign air carrier.

2. *Flight prohibition*. Except as provided below, or in paragraphs 3 and 4 of this SFAR, no person described in paragraph 1 may conduct flight operations within the territory and airspace of Somalia below flight level (FL) 200.

(a) Overflights of Somalia may be conducted above FL 200 subject to the approval of, and in accordance with the conditions established by, the appropriate authorities of Somalia.

(b) Flights departing from countries adjacent to Somalia whose climb performance will not permit operation above FL 200 prior to entering Somali airspace may operate at altitudes below FL 200 within Somalia to the extent necessary to permit a climb above FL 200, subject to the approval of, and in accordance with the conditions established by, the appropriate authorities of Somalia.

3. *Permitted operations.* This SFAR does not prohibit persons described in section 1 from conducting flight operations within the territory and airspace below FL 200 of Somalia when such operations are authorized either by another agency of the United States Government with the approval of the FAA or by an exemption issued by the Administrator.

4. *Emergency situations.* In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this SFAR to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of Title 14 CFR parts 119, 121, or 135, each person who deviates from this rule must, within 10 days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

5. *Expiration.* This Special Federal Aviation Regulation will remain in effect until further notice.

[Doc. No. FAA–2007–27602, 72 FR 16712, Apr. 5, 2007]

## SPECIAL FEDERAL AVIATION REGULATION NO. 108—MITSUBISHI MU–2B SERIES SPECIAL TRAINING, EXPERIENCE, AND OPERATING REQUIREMENTS

1. *Applicability.* After February 5, 2009, this Special Federal Aviation Regulation (SFAR) applies to all persons who operate the Mitsubishi MU–2B series airplane including those who act as pilot-in-command, act as second-in-command, or other persons who manipulate the controls while under the supervision of a pilot-in-command. This SFAR also applies to those persons who provide pilot training for the Mitsubishi MU–2B series airplane. The requirements in this SFAR are in addition to the requirements of 14 CFR parts 61, 91, and 135 of this chapter.

2. *Compliance and Eligibility.* (a) Except as provided in paragraph (b) of this section, no person may manipulate the controls, act as pilot-in-command, act as second-in-command, or provide pilot training for the Mitsubishi MU–2B series airplane unless that person meets the applicable requirements of this SFAR.

(b) A person, who does not meet the requirements of this SFAR, may manipulate the controls of the Mitsubishi MU–2B series airplane if a pilot-in-command meeting the applicable requirements of this SFAR is occupying a pilot station, and the flight is being conducted for one of the following reasons—

(1) The pilot-in-command is providing pilot training to the manipulator of the controls, and no passengers or cargo are carried on board the airplane;

(2) The pilot-in-command is conducting a maintenance test flight with a second pilot or certificated mechanic, and no passengers or cargo are carried on board the airplane; or

(3) The pilot-in-command is conducting a simulated instrument flight and is using a safety pilot other than the pilot-in-command who manipulates the controls for the purposes of 14 CFR 91.109, and no passengers or cargo are carried on board the airplane.

(c) A person is required to complete *Initial/transition training* if that person has fewer than—

(1) 50 hours of documented flight time manipulating the controls while serving as pilot-in-command of a Mitsubishi MU–2B series airplane in the preceding 24 months; or

(2) 500 hours of documented flight time manipulating the controls while serving as pilot-in-command of a Mitsubishi MU–2B series airplane.

(d) A person is eligible to receive *Requalification training* in lieu of Initial/transition training if that person has at least—

(1) 50 hours of documented flight time manipulating the controls while serving as pilot-in-command of a Mitsubishi MU–2B series airplane in the preceding 24 months; or

(2) 500 hours of documented flight time manipulating the controls while serving as pilot-in-command of a Mitsubishi MU–2B series airplane.

(e) A person is required to complete *Recurrent training* within the preceding 12 months. Successful completion of Initial/transition or Requalification training within the preceding 12 months satisfies the requirement of Recurrent training. A person must successfully complete Initial/transition training or Requalification training before being eligible to receive Recurrent training.

(f) Successful completion of Initial/transition training or Requalification training is a one-time requirement. A person may elect to retake Initial/transition training or Requalification training in lieu of Recurrent training.

(g) A person is required to complete Differences training if that person operates more than one MU–2B model. Differences training between the K and M models of the MU–2B airplane, and the J and L models of the MU–2B airplane, may be accomplished with Level A training. All other Differences training must be accomplished with Level B training. Persons that are operating two models of the MU–2B airplane are required to receive 1.5 hours of Differences training. Persons that are operating three or more models of the MU–2B airplane are required to receive 3.0 hours of Differences training. An additional 1.5 hours of Differences training is required for each model added at a later date. Differences Training is not a recurring annual requirement. Once a person has received

Differences training between the applicable different models, no additional Differences training between those models is required.

3. *Required Pilot Training.* (a) Except as provided in section 2 paragraph (b) of this SFAR, no person may manipulate the controls, act as pilot-in-command, or act as second-in-command of a Mitsubishi MU–2B series airplane for the purpose of flight unless—

(1) The applicable requirements for ground and flight training on Initial/transition, Requalification, Recurrent, and Differences training have been completed, as specified in this SFAR, including Appendices A through D of this SFAR; and

(2) That person's logbook has been endorsed in accordance with paragraph (f) of this section.

(b) No person may manipulate the controls, act as pilot-in-command, or act as second-in-command, of a Mitsubishi MU–2B series airplane for the purpose of flight unless—

(1) That person satisfactorily completes, if applicable, annual Recurrent pilot training on the *Special Emphasis Items*, and all items listed in the *Training Course Final Phase Check* as specified in Appendix C of this SFAR; and

(2) That person's logbook has been endorsed in accordance with paragraph (f) of this section.

(c) Satisfactory completion of the competency check required by 14 CFR 135.293 within the preceding 12 calendar months may not be substituted for the Mitsubishi MU–2B series airplane annual recurrent flight training of this section.

(d) Satisfactory completion of a Federal Aviation Administration sponsored pilot proficiency award program, as described in 14 CFR 61.56(e) may not be substituted for the Mitsubishi MU–2B series airplane annual recurrent flight training of this section.

(e) If a person complies with the requirements of paragraph (a) or (b) of this section in the calendar month before or the calendar month after the month in which compliance with these paragraphs are required, that person is considered to have accomplished the training requirement in the month the training is due.

(f) The endorsement required under paragraph (a) and (b) of this section must be made by—

(1) A certificated flight instructor meeting the qualifications of section 5 of this SFAR; or

(2) For persons operating the Mitsubishi MU–2B series airplane for a part 119 certificate holder within the last 12 calendar months, the 14 CFR part 119 certificate holder's flight instructor if authorized by the FAA and if that flight instructor meets the requirements of section 5 of this SFAR.

(g) All training conducted for the Mitsubishi MU–2B series airplane must be completed in accordance with the applicable MU–2B series checklist listed in table 1 of this SFAR or an MU–2B series airplane checklist that has been accepted by the Federal Aviation Administration's MU–2B Flight Standardization Board.

TABLE 1 TO SFAR 108—MU–2B SERIES AIRPLANE MANUFACTURER'S CHECKLISTS

| Model | Type certificate | Cockpit checklist | Date the checklist was accepted by the FSB |
|---|---|---|---|
| | | MHI document No. | |
| MU–2B–60 .. | A10SW ..... | YET06220C | 2/12/2007 |
| MU–2B–40 .. | A10SW ..... | YET06256A | 2/12/2007 |
| MU–2B–36A | A10SW ..... | YET06257B | 2/12/2007 |
| MU–2B–36 .. | A2PC ..... | YET06252B | 2/12/2007 |
| MU–2B–35 .. | A2PC ..... | YET06251B | 2/12/2007 |
| MU–2B–30 .. | A2PC ..... | YET06250A | 3/2/2007 |
| MU–2B–26A | A10SW ..... | YET06255A | 2/12/2007 |
| MU–2B–26 .. | A2PC ..... | YET06249A | 3/2/2007 |
| MU–2B–26 .. | A10SW ..... | YET06254A | 3/2/2007 |
| MU–2B–25 .. | A10SW ..... | YET06253A | 3/2/2007 |
| MU–2B–25 .. | A2PC ..... | YET06248A | 3/2/2007 |
| MU–2B–20 .. | A2PC ..... | YET06247A | 2/12/2007 |
| MU–2B–15 .. | A2PC ..... | YET06246A | 3/2/2007 |
| MU–2B–10 .. | A2PC ..... | YET06245A | 3/2/2007 |
| MU–2B ..... | A2PC ..... | YET06244A | 3/2/2007 |

4. *Aeronautical Experience.* No person may act as pilot-in-command of a Mitsubishi MU–2B series airplane for the purpose of flight unless that person holds an airplane category and multi-engine land class rating, and has logged a minimum of 100 flight hours of pilot-in-command time in multi-engine airplanes.

5. *Instruction, Checking and Evaluation.* (a) *Flight Instructor (Airplane).* No flight instructor may provide instruction or conduct a flight review in a Mitsubishi MU–2B series airplane unless that flight instructor meets the requirements of this paragraph.

(1) Each flight instructor who provides flight training in the Mitsubishi MU–2B series airplane must meet the pilot training and documentation requirements of section 3 of this SFAR before giving flight instruction in the Mitsubishi MU–2B series airplane.

(2) Each flight instructor who provides flight training in the Mitsubishi MU–2B series airplane must meet the currency requirements of paragraphs (a) and (c) of section 6 of this SFAR before giving flight instruction in the Mitsubishi MU–2B series airplane.

(3) Each flight instructor who provides flight training in the Mitsubishi MU–2B series airplane must have a minimum total pilot time of 2,000 pilot-in-command hours, 800 pilot-in-command hours in multiengine airplanes.

(4) Each flight instructor who provides flight training in the Mitsubishi MU–2B series airplane must have—

(i) 300 pilot-in-command hours in the Mitsubishi MU–2B series airplane, 50 hours of which must have been within the preceding 12 months; or

(ii) 100 pilot-in-command hours in the Mitsubishi MU–2B series airplane, 25 hours of which must have been within the preceding 12 months, and 300 hours providing instruction in a FAA-approved Mitsubishi MU–2B simulator or FAA-approved Mitsubishi MU–2B flight training device, 25 hours of which must have been within the preceding 12 months.

(b) *Flight Instructor (Simulator/ Flight Training Device)*. No flight instructor may provide instruction for the Mitsubishi MU–2B series airplane unless that instructor meets the requirements of this paragraph.

(1) Each flight instructor who provides flight training for the Mitsubishi MU–2B series airplane must meet the pilot training and documentation requirements of section 3 of this SFAR before giving flight instruction for the Mitsubishi MU–2B series airplane.

(2) Each flight instructor who provides flight training for the Mitsubishi MU–2B series airplane must meet the currency requirements of paragraph (c) of section 6 of this SFAR before giving flight instruction for the Mitsubishi MU–2B series airplane.

(3) Each flight instructor who provides flight training for the Mitsubishi MU–2B series airplane must have—

(i) A minimum total pilot time of 2000 pilot-in-command hours and 800 pilot-in-command hours in multiengine airplanes; and

(ii) Within the preceding 12 months, either 50 hours of Mitsubishi MU–2B series airplane pilot-in-command experience or 50 hours providing simulator or flight training device instruction for the Mitsubishi MU–2B.

(c) *Checking and Evaluation*. No person may provide checking or evaluation for the Mitsubishi MU–2B series airplane unless that person meets the requirements of this paragraph.

(1) For the purpose of checking, designated pilot examiners, training center evaluators, and check airmen must have completed the appropriate training in the Mitsubishi MU–2B series airplane in accordance with section 3 of this SFAR.

(2) For checking conducted in the Mitsubishi MU–2B series airplane, each designated pilot examiner and check airman must have 100 hours pilot-in-command flight time in the Mitsubishi MU–2B series airplane and maintain currency in accordance with section 6 of this SFAR.

6. *Currency Requirements and Flight Review*. (a) The takeoff and landing currency requirements of 14 CFR 61.57 must be maintained in the Mitsubishi MU–2B series airplane. Takeoff and landings in other multiengine airplanes do not meet the takeoff landing currency requirements for the Mitsubishi MU–2B series airplane. Takeoff and landings in either the short-body or long-body Mitsubishi MU–2B model airplane may be credited toward takeoff and landing currency for both Mitsubishi MU–2B model groups.

(b) Instrument experience obtained in other category and class of aircraft may be used to satisfy the instrument currency requirements of 14 CFR 61.57 for the Mitsubishi MU–2B series airplane.

(c) Satisfactory completion of a flight review to satisfy the requirements of 14 CFR 61.56 is valid for operation of a Mitsubishi MU–2B series airplane only if that flight review is conducted in a Mitsubishi MU–2B series airplane. The flight review for Mitsubishi MU–2B series airplanes must include the *Special Emphasis Items*, and all items listed in the *Training Course Final Phase Check* of Appendix C of this SFAR.

(d) A person who successfully completes the Initial/transition, Requalification, or Recurrent training requirements, as described in section 3 of this SFAR, also meets the requirements of 14 CFR 61.56 and need not accomplish a separate flight review provided that at least 1 hour of the flight training was conducted in the Mitsubishi MU–2B series airplane.

7. *Operating Requirements*. (a) Except as provided in paragraph (b) of this section, no person may operate a Mitsubishi MU–2B airplane in single pilot operations unless that airplane has a functional autopilot.

(b) A person may operate a Mitsubishi MU–2B airplane in single pilot operations without a functional autopilot when—

(1) Operating under day visual flight rule requirements; or

(2) Authorized under a FAA approved minimum equipment list for that airplane, operating under instrument flight rule requirements in daytime visual meteorological conditions.

(c) No person may operate a Mitsubishi MU–2B series airplane unless a copy of the appropriate Mitsubishi Heavy Industries MU–2B Airplane Flight Manual is carried on board the airplane and is accessible during each flight at the pilot station.

(d) No person may operate a Mitsubishi MU–2B series airplane unless an MU–2B series airplane checklist, appropriate for the model being operated and accepted by the Federal Aviation Administration MU–2B Flight Standardization Board, is accessible for each flight at the pilot station and is used by the flight crewmembers when operating the airplane.

(e) No person may operate a Mitsubishi MU–2B series airplane contrary to the MU–2B training program in the Appendices of this SFAR.

(f) If there are any differences between the training and operating requirements of this SFAR and the MU–2B Airplane Flight Manual's procedures sections (Normal, Abnormal,

and Emergency) and the MU–2B airplane series checklist specified in section 3(g), table 1, the person operating the airplane must operate the airplane in accordance with the training specified in section 3(g), table 1.

8. *Credit for Prior Training.* Initial/transition or requalification training conducted between July 27, 2006, and April 7, 2008, using Mitsubishi Heavy Industries MU–2B Training Program, Part number YET 05301, Revision Original, dated July 27, 2006, or Revision 1, dated September 19, 2006, is considered to be compliant with this SFAR, if the student met the eligibility requirements for the applicable category of training and the student's instructor met the experience requirements of this SFAR.

9. *Incorporation by Reference.* You must proceed in accordance with the Mitsubishi Heavy Industries MU–2B Checklists as listed in Table 1 of this SFAR which are incorporated by reference. The Director of the Federal Register approved this incorporation by reference in accordance with 5 U.S.C. section 552(a) and 1 CFR part 51. The Mitsubishi Heavy Industries MU–2B Checklists are distributed by Turbine Aircraft Services, Inc. You may obtain a copy from Turbine Aircraft Services Inc., 4550 Jimmy Doolittle Drive, Addison, Texas 75001, USA. You may inspect a copy at U.S. Department of Transportation, Docket Management Facility, Room W 12–140, West Building Ground Floor, 1200 New Jersey Ave., SE., Washington, DC 20590–0001, or at the National Archives and Records Administration at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

10. *Expiration.* This SFAR will remain in effect until further notice.

## APPENDIX A TO SFAR 108—MU–2B GENERAL TRAINING REQUIREMENTS

(a) The Mitsubishi MU–2B Training Program consists of both ground and flight training. The minimum pilot training requirement hours are shown in Table 1 of this appendix for ground instruction and Table 2 of this appendix for flight instruction. An additional ground training requirement for Differences Training is shown in Table 3.

(b) The MU–2B is certificated by the Federal Aviation Administration (FAA) as a single pilot airplane. No training credit is given for second in command (SIC) training and no credit is given for right seat time under this program. Only the sole manipulator of the controls of the MU–2B airplane, Flight Training Device (FTD), or Level C or D simulator can receive training credit under this program.

(c) The training program references the applicable MU–2B airplane flight manual (AFM) in several sections. There may be differences between sequencing of procedures found in the AFM's procedures sections and the checklists, procedures, and techniques found within this training program. The FAA's Mitsubishi MU–2B SFAR requires that if there are any differences between the AFM's procedures sections (Normal, Abnormal, and Emergency) and the training and operating requirements of the Mitsubishi MU–2B SFAR, the person operating the airplane must operate the airplane in accordance with the training specified in the SFAR and this MU–2B training program.

(d) Minimum Programmed Training Hours

TABLE 1 TO APPENDIX A OF SFAR 108

| Ground instruction | | |
|---|---|---|
| Initial/transition | Requalification | Recurrent |
| 20 hours ..... | 12 hours ..... | 8 hours. |

TABLE 2 TO APPENDIX A OF SFAR 108

| Flight instruction | | |
|---|---|---|
| Initial/transition | Requalification | Recurrent |
| 12 hours with a minimum of 6 hours at Level E. | 8 hours Level C or Level E. | 4 hours at Level E, or 6 hours at Level C. |

TABLE 3 TO APPENDIX A OF SFAR 108

| Differences training | |
|---|---|
| 2 models currently ..... | 1.5 hours at Level A or B. |
| More than 2 models currently | 3 hours at Level A or B. |
| Each additional model added | 1.5 hours at Level A or B. |

(e) Definitions of Levels of Training as Used in This Appendix

(1) LEVEL A Training—Training that is conducted through self instruction by the pilot.

(2) LEVEL B Training—Training that is conducted in the classroom environment with the aid of a qualified instructor who meets the requirements of this SFAR.

(3) LEVEL C Training—Training that is accomplished in an FAA-approved Level 5, 6, or 7 Flight Training Device (FTD). In addition to the basic FTD requirements, the FTD must be representative of the MU–2B cockpit controls and be specifically approved by the FAA for the MU–2B airplane.

(4) LEVEL E Training—Training that must be accomplished in the MU–2B airplane, Level C simulator, or Level D simulator.

## APPENDIX B TO SFAR 108—MU–2B GROUND TRAINING CURRICULUM CONTENTS

All items in the ground training curriculum must be covered. The order of presentation is at the discretion of the instructor. The student must satisfactorily complete a written or oral exam given by the training provider based on this MU–2B Training Program.

I. Aircraft General
A. Introduction
B. Airplane (Structures/Aerodynamics/Engines) Overview
1. Fuselage
2. Wing
3. Empennage
4. Doors
5. Windshield and Windows
C. Airplane Systems
1. Electrical Power
2. Lighting
3. Fuel System
4. Powerplant
5. Environmental
6. Fire Protection
7. Ice and Rain Protection
8. Landing Gear and Brakes
9. Flight Controls and Trim
10. Pilot Static System/Flight Instruments
11. Oxygen System
D. Operating Limitations
1. Weights
2. Center of Gravity and Loading
3. Airspeeds
4. Maneuvering Load Factors
5. Takeoff And Landing Operations
6. Enroute Operations
E. Required Placards
F. Instrument Markings
G. Flight Characteristics
1. Control System
2. Stability and Stall Characteristics
3. Single Engine Operation
4. Maneuvering and Trim
5. Takeoff and Landing
II. Electrical Power
A. General Description
B. DC Electrical System
1. DC Power Generation
2. DC Power Distribution
3. Battery System
4. External Power System
C. AC Electrical System
1. AC Power Generation
2. Controls and Indicators
3. AC Power Distribution
D. Limitations
1. General Limitations
2. Instrument Markings
III. Lighting
A. Exterior Lighting System
1. Navigation Lights
2. Anti-Collision Lights
3. Wing Inspection Lights
4. Taxi Lights
5. Landing Lights
6. Rotating Beacon
7. Operation
B. Interior Lighting System
1. Flight Compartment Lights
2. Passenger Compartment Lights
C. Emergency Lighting System
1. Cockpit Emergency Lighting
2. Aircraft Emergency Lighting
D. Procedures
1. Normal
2. Abnormal
3. Emergency
IV. Master Caution System
A. System Description and Operation
1. Master Caution Light and Reset Switch
2. Annunciator and Indicator Panels
3. Operation Lights
4. System Tests
B. Procedures
V. Fuel System
A. Fuel Storage
1. Refueling/Balancing
2. De-Fueling and Draining
3. Tank Vent System
B. Fuel Distribution
1. Fuel Transfer
2. Fuel Balancing
3. Boost Pump Operation
C. Fuel Indicating
1. Fuel Quantity
2. Low Fuel Warning
D. Fuel System Limitations
1. Approved Fuels
2. Fuel Anti-Icing Additives
3. Fuel Temperature Limitations
4. Fuel Transfer and Fuel Imbalance
5. Fuel Pumps
6. Refueling
7. Capacity
8. Unusable Fuel
VI. Powerplant
A. Engine Description
1. Major Sections
2. Cockpit Controls
3. Instrumentation
4. Operation
B. Engine Systems
1. Lubrication
2. Fuel
3. Ignition
4. Engine Starting
5. Anti-Ice
C. Propeller System
1. Ground Operations
2. In-Flight Operations
3. Synchronization
4. De-Ice
D. Ground Checks
1. Overspeed Governor
2. SRL and Delta P/P
3. NTS and Feather Valve
4. Supplementary NTS
E. In Flight Post Maintenance Checks
1. NTS In-Flight
2. Flight Idle Fuel Flow
F. Limitations
1. Powerplant
2. Engine Starting Conditions
3. Airstart Envelope
4. Engine Starting
5. Oil
6. Fuel
7. Starter/Generator
8. External Power
9. Instrument Markings (as applicable)
a. TPE331–10–511M
b. TPE331–5/6–252/251M

c. TPE331–1–151M
G. Engine Malfunctions and Failures
1. Propeller Coupling
2. Torque Sensor
3. Engine Overspeed
4. Fuel Control Spline
VII. Fire Protection
A. Introduction
B. Engine Fire Detection
1. System Description
2. Annunciator
C. Portable Fire Extinguishers
VIII. Pneumatics
A. System Description
B. System Operation
1. Air Sources
2. Limitations
C. Wing and Tail De-Ice
1. System Description
2. Controls
D. Entrance and Baggage Door Seal
1. Air Source
2. Operation
IX. Ice and Rain Protection
A. General Description
B. Wing De-Ice
1. System Description
2. Operation
3. Controls and Indications
C. Engine Anti-Ice
1. System Description
2. Operation
3. Controls and Indications
D. Window Defog
1. Controls
2. Operation
E. Tail De-Ice
1. Horizontal Stabilizer De-Ice
2. Vertical Stabilizer De-Ice
F. Pitot Static System Anti-Icing
1. Pitot Tube Heating
2. Static Port Heating
3. AOA Transmitter Heating
G. Windshield De-Ice/Anti-Ice
1. System Description
2. Controls and Indications
H. Windshield Wiper
1. System Description
2. Control and Operation
I. Propeller De-Ice
1. System Description
2. Controls and Indications
J. Ice Detector
1. System Description
2. Controls and Indications
3. Operation
K. Limitations
1. Temperatures
2. Cycling
X. Air Conditioning
A. System Description and Operation
1. Refrigeration Unit (ACM)
2. Air Distribution
3. Ventilation
4. Temperature Control
5. Water Separator
B. Limitations
XI. Pressurization
A. General
B. Component Description
1. Cabin Pressure Controller
2. Altitude Pressure Regulator
3. Ram Air
4. Outflow Safety Valves
5. Air Filters
6. Manual Control Valve
7. Pneumatic Relays
8. Venturi
C. System Operation
1. Ground Operation
2. Takeoff Mode
3. In-Flight Operation
4. Landing Operation
D. Emergency Operation
1. High Altitude
2. Low Altitude
E. Limitations
1. Maximum Differential
2. Landing Limitations
XII. Landing Gear and Brakes
A. General Description
1. Landing Gear Doors
2. Controls and Indicators
3. Warning Systems
4. Emergency Extension
B. Nosewheel Steering
C. Landing Gear/Brakes/Tires
D. Limitations
1. Airspeed (with flaps)
2. Emergency Extension
3. Tire Speed
4. Brake Energy
XIII. Flight Controls
A. Primary Flight Controls (Elevator/Rudder/Spoilers)
1. Description
2. Operations
B. Trim Systems
1. System Description
2. Roll Trim
a. Normal Operation
b. Emergency Operation
3. Rudder Trim
4. Pitch Trim
a. General
b. Operations
c. Trim-in-Motion Alert System
C. Secondary Flight Controls
1. System Description
2. Flaps
D. Limitations
1. Instrument Markings
2. Placards
E. Flight Characteristics
1. Control Systems
2. Stability and Stall Characteristics
3. Single Engine Operation
5. Maneuvering and Trim
6. Takeoff and Landing
XIV. Avionics
A. Pitot-Static System
1. System Description
2. Pilot's System
3. Co-Pilot's System

4. Alternate Static
B. Air Data Computer
C. Attitude Instrument Displays (EFIS and Standard)
1. EADI
2. Standard Attitude Gyro
D. AHRS
1. System Description
2. Controls and Indications
E. Navigation
1. Nav Systems Descriptions
2. Compass System Descriptions
3. Display Systems
4. Terrain Awareness System
5. Traffic Avoidance System
F. Communications
1. VHF Communications Systems
2. Audio Control
G. Standby Flight Instruments
1. System Description
2. Controls and Indications
H. Automatic Flight Control System
1. Controls and Indications
2. Yaw Damper
3. Trim-in-Motion Alert System
4. Autopilot Automatic Disconnect
5. Aural Alert System
I. Angle of Attack (AOA) System
1. System Description
2. Controls and Indications
J. Limitations
XV. Oxygen System
A. System Description
B. Crew Oxygen
1. Oxygen Cylinder Assembly
2. Pressure Gauge
3. Outlet Valves
4. Duration
C. Passenger Oxygen
1. System Description
2. Duration
D. Limitations
XVI. Performance and Planning
A. Takeoff Performance Charts
1. Runway Requirements
2. Normal and with One Engine Inoperative
B. Climb Performance
1. Normal and with One Engine Inoperative
2. Obstacle Clearance
3. Power Assurance Charts
C. Cruise Performance
1. Power Charts
2. Maximum Practical Altitude
3. Cruise Speeds/Engine Health
4. Buffet Boundary
D. Landing Performance
1. Runway Requirements
a. Dry Runway
b. Wet Runway
2. Go-Around
a. One Engine Inoperative
b. All Engines
XVII. Weight and Balance
A. Aircraft Loading Procedures
B. Limitations
1. Weight Limits
2. C.G. Limits
C. Plotter
1. Description
2. Use
D. Calculations
1. AFM Procedures
2. Examples
XVIII. General Subjects
A. Controlled Flight into Terrain Awareness
B. CRM/SPRM
1. Crew Resource Management
2. Single Pilot Resource Management
C. MU–2B Flight Standardization Board Report

APPENDIX C TO SFAR 108—MU–2B FINAL PHASE CHECK AND FLIGHT TRAINING REQUIREMENTS

*(I) MU–2B Final Phase Check Requirements*

(A) Completion of the MU–2B Training Program in this appendix requires successful completion of a final phase check taken in the MU–2B airplane or a Level C or D simulator for Initial/Transition training. The final phase check for Requalification or Recurrent Training may be taken in the MU–2B airplane, a Level C or D simulator, or in a Level 5, 6, or 7 FAA-approved MU–2B Flight Training Device (FTD). The final phase check must be conducted by a qualified flight instructor who meets the requirements of the MU–2B SFAR. Simultaneous training and checking is not allowed for Initial/Transition training.

(B) For pilots operating under 14 CFR part 135, checking must be done in accordance with applicable regulations. For the purpose of recurrent testing in 14 CFR 135.293(b), the MU–2B is considered a separate type of aircraft.

(C) The final phase check must be conducted using the standards contained in the FAA Commercial Pilot—Airplane Multi-Engine Land, and Instrument Rating—Airplane Practical Test Standards (PTS).

(D) The final phase check portion of the training is comprised of the following tasks for *all* airmen (instrument rated and non instrument rated). An (*) indicates those maneuvers for Initial/Transition training which must be completed in the MU–2B airplane, or a Level C or D simulator.

(1) Preflight Check.

(2) Start and Taxi Procedures.

(3) * Normal Takeoff (X-Wind) (Two Engine).

(4) * Takeoff Engine Failure.

(5) Rejected Takeoff.

(6) * Steep Turns.

(7) * Approach to Stalls (3) (must include Accelerated Stalls).

(8) * Maneuvering with One Engine Inoperative—Loss of Directional Control ($V_{mc}$).

(9) Abnormal and Emergency Procedures—To include MU–2B operation in icing conditions without the autopilot or without trim-

in-motion or automatic autopilot disconnect.

(10) * Precision Approach (One Engine Inoperative).

(11) Go Around/Rejected Landing.

(12) Normal Landing (X-Wind).

(13) * Landing with One Engine Inoperative.

(14) * Landing with Non-Standard Flap Configuration (0 or 5 degrees).

(15) Postflight Procedures.

(E) The following additional tasks are required for those airmen who possess an instrument rating. An (*) indicates those maneuvers for Initial/Transition training which must be completed in the MU–2B airplane, or a Level C or D simulator.

(1) Preflight Check.

(2) Unusual Attitudes.

(3) Abnormal and Emergency Procedures.

(4) Basic Instrument Flight Maneuvers.

(5) Area Arrival and Departure.

(6) Holding.

(7) Precision Approach (Two Engine).

(8) * Non-Precision Approaches (2)—Must include a Non-Precision Approach with One Engine Inoperative.

(9) Missed Approach from either Precision or Non Precision Instrument Approach (Two Engine).

(10) Landing from a Straight-In or Circling Approach.

(11) Circling Approach.

(12) Postflight Procedures.

(F) A form titled ''Training Course Final Phase Check'' has been included in this appendix for use in creating a training and final check record for the student and the training provider.

*(II) MU–2B Required Flight Training Tasks*

(A) General Flight Training Requirements: All flight training maneuvers must be consistent with this training program and the applicable MU–2B checklist accepted by the FAA. The maneuver profiles shown in Appendix D to this SFAR No. 108 are presented to show the required training scenarios. Profiles conducted in flight require planning and care on the part of both the instructor and student in order to provide the highest level of safety possible. The maneuver profiles shown in Appendix D to this SFAR No. 108 do not account for local geographic and flight conditions. The instructor and student must consider local conditions when performing these maneuvers in flight.

(B) Special Emphasis Items: Certain aspects of pilot knowledge, skills and abilities must be emphasized and evaluated during the training and checking process of the MU–2B Training Program.

(1) Accelerated stall awareness and recovery procedures with emphasis on configuration management. Awareness of the margin to stall in all flight operations and configurations must be emphasized throughout training.

(2) $V_{mc}$ awareness and early recognition must be trained and checked. Minimum airspeeds for one engine inoperative must be emphasized in all configurations.

(3) Airspeed management and recognition of airspeed deterioration below recommended speeds and recovery methods in this training program must be emphasized throughout training and checking.

(4) Knowledge of icing conditions and encounters must be emphasized throughout training and checking including: Equipment requirements, certification standards, minimum airspeeds, and the use of the autopilot and other applicable AFM procedures.

(5) Airplane performance characteristics with all engines operating and with one engine inoperative must be emphasized.

(C) MU–2B Flight Training Program Proficiency Standards.

(1) Each pilot, regardless of the level of pilot certificate held, must be trained to and maintain the proficiency standards described below.

(a) General VFR/IFR.

(i) Bank Angle—±5 degrees of prescribed bank angle

(ii) Heading—±10 degrees

(iii) Altitude—±100 feet

(iv) Airspeed—±10 knots

(b) Instrument Approach—Final Approach Segment.

*Precision Approach*

(i) Heading—±10 degrees

(ii) Altitude—±100 feet

(iii) Airspeed—±10 knots prior to final

(iv) Airspeed—±10 knots after established on final

(v) Glide Slope (GS)/Localizer Deviation—Within ¾ scale—not below GS

*Non-Precision Approach*

Straight In

(vi) Initial Approach Altitude—±100 feet

(vii) Heading—±10 degrees

(viii) Altitude (MDA)— + 100, −0 feet

(ix) Airspeed— + 10 knots

(x) Course Deviation Indicator—Within ¾ scale or ±10 degrees on RMI

Circling Approach

(xi) Maximum Bank—30 degrees

(xii) Heading—Within 10 degrees

(xiii) Altitude— + 100, −0 feet

(xiv) Airspeed—Within 10 knots but not less than $V_{ref}$

(c) In all cases, a pilot must show complete mastery of the aircraft with the outcome of each maneuver or procedure never seriously in doubt.

(D) Maneuvers and Procedures. All flight training maneuvers and procedures must be

conducted as they are applicable to the MU–2B and each type of operations involved.

*Preflight*

(1) Preflight Inspection—The pilot must—

(a) Conduct an actual visual inspection of the exterior and interior of the airplane, locating each item and explaining briefly the purpose of inspecting it; and

(b) Demonstrate the use of the appropriate checklist, appropriate control system checks, starting procedures, radio and electronic equipment checks, and the selection of proper navigation and communications radio facilities and frequencies prior to flight.

(2) Taxiing—this maneuver includes taxiing in compliance with instructions issued by the appropriate ATC facility or by the person conducting the check.

(3) Pre-Takeoff Checks—The pilot must satisfactorily complete all pre-takeoff aircraft systems and powerplant checks before takeoff.

*Takeoff and Departure*

(1) Normal—One normal takeoff, which for the purpose of this maneuver, begins when the airplane is taxied into position on the runway to be used.

(2) Instrument Takeoff—Takeoff with simulated instrument conditions at or before reaching an altitude of 200 feet above the airport elevation and visibility of 1800 RVR.

(3) Crosswind—One crosswind takeoff, if practical, under the existing meteorological, airport and traffic conditions.

(4) Powerplant Failure—One takeoff with a simulated failure of the most critical powerplant at a point after Vlof. In the MU–2B airplane, all simulated powerplant failures must only be initiated when the person conducting the training or checking determines that it is safe under the prevailing conditions. The instructor must assure that the power lever does not move beyond the flight idle gate.

(5) Rejected Takeoff—A rejected takeoff performed in an airplane during a normal takeoff run after reaching a reasonable speed determined by giving due consideration to aircraft characteristics, runway length, surface conditions, wind direction and velocity, brake heat energy, and any other pertinent factors that may adversely affect safety or the airplane.

(6) Area departure—Demonstrate adequate knowledge of departure procedures, establishing appropriate ATC communications and following clearances.

*Flight Maneuvers and Procedures*

(1) Steep bank turns—Each steep turn must involve a bank angle of 50 degrees with a heading change of at least 180 degrees but no more than 360 degrees.

(2) Approaches to stalls—Must be performed in each of the following configurations; takeoff, clean, and landing. One approach to a stall must be performed in either the takeoff, clean, or landing configuration while in a turn with a bank angle between 15 degrees and 30 degrees.

(3) Accelerated stalls—must be done in the flaps 20 and flaps 0 configurations.

(4) Recovery procedures must be initiated at the first indication of a stall.

*Normal and Abnormal Procedures and Operations*

(1) Runway trim.

(2) Normal and abnormal operations of the following systems:

(a) Pressurization.

(b) Pneumatic.

(c) Air conditioning.

(d) Fuel.

(e) Electrical.

(f) Flight control.

(g) Anti-icing and de-icing.

(h) Autopilot.

(i) Stall warning devices, as applicable.

(j) Airborne radar and weather detection devices.

(k) Other systems, devices or aids available.

(l) Electrical, flight control and flight instrument system malfunction or failure.

(m) Landing gear and flap system malfunction or failure.

(n) Failure of navigation or communications equipment.

*Flight Emergency Procedures*

(1) Powerplant failure.

(2) Powerplant, cabin, flight deck, wing and electrical fires.

(3) Smoke control.

(4) Fuel jettisoning, as applicable.

(5) Any other emergency procedures outlined in the appropriate AFM or FAA-accepted checklist.

*Instrument Procedures*

(1) Area departure.

(2) Use of navigation systems including adherence to assigned course and/or radial.

(3) Holding procedures.

(4) Aircraft approach category airspeeds.

(5) Approach procedures: Each instrument approach must be performed according to all procedures and limitations approved for that facility. An instrument approach procedure begins when the airplane is over the initial approach fix for the approach procedure being used and ends when the airplane touches down on the runway or when transition to missed approach configuration is completed.

(a) ILS, ILS/DME, approach.

(i) A manually controlled ILS with a powerplant inoperative; occurring before initiating the final approach course and continuing to full stop or through the missed approach procedure.

(ii) A manually controlled ILS utilizing raw data to 200 feet or decision height (DH).

(iii) An ILS with the autopilot coupled.

(b) Non-precision approaches.

(i) NDB, NDB/DME approach, straight in or circle.

(ii) VOR, VOR/DME, straight in or circle.

(iii) LOC, LOC/DME, LOC backcourse.

(iv) GPS approach (If the aircraft/FTD/flight simulator has a GPS installed, the applicant must demonstrate GPS approach proficiency.)

(v) ASR approach.

(c) Missed approach procedure: One missed approach procedure must be a complete approved missed approach procedure as published or as assigned by ATC.

(i) From a precision approach.

(ii) From a non-precision approach.

(iii) With a simulated powerplant failure.

(d) Circling approach.

(i) The circling approach must be made to the authorized MDA and followed by a change in heading and the necessary maneuvering (by visual reference) to maintain a flight path that permits a normal landing on the runway.

(ii) The circling approach must be performed without excessive maneuvering and without exceeding the normal operating limits of the airplane and the angle of bank must not exceed 30°.

*Landings and Approaches to Landings*

(1) Airport orientation.

(2) Normal landings with stabilized approach.

(3) Crosswind landings.

(4) From a precision instrument approach.

(5) From a precision instrument approach with a powerplant inoperative.

(6) From a non-precision instrument approach.

(7) From a non-precision instrument approach with a powerplant inoperative.

(8) From a circling approach or VFR traffic pattern.

(9) Go Around/Rejected landings—a normal missed approach procedure or a visual go-around after the landing is rejected. The landing should be rejected at approximately 50 feet and approximately over the runway threshold.

(10) Zero flap landing.

(a) Runway requirements.

(b) Airspeeds.

| TRAINING COURSE FINAL PHASE CHECK | | | | |
|---|---|---|---|---|
| NAME OF AIRMAN *(last, first, middle initial)* | | GRADE OF CERTIFICATE | | CERTIFICATE NUMBER |
| DATE OF CHECK | LOCATION OF CHECK | TYPE OF CHECK | MU-2B MODEL | FTD MODEL |
| SCHOOL NAME | INSTRUCTOR NAME | CFI NUMBER | | EXPIRES |

| FLIGHT MANEUVERS GRADE *(S-Satisfactory U-Unsatisfactory)* | | |
|---|---|---|
| **MANEUVERS REQUIRED FOR ALL AIRMEN** | A/C | FTD |
| PREFLIGHT CHECK | | |
| START AND TAXI PROCEDURES | | |
| *NORMAL TAKEOFF (X WIND) (TWO ENGINE) | | |
| *TAKEOFF ENGINE FAILURE | | |
| REJECTED TAKEOFF | | |
| *STEEP TURNS | | |
| *APPROACH TO STALL (3) | | |
| *MANEUVERING WITH ONE ENGINE INOP (VMC) | | |
| ABNORMAL AND EMERGENCY PROCEDURES - TO INCLUDE THE MU-2 OPERATIOIN IN ICING CONDITIONS WITHOUT THE AUTOPILOT OR WITHOUT TRIM-IN-MOTION/AUTOMATIC AUTOPILOT DISCONNECT. | | |
| *PRECISION APROACH (ONE ENGINE INOPERATIVE) | | |
| GO AROUND / REJECTED LANDING | | |
| NORMAL LANDING (X WIND) | | |
| *LANDING WITH ONE ENGINE INOPERATIVE | | |
| *LANDING WITH NON-STANDARD FLAP CONFIG | | |
| POST FLIGHT PROCEDURES | | |
| **ADDITIONAL MANEUVERS REQUIRED FOR INSTRUMENT RATED AIRMEN** | A/C | FTD |
| PREFLIGHT CHECK | | |
| UNUSUAL ATTITUDES | | |
| ABNORMAL AND EMERGENCY PROCEDURES | | |
| BASIC INSTRUMENT FLIGHT MANEUVERS | | |
| AREA ARRIVAL AND DEPARTURE | | |
| HOLDING | | |
| PRECISION APPROACH (TWO ENGINE) | | |
| *NON-PRECISION APPROACHES (2) | | |
| MISSED APPROACH FROM EITHER PRECISION OR NON-PRECISION APPROACH (TWO ENGINE) MUST INCLUDE AN APPROACH WITH ONE ENGINE INOP | | |
| LANDING FROM A STRAIGHT-IN/CIRCLING APPROACH | | |
| CIRCLING APPROACH | | |
| POST FLIGHT PROCEDURES | | |

| | | | | | |
|---|---|---|---|---|---|
| RESULTS OF CHECK | SATISFACTORY | | FLIGHT TIMES | AIRCRAFT | FTD |
| | UNSATISFACTORY | | | | |
| INSTRUCTOR SIGNATURE | | | AIRMAN SIGNATURE | | |

APPENDIX D TO SFAR 108—MU–2B MANEUVER PROFILES

(A) The Maneuver Profiles are provided to develop pilot proficiency with the procedures and techniques contained within this MU–2B Flight Training Program.

(B) Though constructed for use in the airplane they may also be used in the Flight Training Device (FTD). When an FTD is

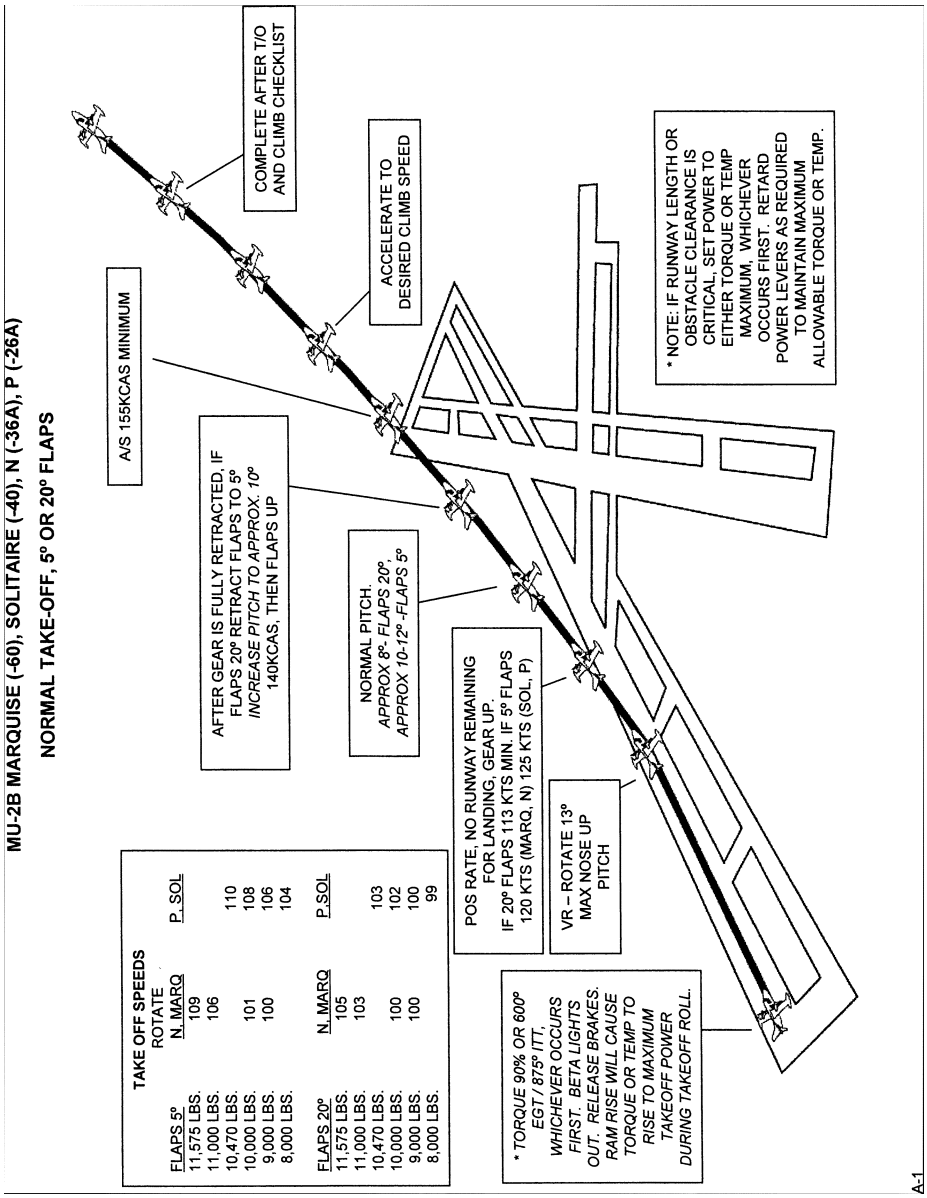
used, a maneuver may be performed at lower altitudes or carried to its completion. When training is conducted in the MU–2B airplane, all maneuvers must be performed in a manner sufficient to evaluate the performance of the student while never jeopardizing the safety of the flight.

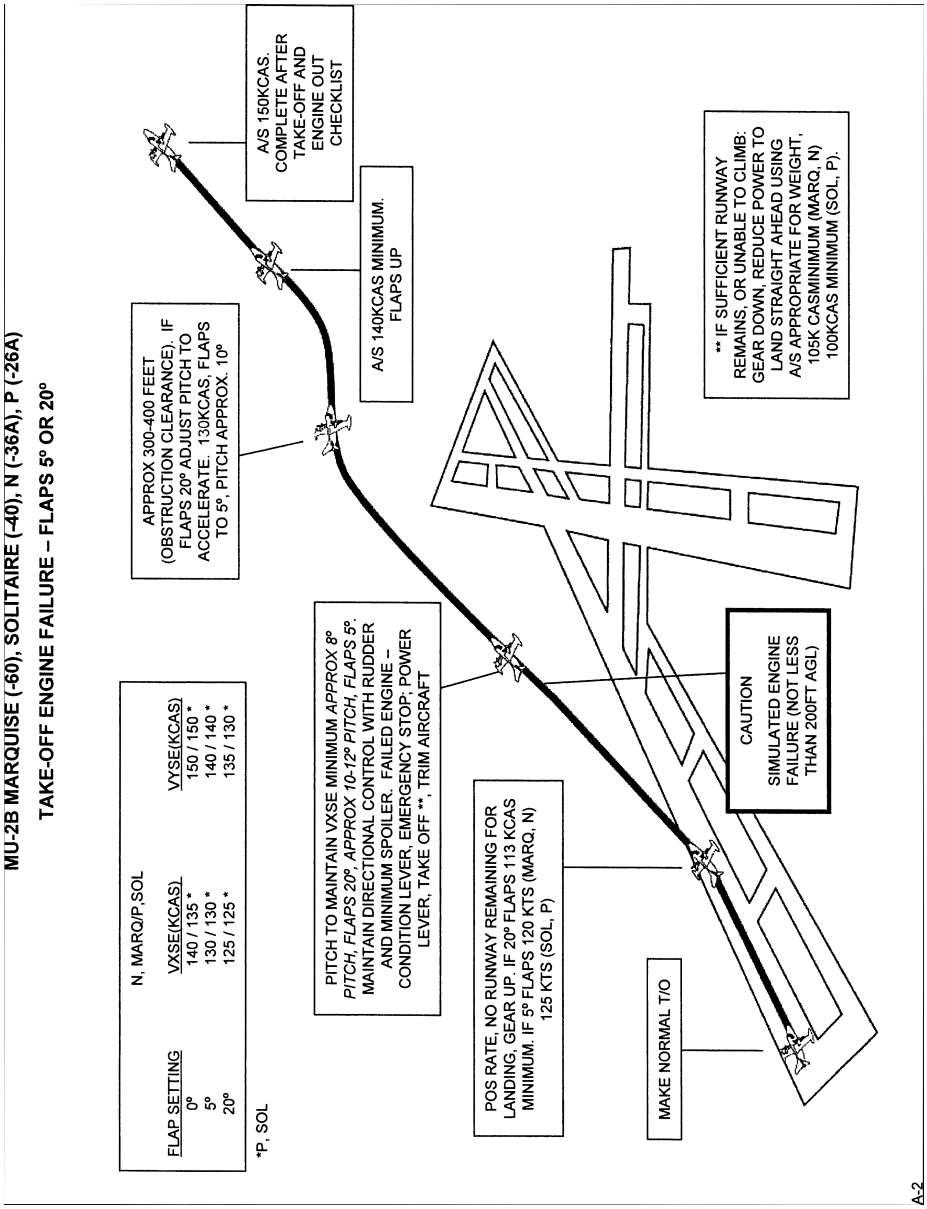
(C) The maneuvers profiles are broken down into three sections by similar aircraft model groups. The three sections of this program are:

(1) Marquise (−60), Solitaire (–40), N (–36A), P (–26A)—Figures A–1 through A–28

(2) J (–35), K (–25), L (–;36), M (–26)—Figures B–1 through B–28

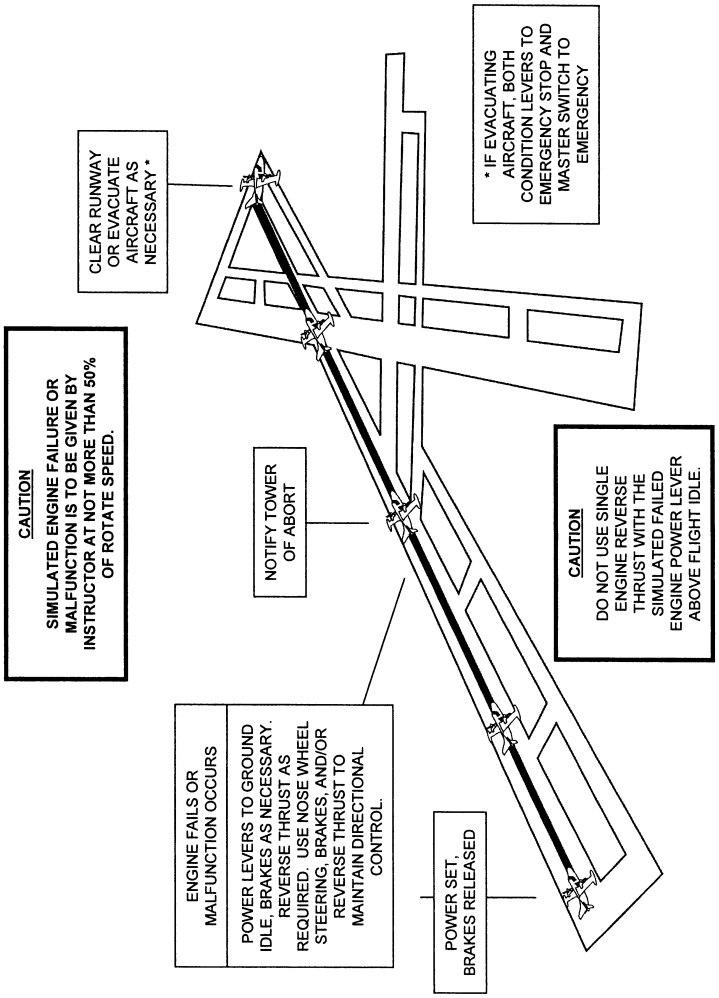
(3) B, D (–10), F (–20), G (–30)—Figures C–1 through C–28


MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)
NORMAL TAKE-OFF, 5° OR 20° FLAPS
TAKE OFF SPEEDS
ROTATE
FLAPS 5° N. MARQ P. SOL
11,575 LBS. 109
11,000 LBS. 106
10,470 LBS. 110
10,000 LBS. 101 108
9,000 LBS. 100 106
8,000 LBS. 104
FLAPS 20° N. MARQ P.SOL
11,575 LBS. 105
11,000 LBS. 103
10,470 LBS. 103
10,000 LBS. 100 102
9,000 LBS. 100 100
8,000 LBS. 99
* TORQUE 90% OR 600° EGT / 875° ITT, WHICHEVER OCCURS FIRST. BETA LIGHTS OUT. RELEASE BRAKES. RAM RISE WILL CAUSE TORQUE OR TEMP TO RISE TO MAXIMUM TAKEOFF POWER DURING TAKEOFF ROLL.
VR – ROTATE 13° MAX NOSE UP PITCH
POS RATE. NO RUNWAY REMAINING FOR LANDING, GEAR UP.
IF 20° FLAPS 113 KTS MIN. IF 5° FLAPS 120 KTS (MARQ, N) 125 KTS (SOL, P)
NORMAL PITCH.
APPROX 8°- FLAPS 20°.
APPROX 10-12° -FLAPS 5°
AFTER GEAR IS FULLY RETRACTED, IF FLAPS 20° RETRACT FLAPS TO 5°
INCREASE PITCH TO APPROX. 10°
140KCAS, THEN FLAPS UP
A/S 155KCAS MINIMUM
ACCELERATE TO DESIRED CLIMB SPEED
COMPLETE AFTER T/O AND CLIMB CHECKLIST
* NOTE: IF RUNWAY LENGTH OR OBSTACLE CLEARANCE IS CRITICAL, SET POWER TO EITHER TORQUE OR TEMP MAXIMUM, WHICHEVER OCCURS FIRST. RETARD POWER LEVERS AS REQUIRED TO MAINTAIN MAXIMUM ALLOWABLE TORQUE OR TEMP.
A-1


MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)
TAKE-OFF ENGINE FAILURE – FLAPS 5° OR 20°
N, MARQ/P,SOL
FLAP SETTING
VXSE(KCAS)
VYSE(KCAS)
0°
140 / 135 *
150 / 150 *
5°
130 / 130 *
140 / 140 *
20°
125 / 125 *
135 / 130 *
*P, SOL
APPROX 300-400 FEET (OBSTRUCTION CLEARANCE). IF FLAPS 20° ADJUST PITCH TO ACCELERATE. 130KCAS, FLAPS TO 5°, PITCH APPROX. 10°
A/S 140KCAS MINIMUM. FLAPS UP
A/S 150KCAS. COMPLETE AFTER TAKE-OFF AND ENGINE OUT CHECKLIST
PITCH TO MAINTAIN VXSE MINIMUM APPROX. 8° PITCH, FLAPS 20°, APPROX 10-12° PITCH, FLAPS 5°. MAINTAIN DIRECTIONAL CONTROL WITH RUDDER AND MINIMUM SPOILER. FAILED ENGINE – CONDITION LEVER, EMERGENCY STOP; POWER LEVER, TAKE OFF **, TRIM AIRCRAFT
POS RATE, NO RUNWAY REMAINING FOR LANDING, GEAR UP. IF 20° FLAPS 113 KCAS MINIMUM. IF 5° FLAPS 120 KTS (MARQ, N) 125 KTS (SOL, P)
MAKE NORMAL T/O
CAUTION
SIMULATED ENGINE FAILURE (NOT LESS THAN 200FT AGL)
** IF SUFFICIENT RUNWAY REMAINS, OR UNABLE TO CLIMB: GEAR DOWN, REDUCE POWER TO LAND STRAIGHT AHEAD USING A/S APPROPRIATE FOR WEIGHT, 105K CASMINIMUM (MARQ, N) 100KCAS MINIMUM (SOL, P).
A-2

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

**TAKE-OFF ENGINE FAILURE ON RUNWAY**

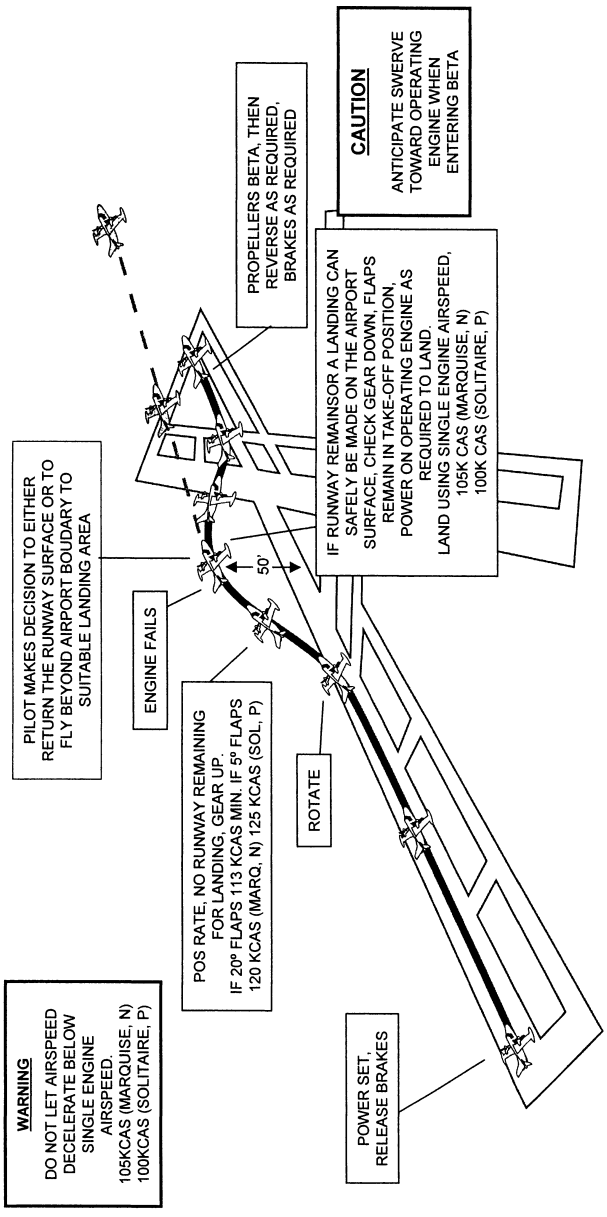



A-3

MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)

TAKE-OFF ENGINE FAILURE - UNABLE TO CLIMB

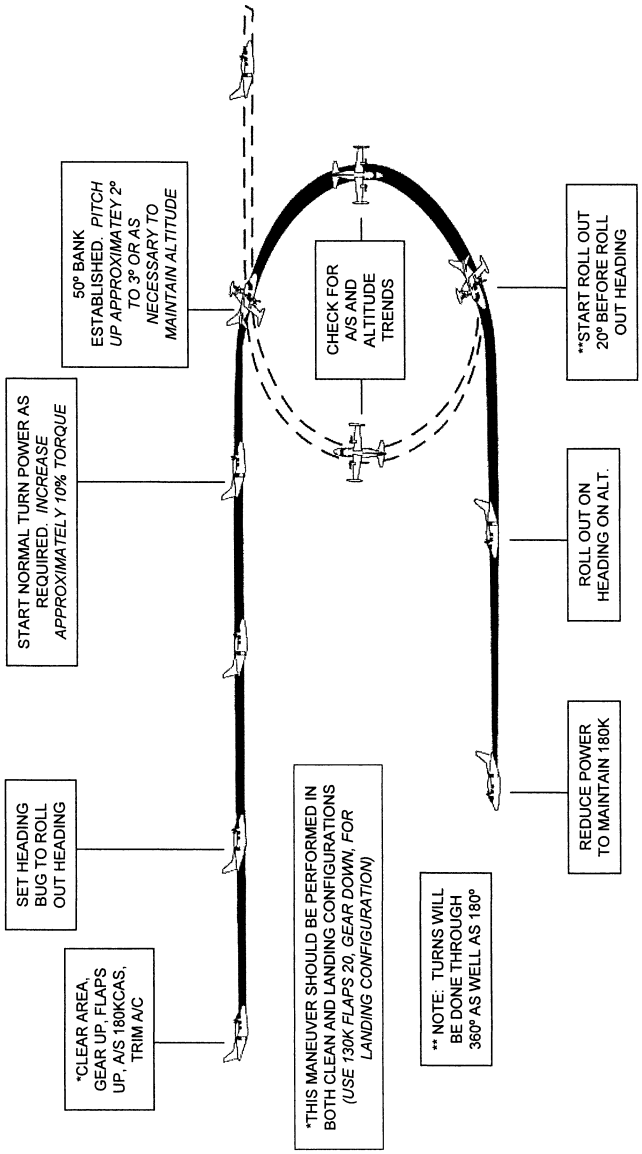
*CLASSROOM DISCUSSION OR FTD USE ONLY*




A-4

MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)

STEEP TURNS




A-5

## MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)

## SLOW FLIGHT MANEUVERING

## MINIMUM CONTROLLABLE AIRSPEED

SLOW FLIGHT MANEUVERING IS CONDUCTED AS FOLLOWS:

CLEAR THE AREA PRIOR TO BEGINNING THE MANEUVER.

START WITH CLEAN CONFIGURATION AND CHANGE AIRCRAFT CONFIGURATION FROM CLEAN TO FULL FLAP AND GEAR IN STAGES. USE A MAXIMUM OF 15° BANK AND PERFORM HEADING CHANGES OF 90° LEFT AND RIGHT. CONSTANT ALTITUDE IS REQUIRED THROUGHOUT.
MAINTAIN 115KCAS IN ALL CONFIGURATIONS.

**APPROXIMATE POWER SETTINGS ARE:

| | | | |
|---|---|---|---|
| *CLEAN* | *TORQUE* | *(35%) PER ENGINE* | *APPROX PITCH +12* |
| *5° FLAP* | *TORQUE* | *(32%) PER ENGINE* | *APPROX PITCH +8* |
| *5° FLAP & GEAR* | *TORQUE* | *(44%) PER ENGINE* | *APPROX PITCH +9* |
| *20° FLAP & GEAR* | *TORQUE* | *(42%) PER ENGINE* | *APPROX PITCH +4* |
| *40° FLAP & GEAR* | *TORQUE* | *(54%) PER ENGINE* | *APPROX PITCH 0* |

** NOTE: POWER SETTINGS WILL VARY WITH AIRCRAFT WEIGHT AND ALTITUDE.

STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
N, MARQUISE / P, SOLITIARE

| ANGLE OF BANK | 0° | 15° |
|---|---|---|
| FLAPS | | |
| UP | 106/104* | 108/106* |
| 5° | 99/ 98* | 100/ 99* |
| 20° | 87/ 88* | 88/ 88* |
| 40° | 81/ 78* | 83/ 79* |

*P, SOL

Vmc FLAPS 5° 99K (MARQ, N), 100KCAS (SOL, P)
FLAPS 20° 99K (MARQ, N), 93KCAS (SOL, P)

CAUTION

STALL WARNING MAY ACTIVATE
4 TO 9 KCAS ABOVE STALL

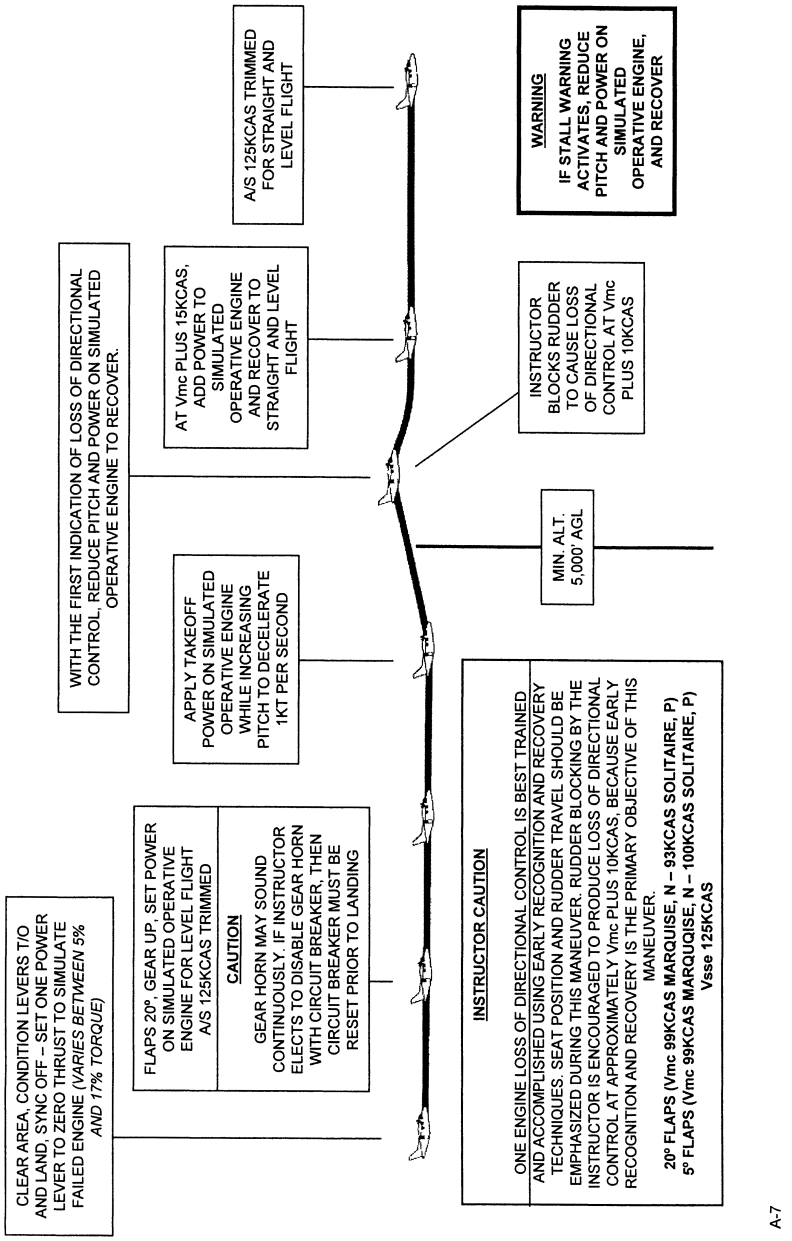
MINIMUM CONTROLLABLE AIRSPEED IS CONDUCTED AS FOLLOWS:

CLEAR THE AREA PRIOR TO BEGINNING THE MANEUVER.

THE MANEUVER MAY BE DONE IN ANY COMBINATION OF GEAR OR FLAP CONFIGURATIONS. IF BANK IS TO BE USED, IT SHOULD BE DONE AT BANK OF NOT MORE THAN 15°. BEGIN THE MANEUVER BY CONFIGURING THE AIRCRAFT IN THE DESIRED GEAR AND FLAP CONFIGURATION. SLOW THE AIRCRAFT UNTIL THE STALL WARNING (STICK SHAKER) IS ACTIVATED AND ADD POWER TO MAINTAIN ALTITUDE AND A SPEED JUST ABOVE AERODYNAMIC STALL. DO NOT ALLOW THE AIRCRAFT TO REACH AERODYNAMIC STALL BUFFET.

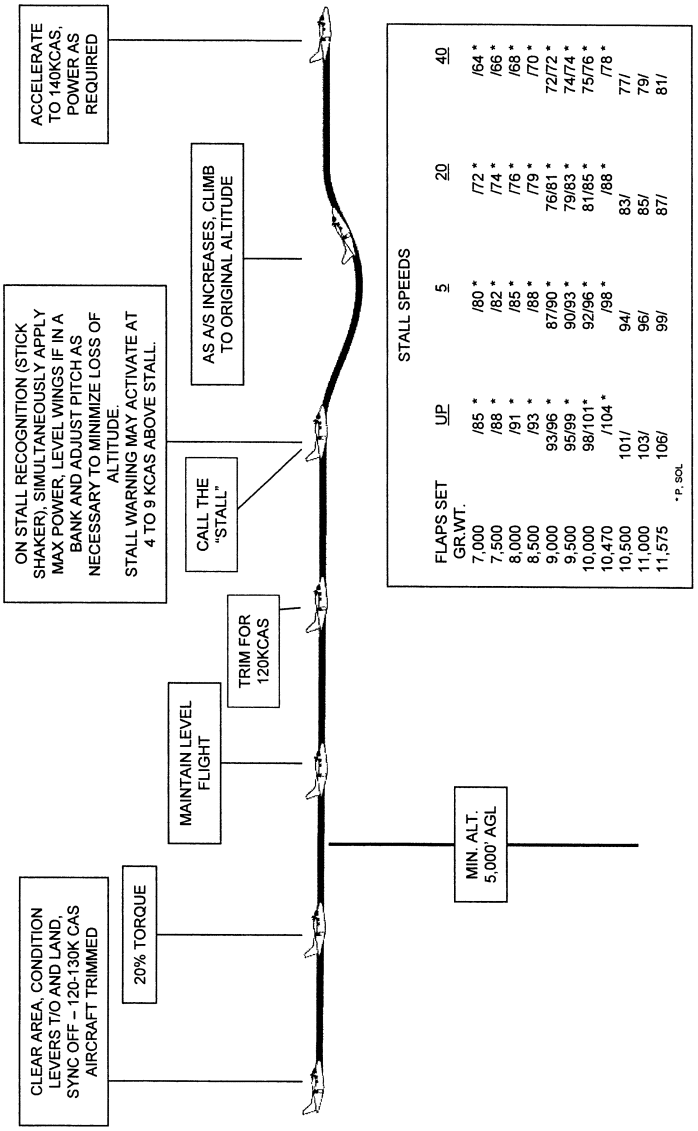
**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

**ONE ENGINE INOPERATIVE MANEUVERING LOSS OF DIRECTIONAL CONTROL**




A-7

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**
**APPROACH TO STALL CLEAN CONFIGURATION / WINGS LEVEL**

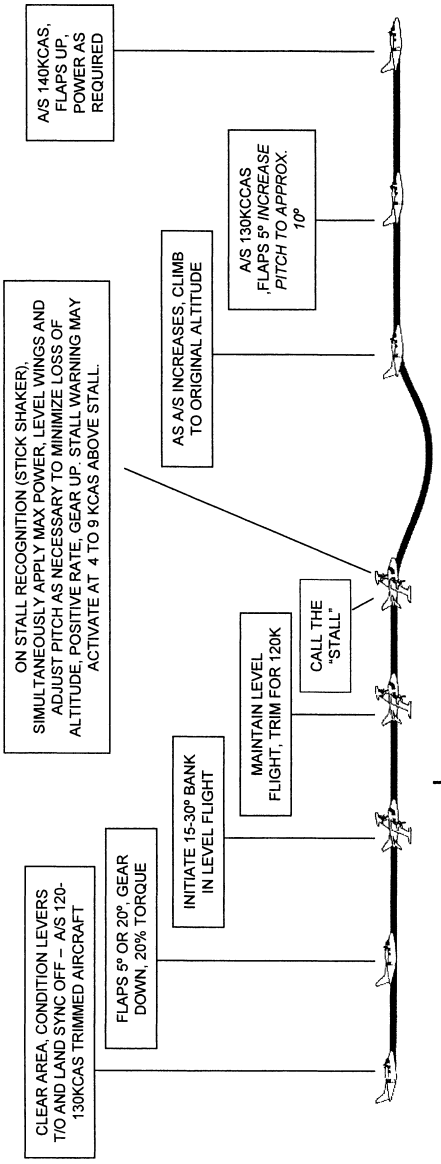



A-8

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

**APPROACH TO STALL**

**TAKEOFF CONFIGURATION 15-30° BANK**




STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
N, MARQUISE / P, SOLITARE

| ANGLE OF BANK FLAPS UP | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|
| | 107/104* | 109/108* | 113/112* | 120/119* | 131/130* | 148/146* |
| 5° | 99/ 98* | 102/101* | 106/105* | 113/112* | 123/122* | 138/138* |
| 20° | 87/ 88* | 89/ 90* | 93/ 94* | 98/100* | 108/109* | 122/123* |
| 40° | 82/ 79* | 84/ 80* | 87/ 84* | 92/ 90* | 101/ 98* | 113/110* |

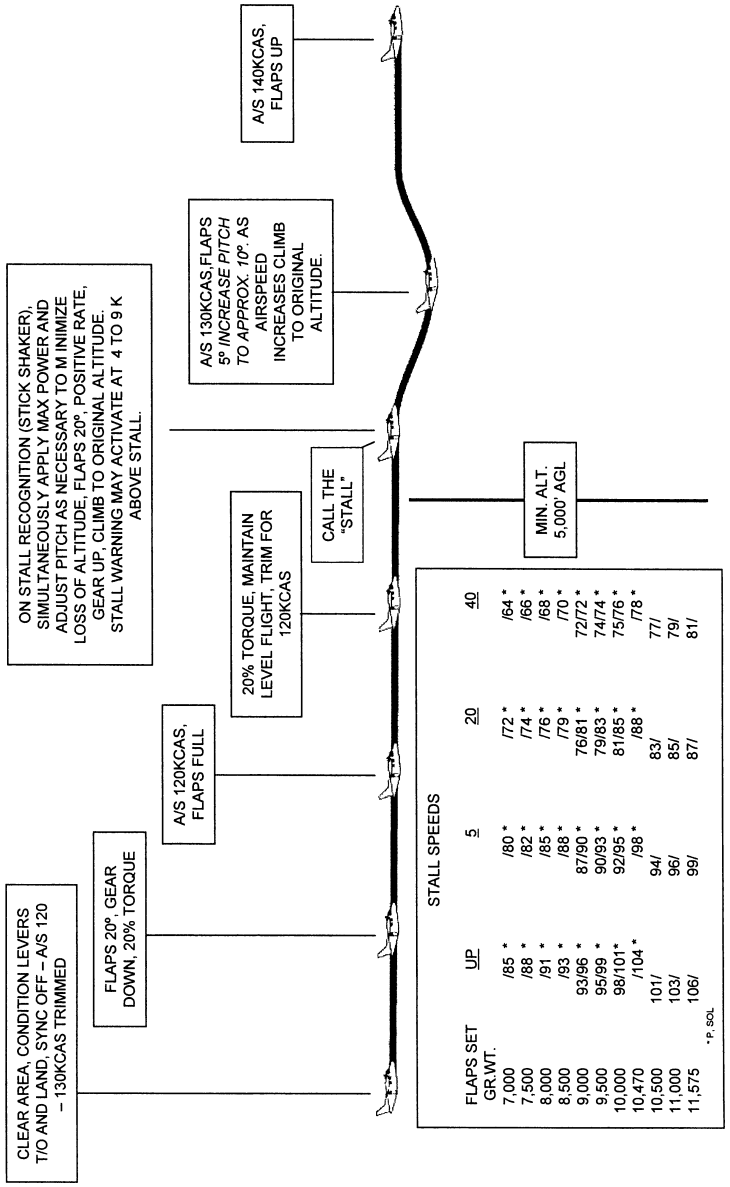
*P, SOL

A-9

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

**APPROACH TO STALL**

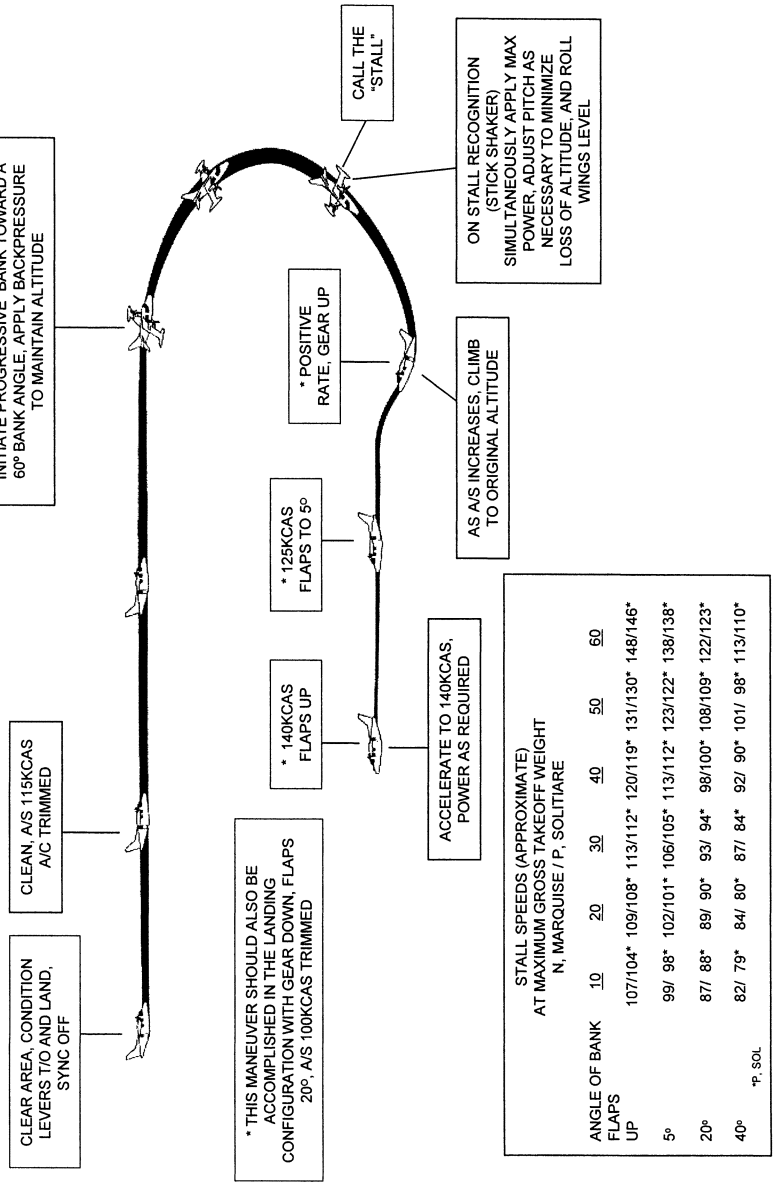
**GEAR DOWN – FULL FLAPS**




A-10

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

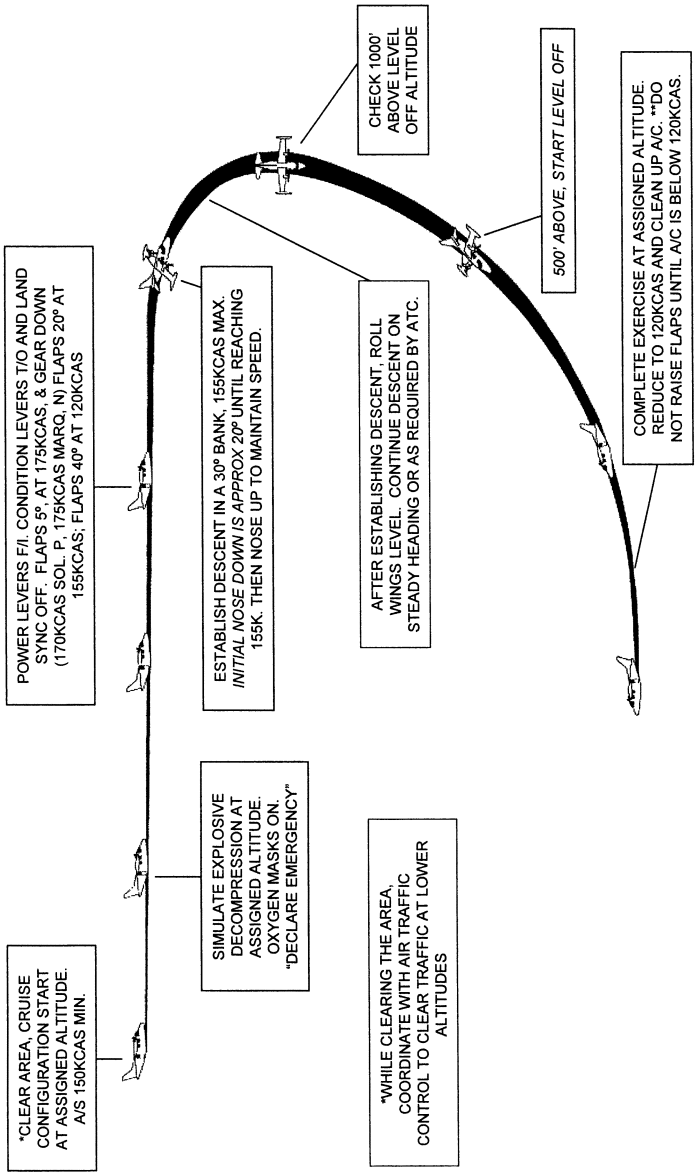
**ACCELERATED STALLS**




A-11

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

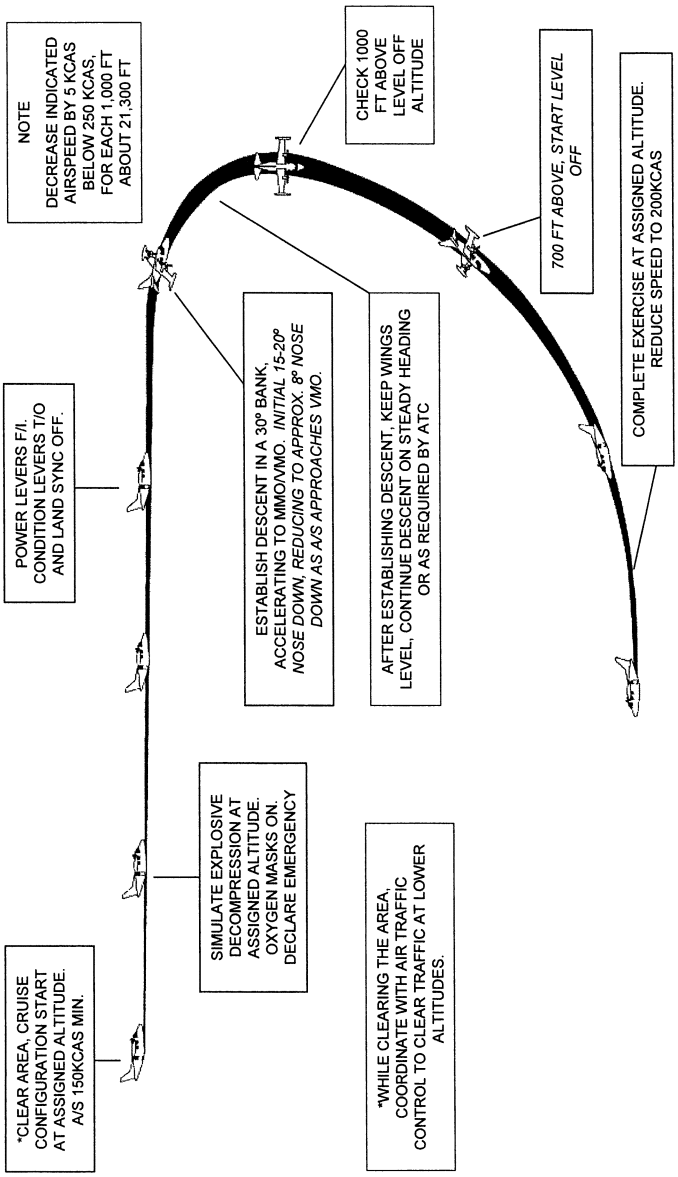
**EMERGENCY DESCENT (LOW SPEED)**




A-12

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

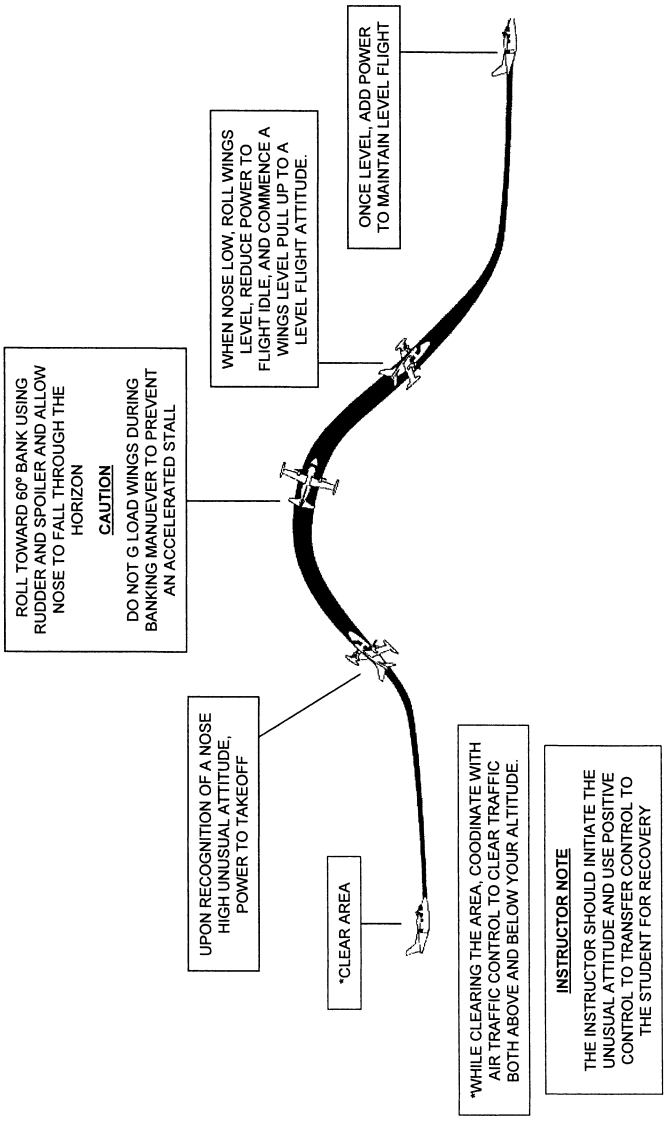
**EMERGENCY DESCENT (HIGH SPEED)**




A-13

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

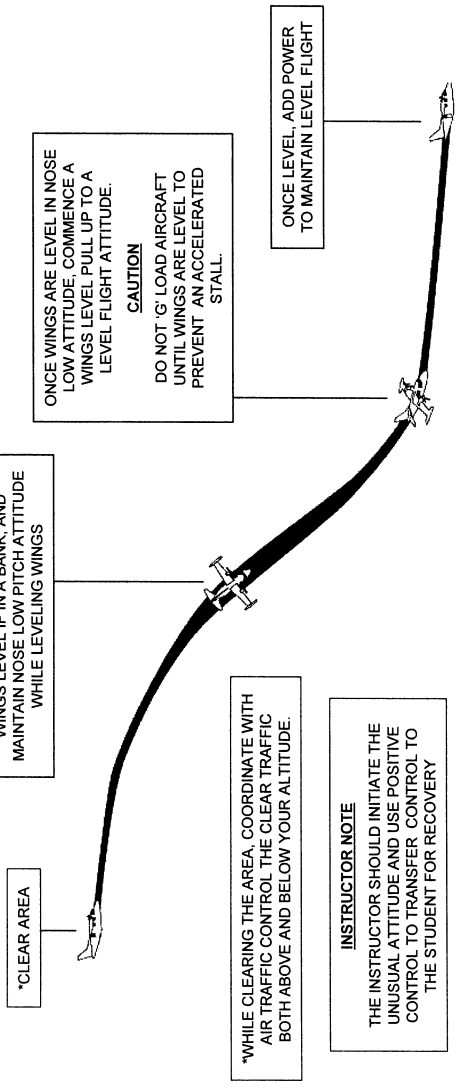
**UNUSUAL ATTITUDE RECOVERY (NOSE HIGH)**




A-14

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

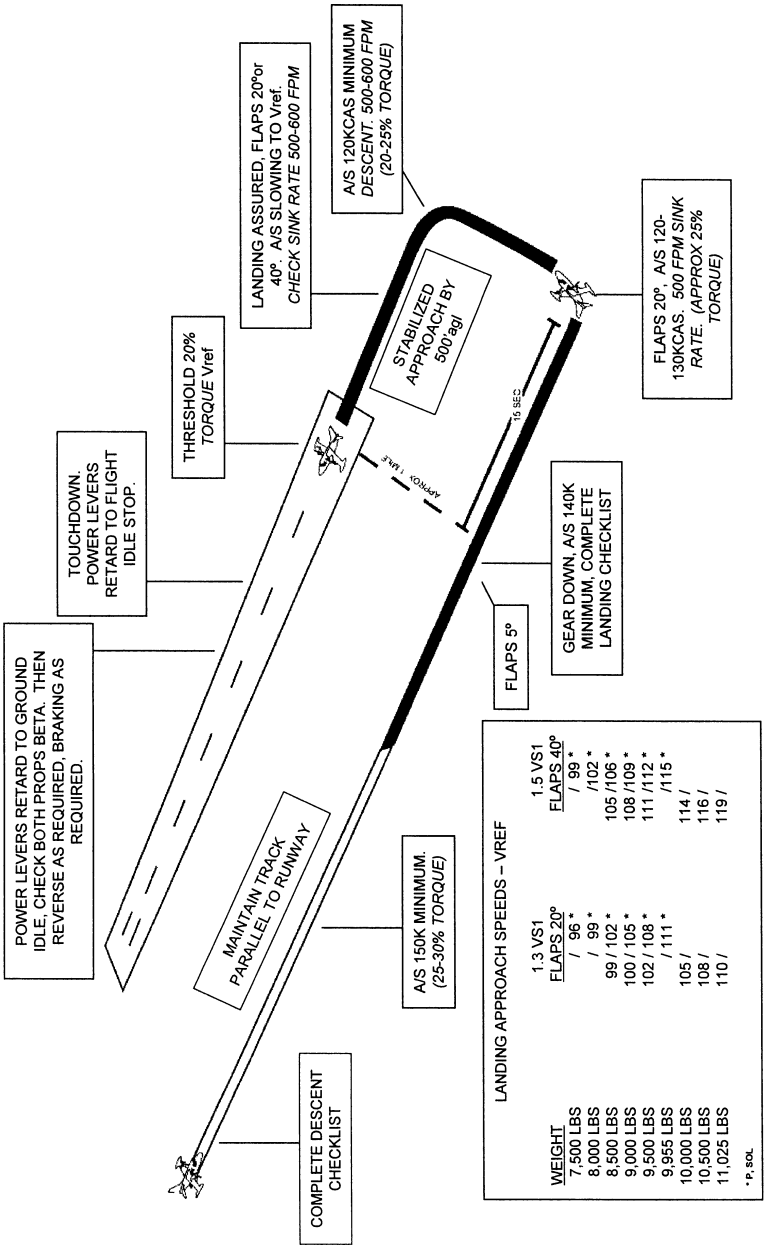
**UNUSUAL ATTITUDE RECOVERY (NOSE LOW)**




A-15

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

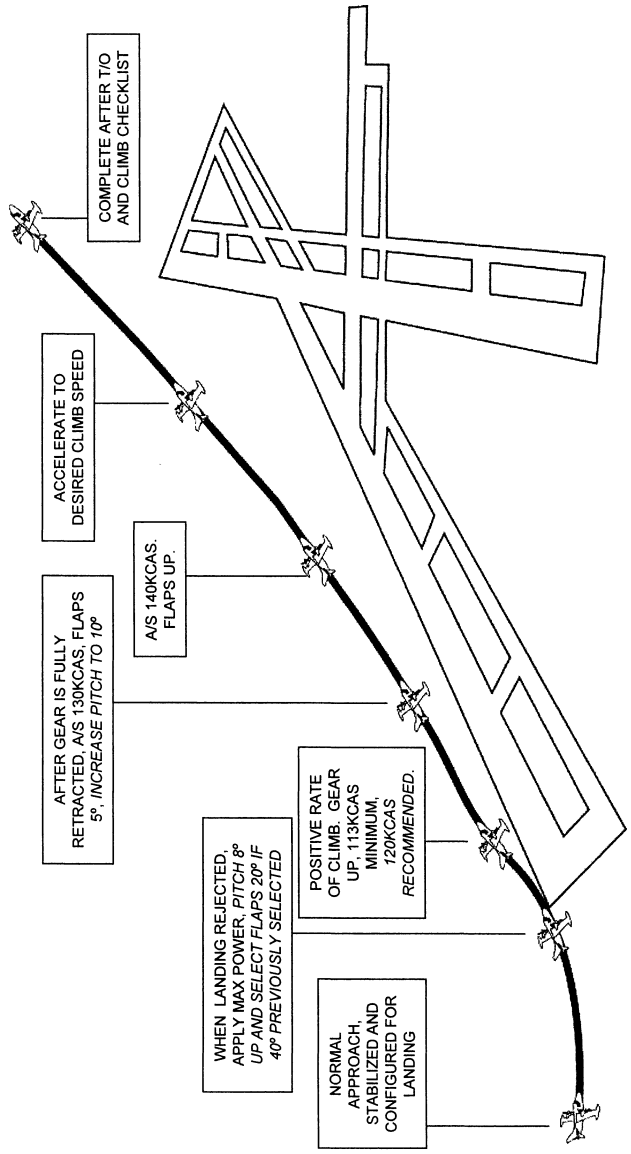
**NORMAL LANDING (20°or 40° FLAPS)**




A-16

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

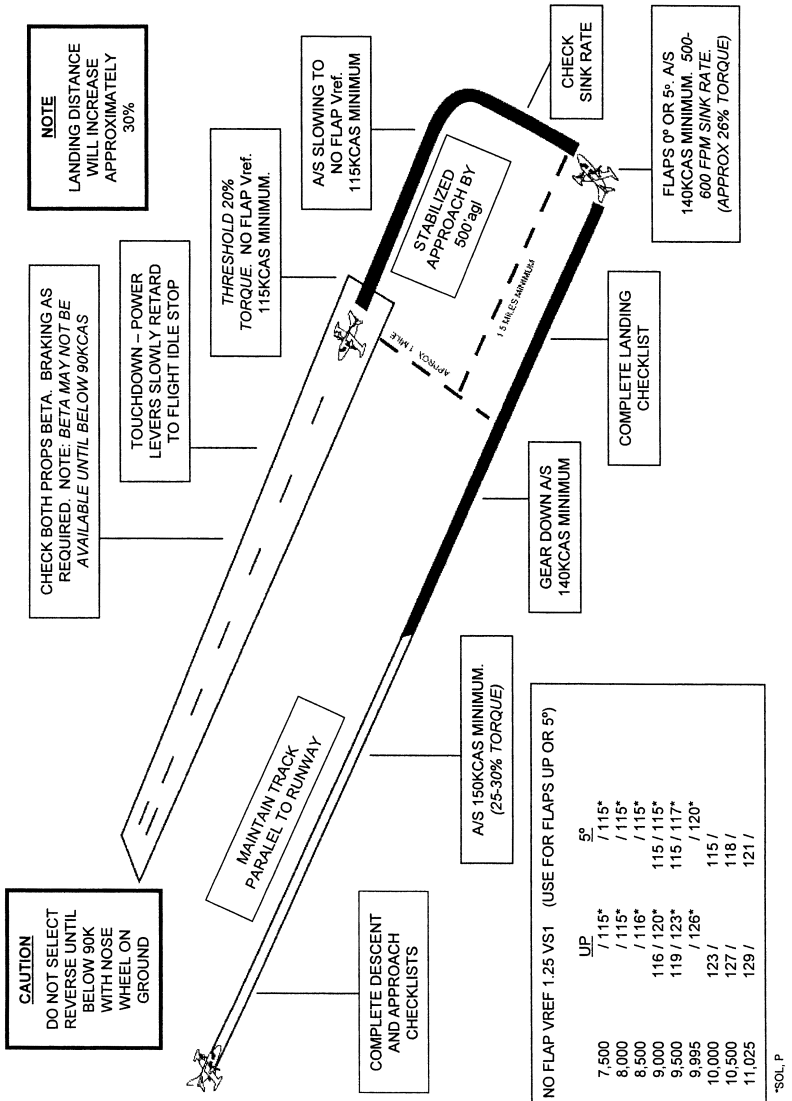
**GO AROUND - REJECTED LANDING**




A-17

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

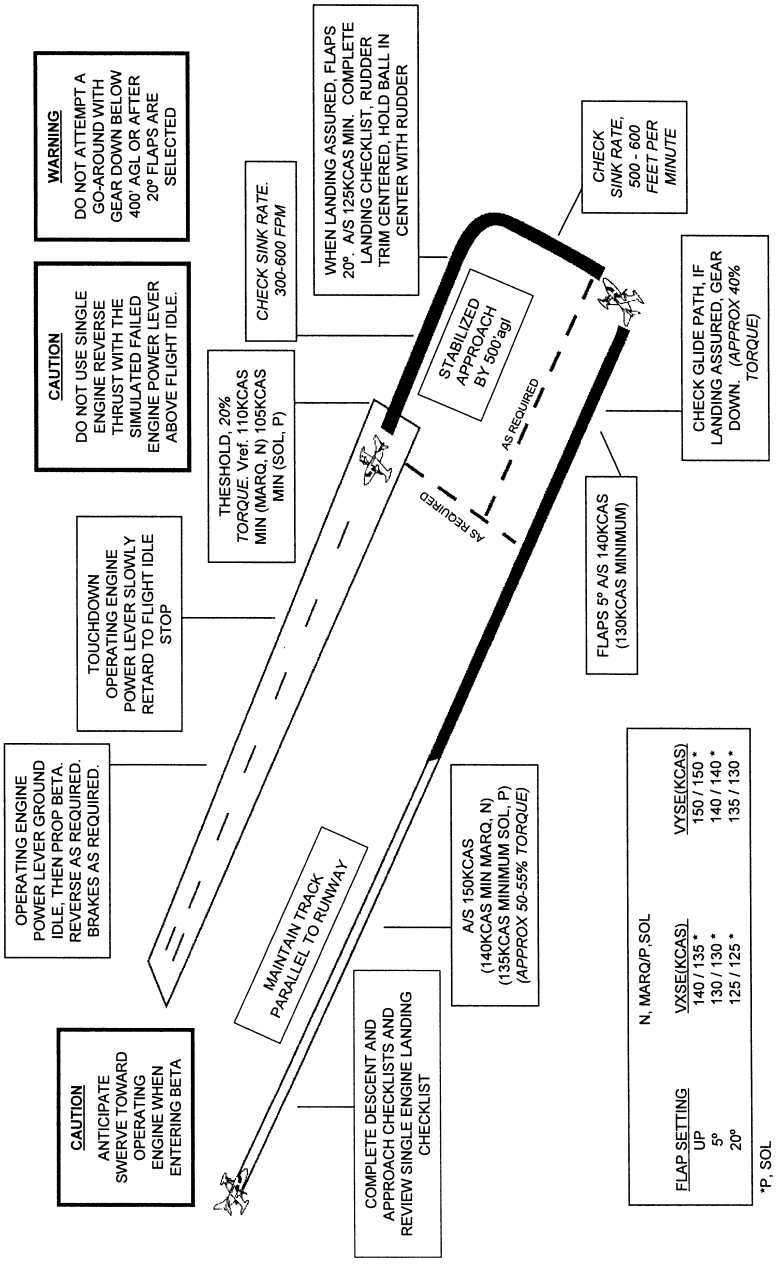
**NO FLAP OR 5° FLAP LANDING**




A-18

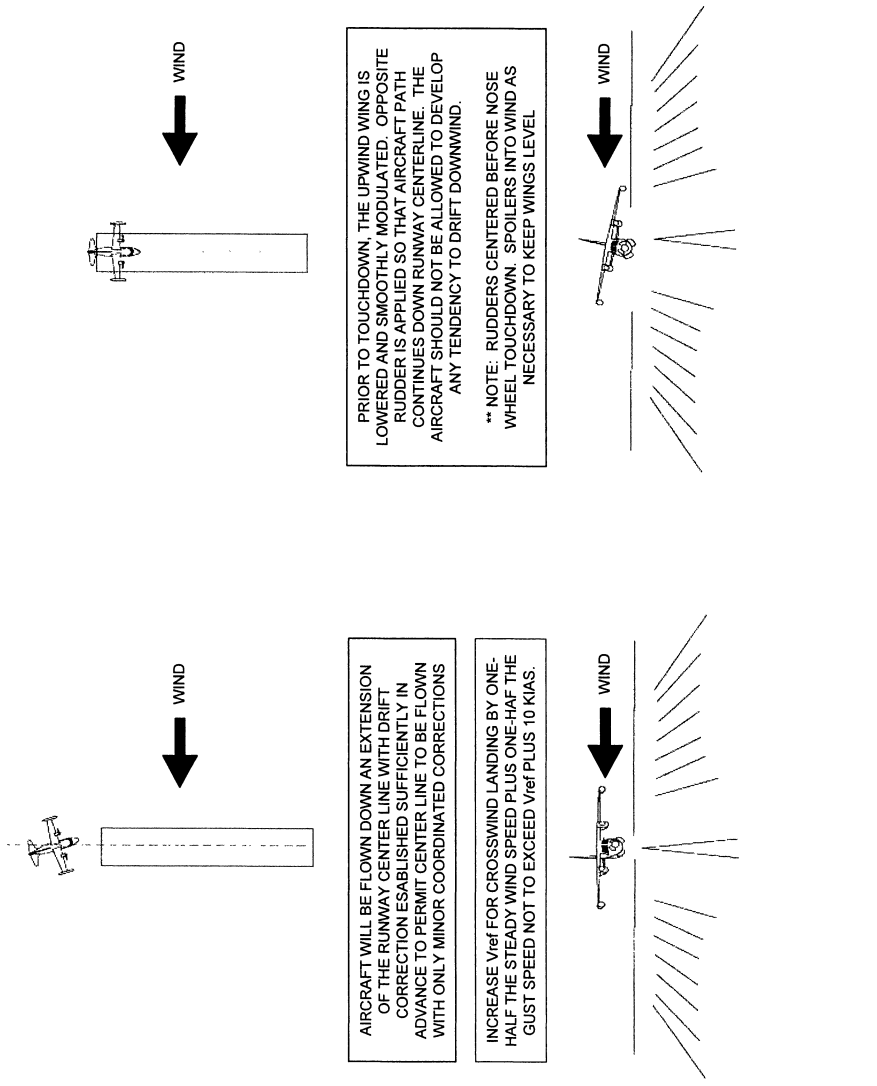
**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

**ONE ENGINE INOPERATIVE LANDING**



**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

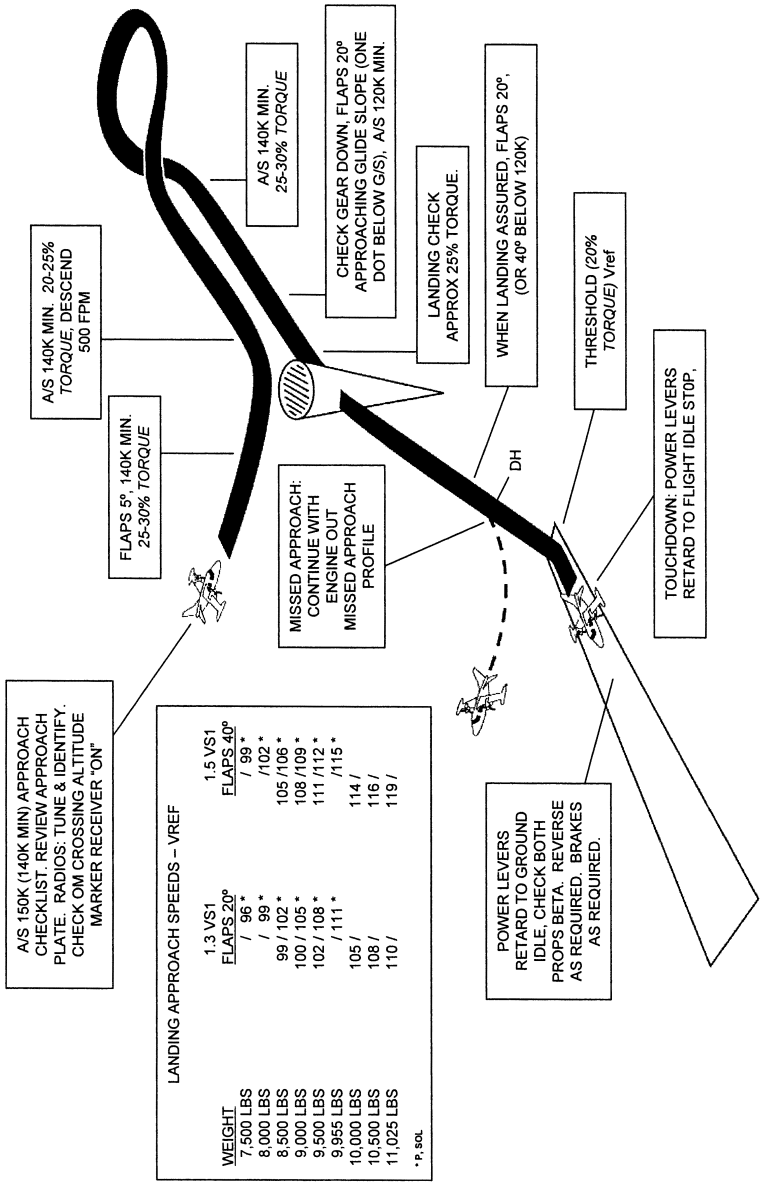
**CROSSWIND LANDING**




A-20

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

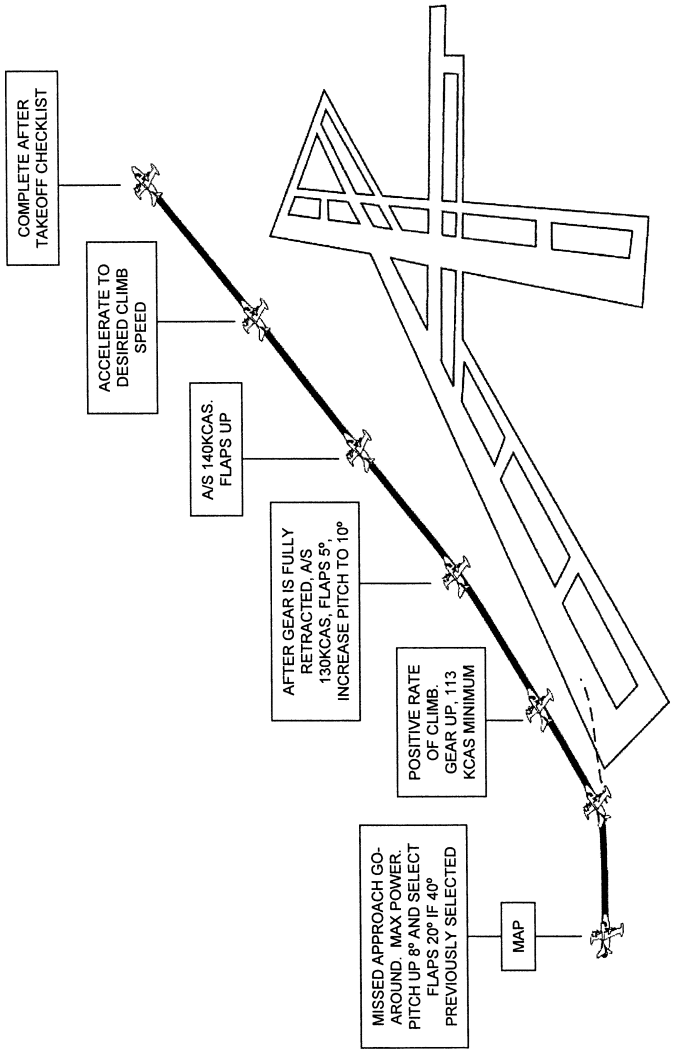
**ILS AND MISSED APPROACH**




A-21

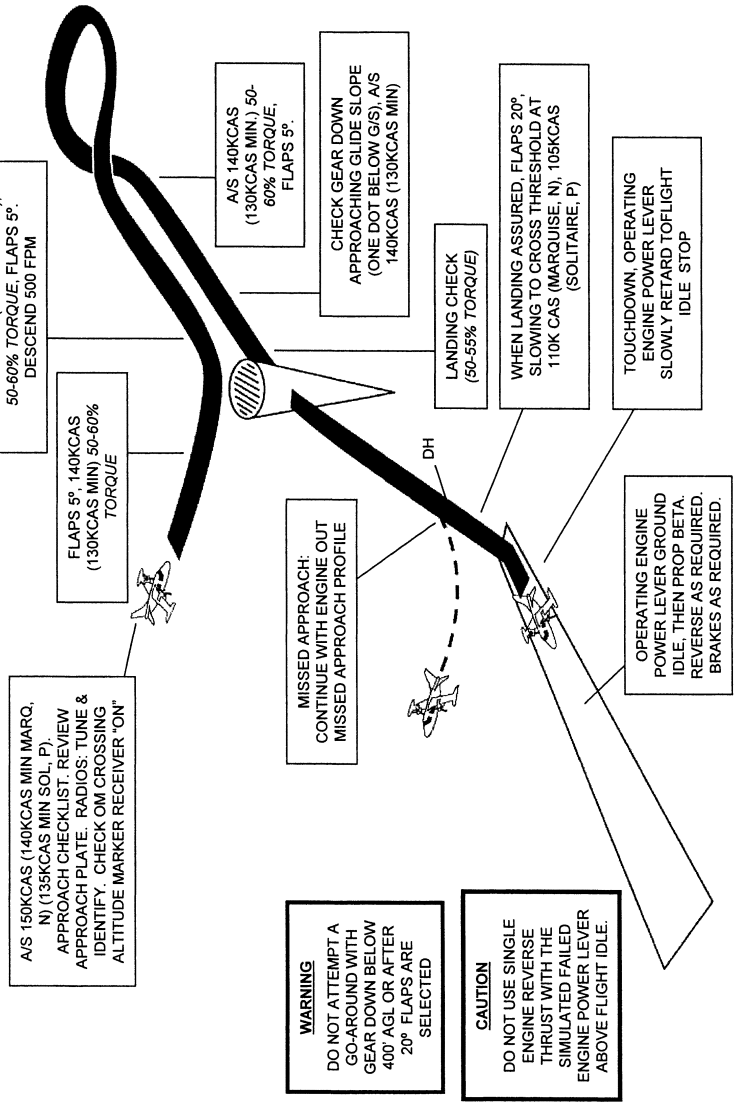
MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)

TWO ENGINE MISSED APPROACH




A-22

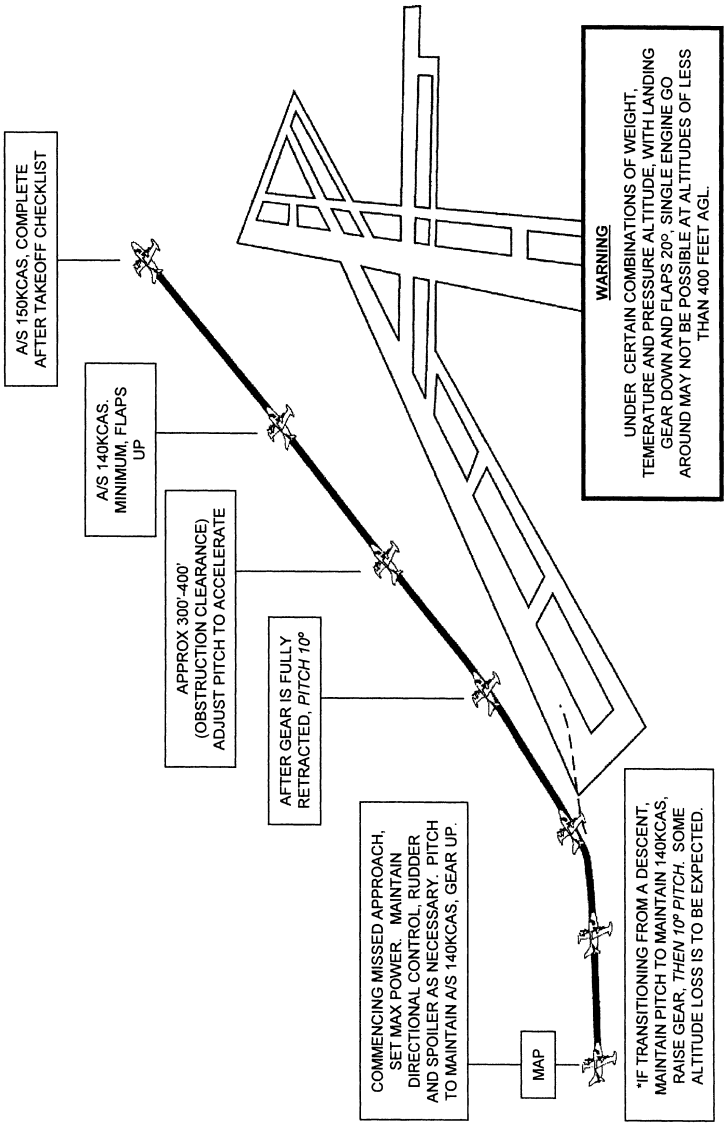
**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**
**ONE ENGINE INOPERATIVE ILS AND MISSED APPROACH**




A-23

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

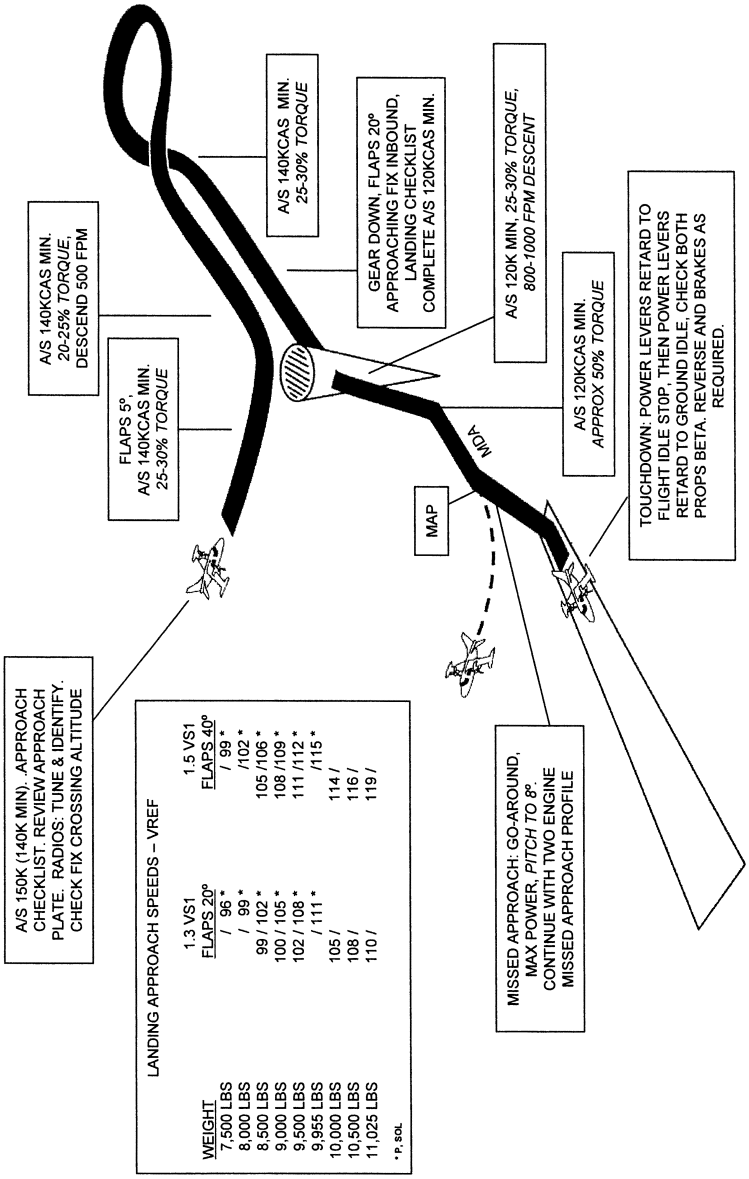
**ONE ENGINE INOPERATIVE MISSED APPROACH**




A-24

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

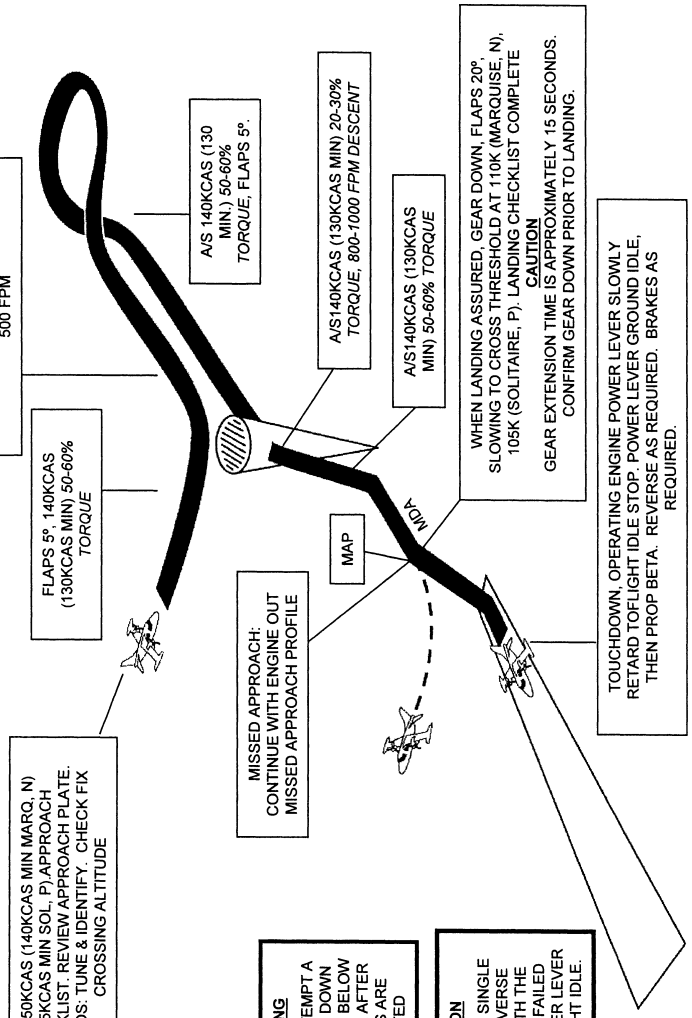
**NON-PRECISION AND MISSED APPROACH**




A-25

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

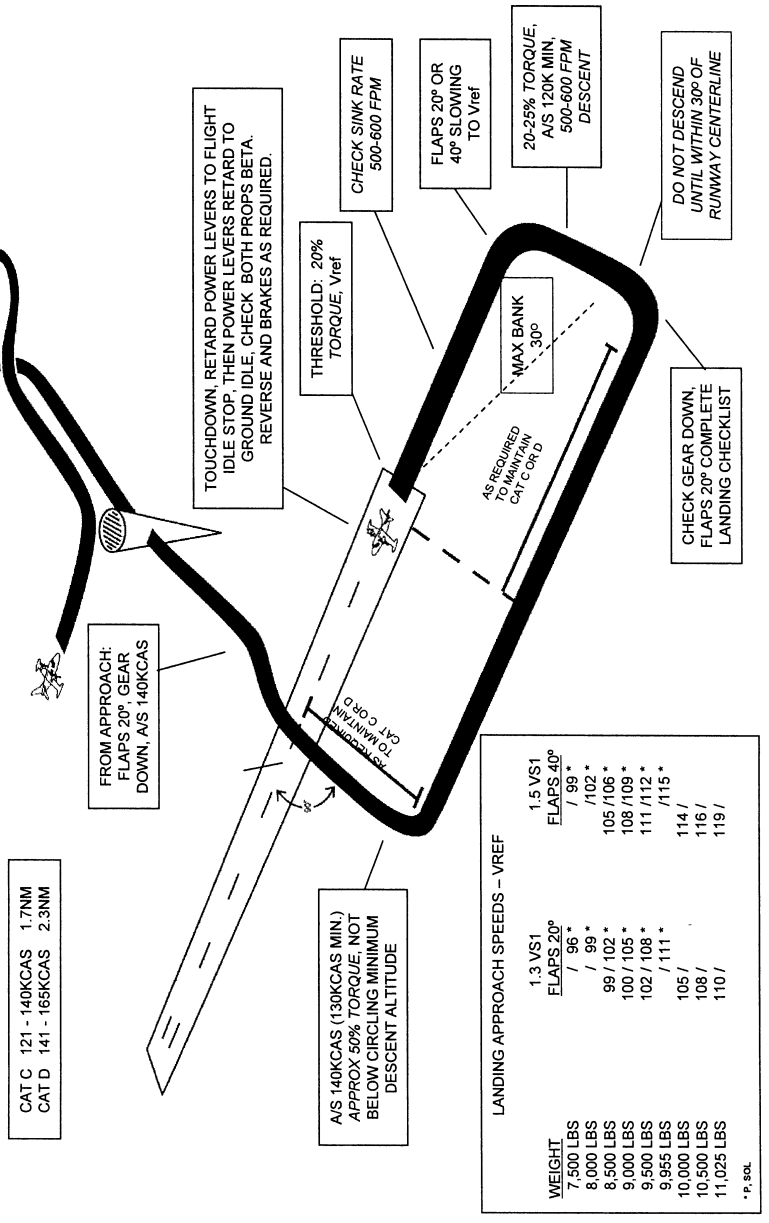
**ONE ENGINE INOPERATIVE NON-PRECISION AND MISSED APPROACH**




A-26

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

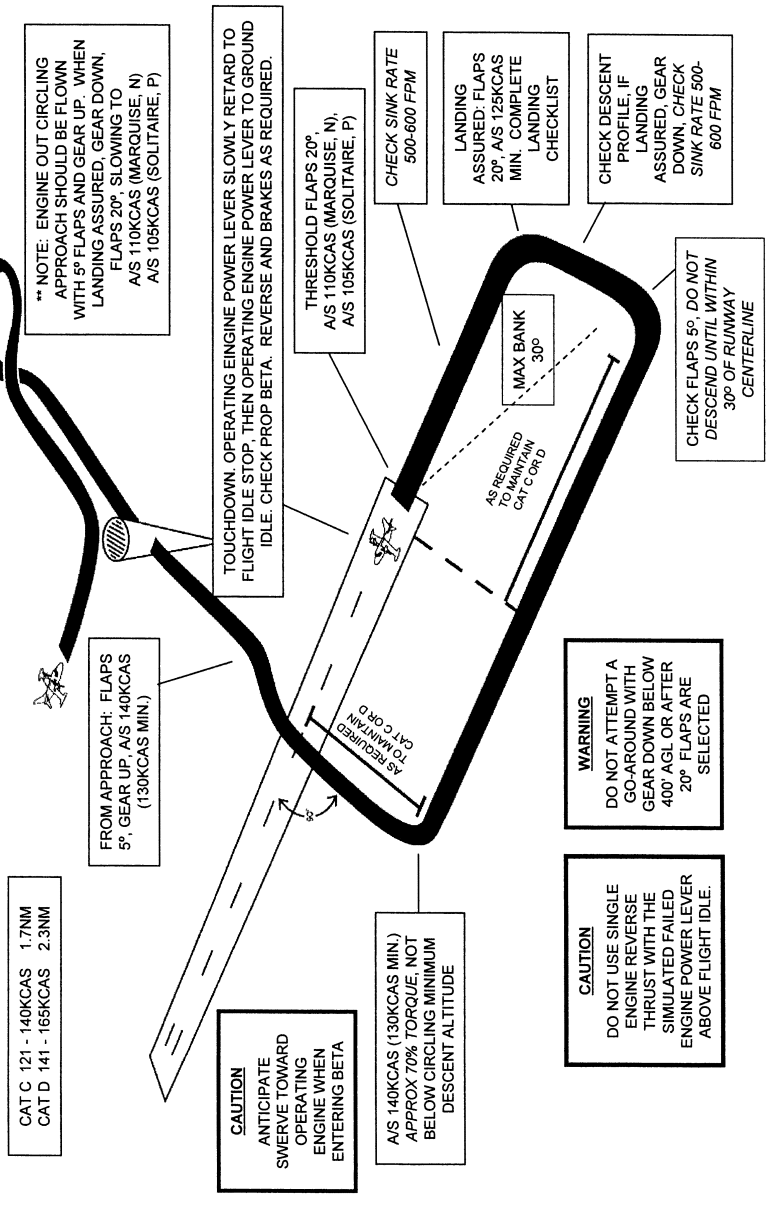
**CIRCLING APPROACH AT WEATHER MINIMUMS**




A-27

**MU-2B MARQUISE (-60), SOLITAIRE (-40), N (-36A), P (-26A)**

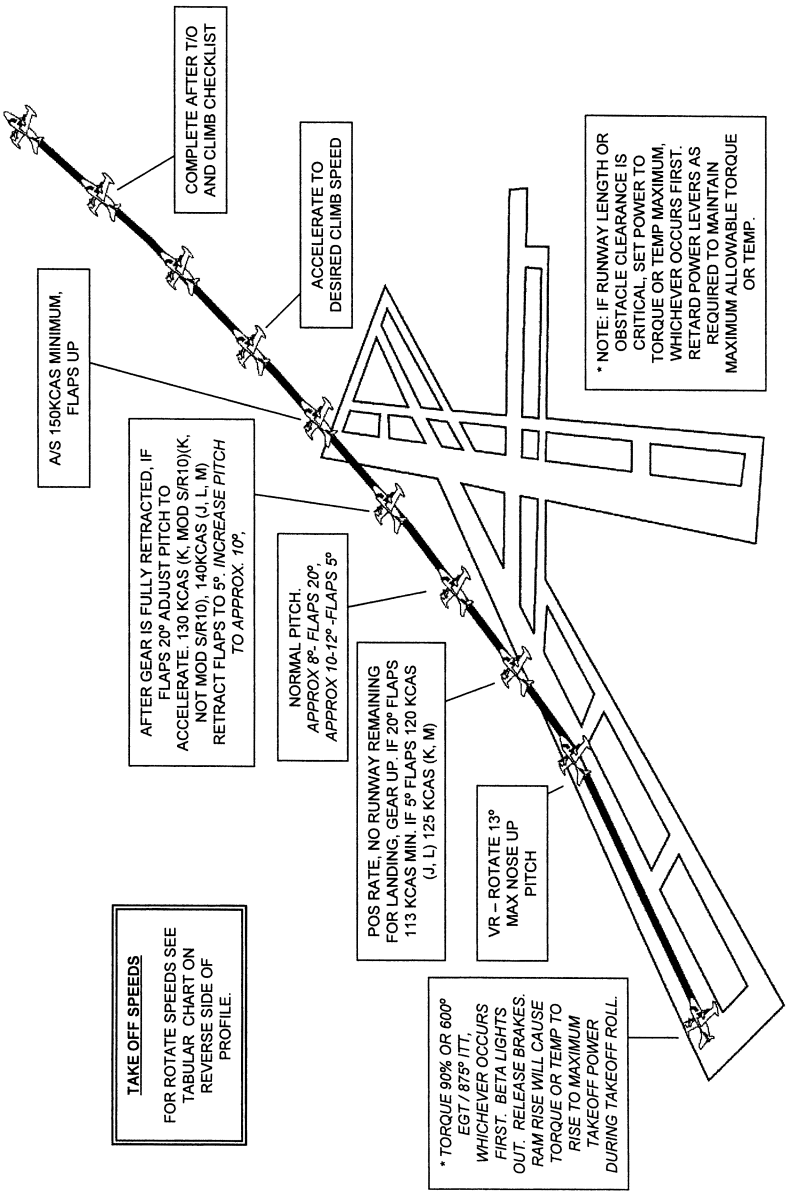
**ONE ENGINE INOPERATIVE CIRCLING APPROACH AT WEATHER MINIMUMS**




A-28

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**NORMAL TAKE-OFF, 5° OR 20° FLAPS**




B-1

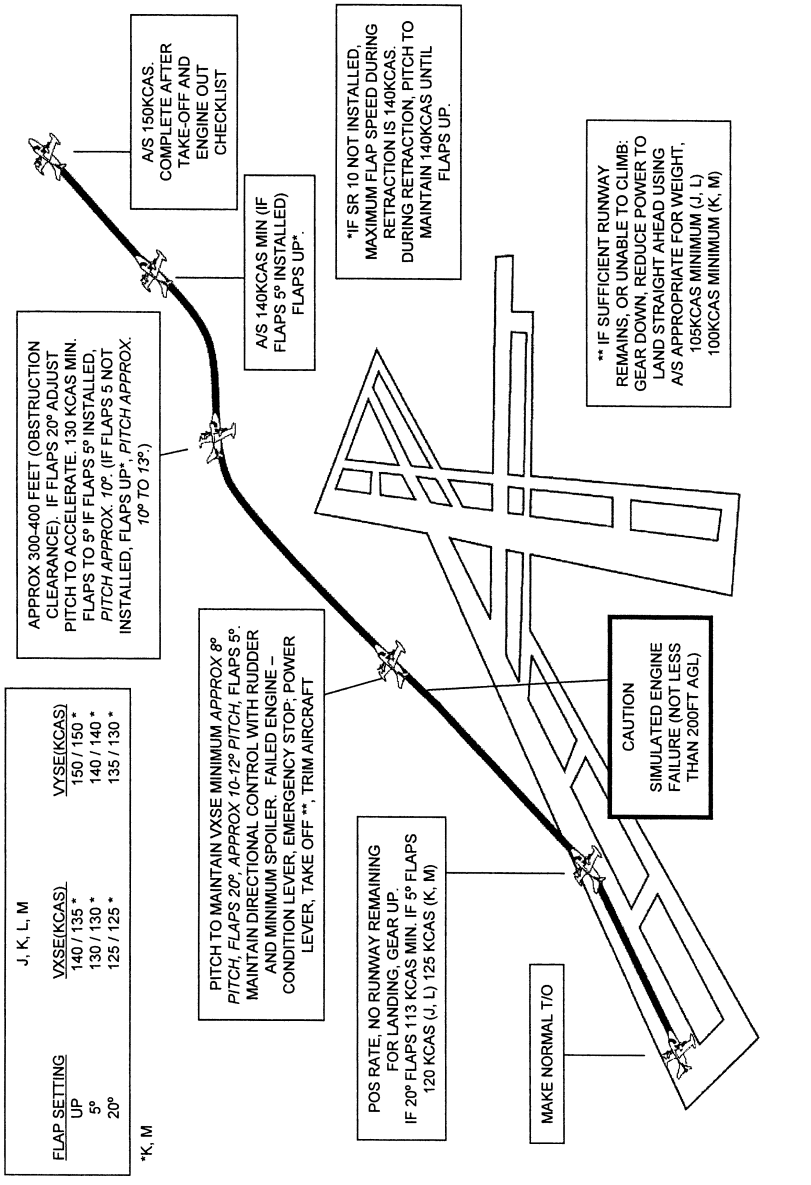
**TAKE OFF SPEEDS**

| | ROTATE | | | |
|---|---|---|---|---|
| | K | M | J | L |
| FLAPS 5° | | | | |
| 11,575 LBS | | | | 109 |
| 11,000 LBS | | | | 106 |
| 10,800 LBS | | | 109 | 105 |
| 10,470 LBS | | 110 | | 104 |
| 10,000 LBS | | 108 | 105 | 101 |
| 9,920 LBS | 108 | | | 101 |
| 9,500 LBS | 107 | 107 | 103 | 101 |
| 9,000 LBS | 106 | 106 | 101 | 100 |
| 8,000 LBS | 104 | 104 | 100 | |
| 7,500 LBS | 102 | | | |
| FLAPS 20° | K | M | J | L |
| 11,575 LBS | | | | 105 |
| 11,000 LBS | | | | 103 |
| 10,800 LBS | | | 105 | |
| 10,470 LBS | | 103 | | |
| 10,000 LBS | | 102 | 102 | 100 |
| 9,920 LBS | 102 | | | |
| 9,500 LBS | 101 | 101 | 101 | 100 |
| 9,000 LBS | 100 | 100 | 100 | 100 |
| 8,000 LBS | 99 | 99 | 100 | |
| 7,500 LBS | 98 | | | |

B-1a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

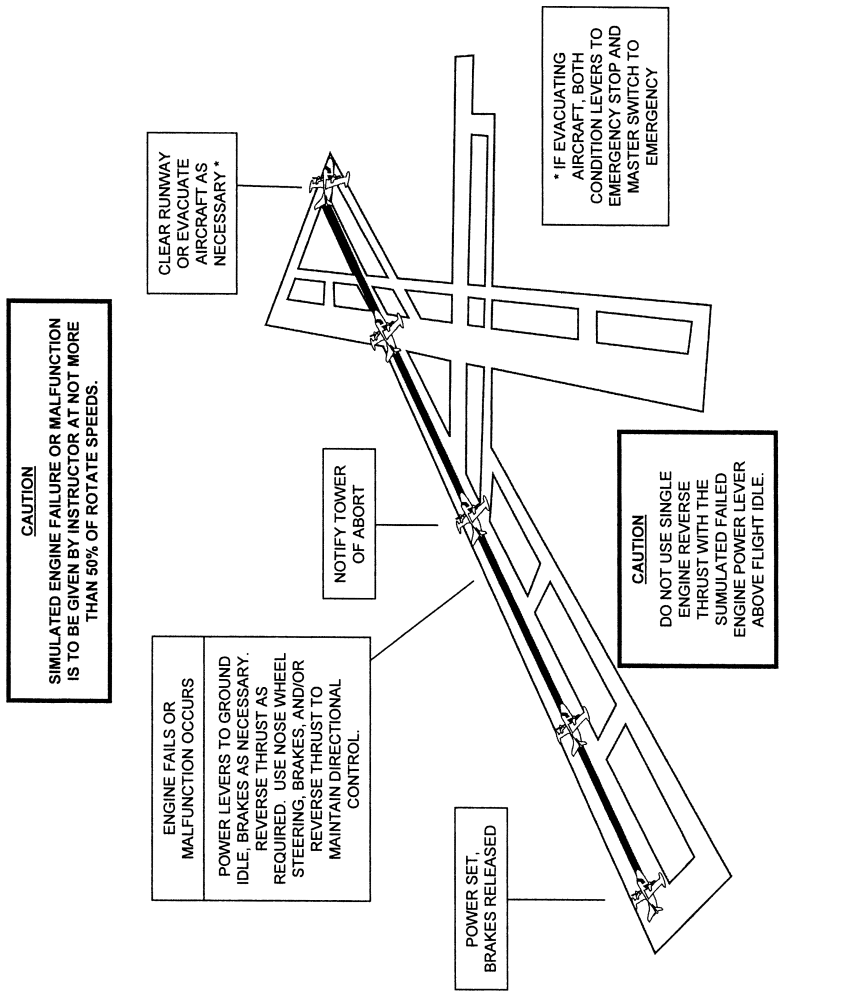
**TAKE-OFF ENGINE FAILURE – FLAPS 5° OR 20°**




B-2

MU-2B J (-35), K (-25), L (-36), M (-26)

TAKE-OFF ENGINE FAILURE ON RUNWAY

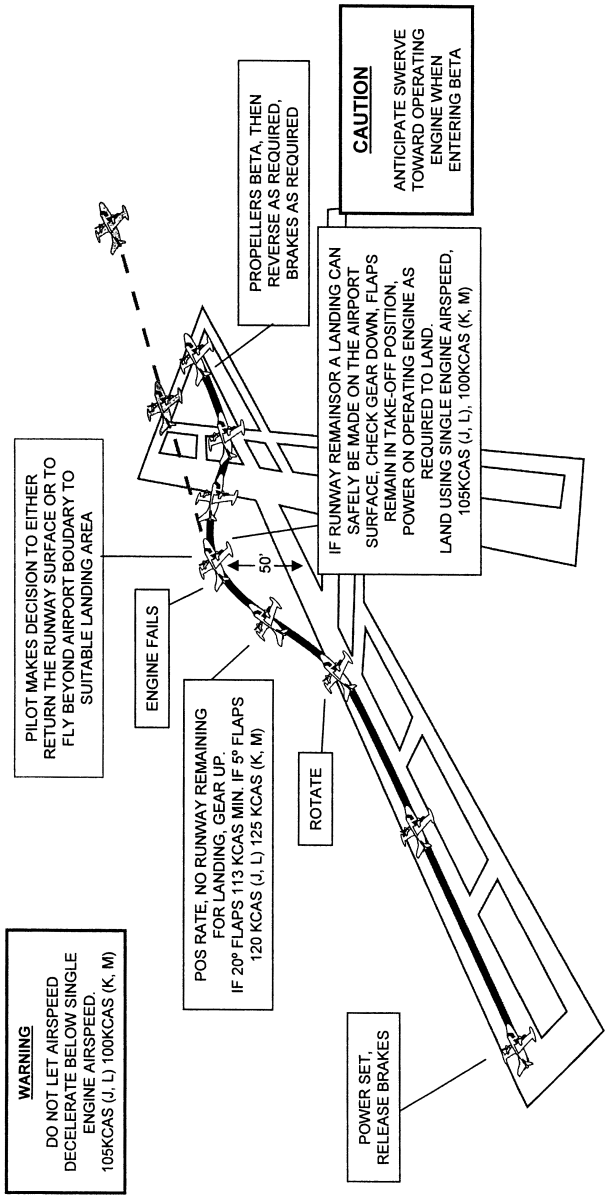



B-3

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**TAKE-OFF ENGINE FAILURE - UNABLE TO CLIMB**

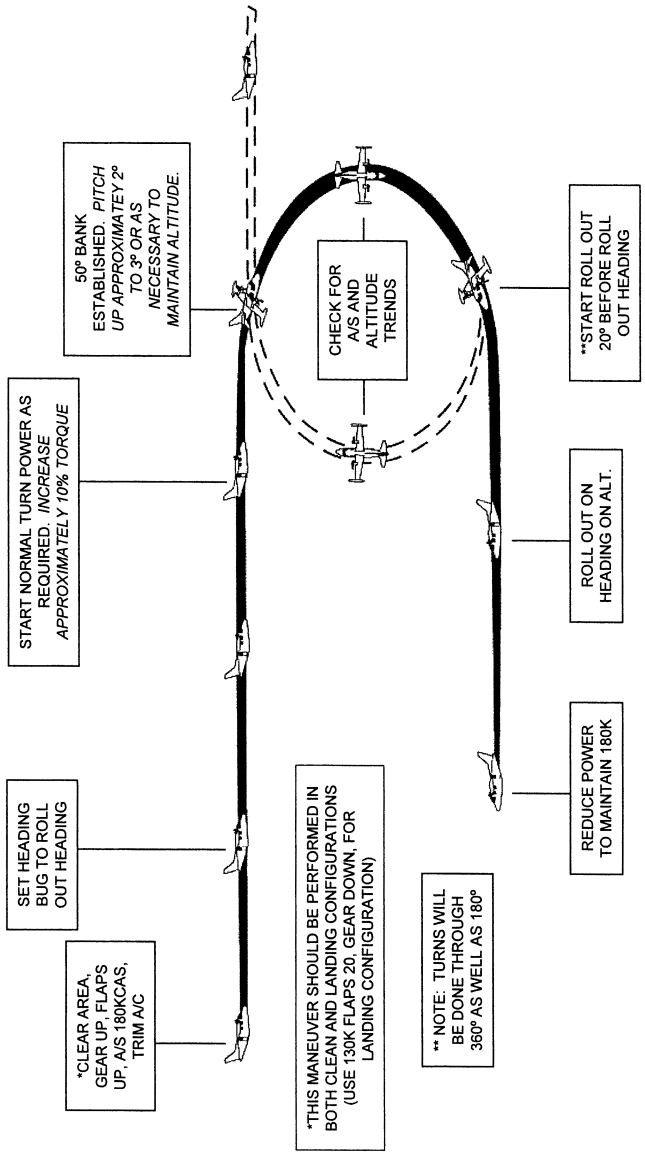
***CLASSROOM DISCUSSION OR FTD USE ONLY***




B-4

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**STEEP TURNS**




B-5

## MU-2B J (-35), K (-25), L (-36), M (-26)

## SLOW FLIGHT MANEUVERING

## MINIMUM CONTROLLABLE AIRSPEED

SLOW FLIGHT MANEUVERING IS CONDUCTED AS FOLLOWS:

CLEAR THE AREA PRIOR TO BEGINNING THE MANEUVER.

START WITH CLEAN CONFIGURATION AND CHANGE AIRCRAFT CONFIGURATION FROM CLEAN TO FULL FLAP AND GEAR IN STAGES. USE A MAXIMUM OF 15° BANK AND PERFORM HEADING CHANGES OF 90° LEFT AND RIGHT. CONSTANT ALTITUDE IS REQUIRED THROUGHOUT.
MAINTAIN 115KCAS IN ALL CONFIGURATIONS.

**APPROXIMATE POWER SETTINGS ARE:

| | | | |
|---|---|---|---|
| *CLEAN* | *TORQUE* | *(35%) PER ENGINE* | *APPROX PITCH +12* |
| *5° FLAP* | *TORQUE* | *(32%) PER ENGINE* | *APPROX PITCH +8* |
| *5° FLAP & GEAR* | *TORQUE* | *(44%) PER ENGINE* | *APPROX PITCH +9* |
| *20° FLAP & GEAR* | *TORQUE* | *(42%) PER ENGINE* | *APPROX PITCH +4* |
| *40° FLAP & GEAR* | *TORQUE* | *(54%) PER ENGINE* | *APPROX PITCH 0* |

** NOTE: POWER SETTINGS WILL VARY WITH AIRCRAFT WEIGHT AND ALTITUDE.

STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
J, K, L, M

| | J / L / K / M | J / L / K / M |
|---|---|---|
| ANGLE OF BANK | 0° | 15° |
| FLAPS | | |
| UP | 104/106/101/104 | 107/108/103/106 |
| 5° | 98/ 99/ 95/ 98 | 100/101/ 97/100 |
| 20° | 86/ 87/ 85/ 87 | 88/ 89/ 87/ 89 |
| 40° | 79/ 81/ 76/ 78 | 82/ 83/ 78/ 80 |

Vmc FLAPS 5° 99KCAS (J, L), 100KCAS (K, M)
FLAPS 20° 90KCAS (J), 99KCAS (L), 93KCAS (K, M)

CAUTION

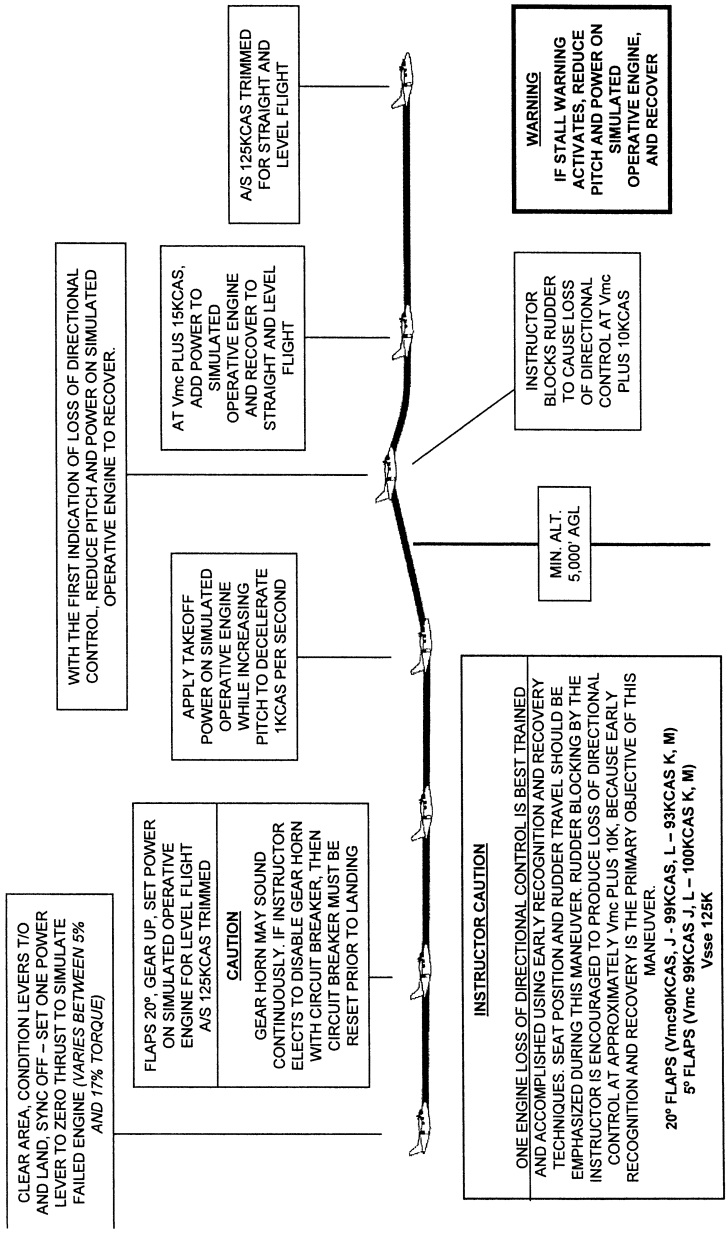
STALL WARNING MAY ACTIVATE
4 TO 9 KTS ABOVE STALL

MINIMUM CONTROLLABLE AIRSPEED IS CONDUCTED AS FOLLOWS:

CLEAR THE AREA PRIOR TO BEGINNING THE MANEUVER.

THE MANEUVER MAY BE DONE IN ANY COMBINATION OF GEAR OR FLAP CONFIGURATIONS. IF BANK IS TO BE USED, IT SHOULD BE DONE AT BANK OF NOT MORE THAN 10°. BEGIN THE MANEUVER BY CONFIGURING THE AIRCRAFT IN THE DESIRED GEAR AND FLAP CONFIGURATION. SLOW THE AIRCRAFT UNTIL THE STALL WARNING (STICK SHAKER) IS ACTIVATED AND ADD POWER TO MAINTAIN ALTITUDE AND A SPEED JUST ABOVE AERODYNAMIC STALL. DO NOT ALLOW THE AIRCRAFT TO REACH AERODYNAMIC STALL BUFFET.

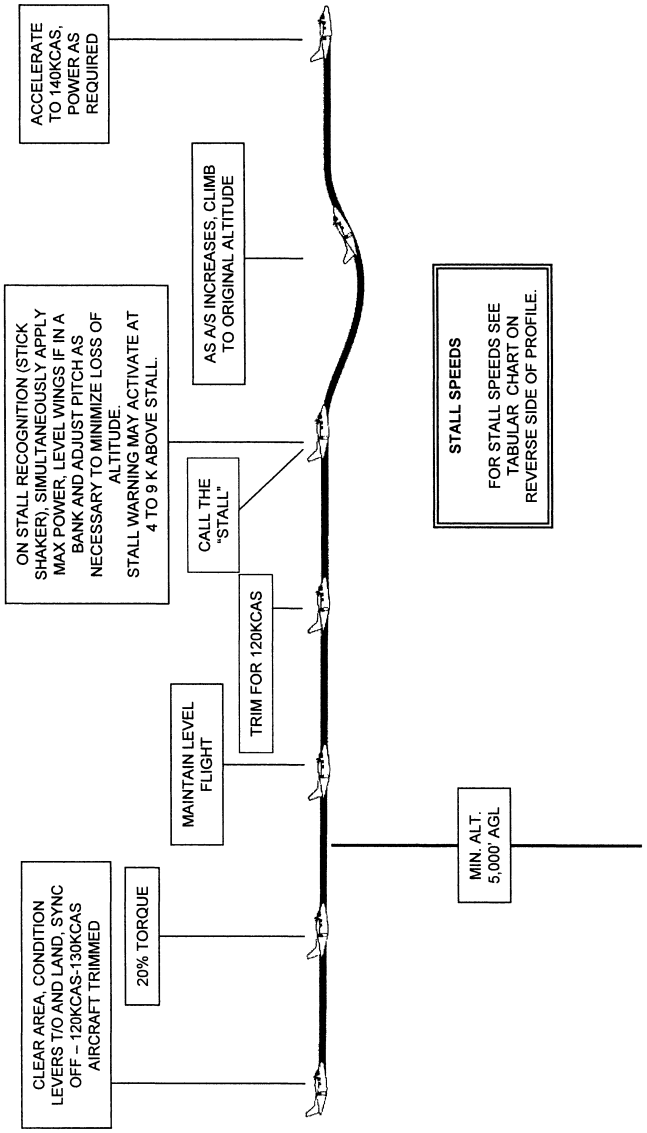
**MU-2B J (-35), K (-25), L (-36), M (-26)**
**ONE ENGINE INOPERATIVE MANEUVERING**
**LOSS OF DIRECTIONAL CONTROL**




B-7

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**APPROACH TO STALL CLEAN CONFIGURATION / WINGS LEVEL**




B-8

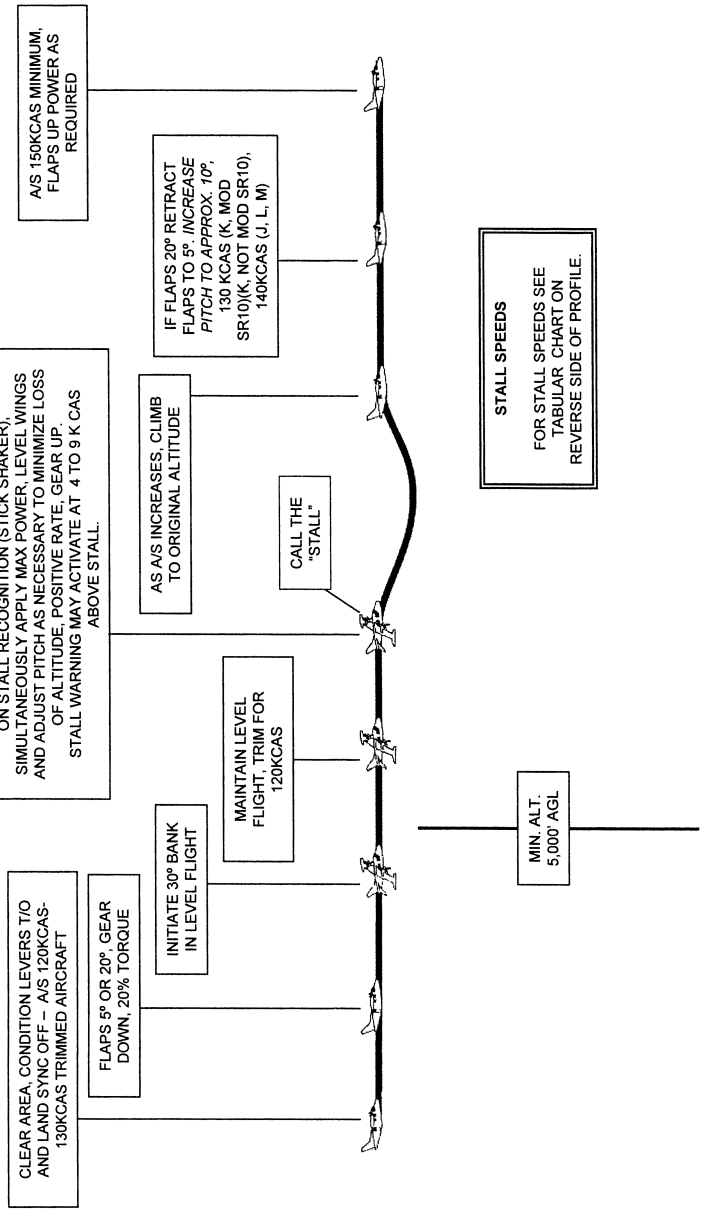
| | STALL SPEEDS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FLAPS SET | 0 | | 5 | | 20 | | 40 | | | |
| GR.WT. | K/M/J/L | | K/M/J/L | | K/M/J/L | | K/M/J/L | | | |
| 7,000 | 85/ 85/ | | 80/ 80/ | | 72/ 72/ | | 64/ 64/ | | | |
| 7,500 | 88 / 88/ | | 83/ 83/ | | 74/ 75/ | | 67/ 66/ | | | |
| 8,000 | 91/ 91/ 90/ | | 86/ 85/ 84/ | | 77/ 77/ 74/ | | 69/ 68/ 69 | | | |
| 8,500 | 94/ 94/ 93/ | | 89/ 88/ 87/ | | 79/ 79/ 77/ | | 71/ 70/ 71/ | | | |
| 9,000 | 97/ 96/ 95/ 93 | | 91/ 91/ 89/ 88 | | 82/ 81/ 79/ 77 | | 73/ 72/ 73/ 72 | | | |
| 9,500 | 99 /99/ 98/ 96 | | 93/ 93/ 92/ 90 | | 84/ 83/ 81/ 79 | | 75/ 74/ 75/ 74 | | | |
| 9,920 | 101/ | | 95/ | | 85/ | | 76/ | | | |
| 10,000 | /102/100/ 98 | | / 96/ 94/ 92 | | / 86/ 84/ 81 | | / 76/ 77/ 76 | | | |
| 10,470 | /104/ | | / 98/ | | / 88/ | | / 78/ | | | |
| 10,500 | /103/101 | | / 96/ 94 | | / 85/ 83 | | / 79/ 77 | | | |
| 10,800 | /104/ | | / 98/ | | / 86/ | | / 80/ 78 | | | |
| 11,000 | /103 | | / 97 | | / 85 | | / 79 | | | |
| 11,500 | /106 | | / 99 | | / 87 | | / 81 | | | |

B-8a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**APPROACH TO STALL**

**TAKEOFF CONFIGURATION 15-30° BANK**




B-9

STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
J, K, L, M

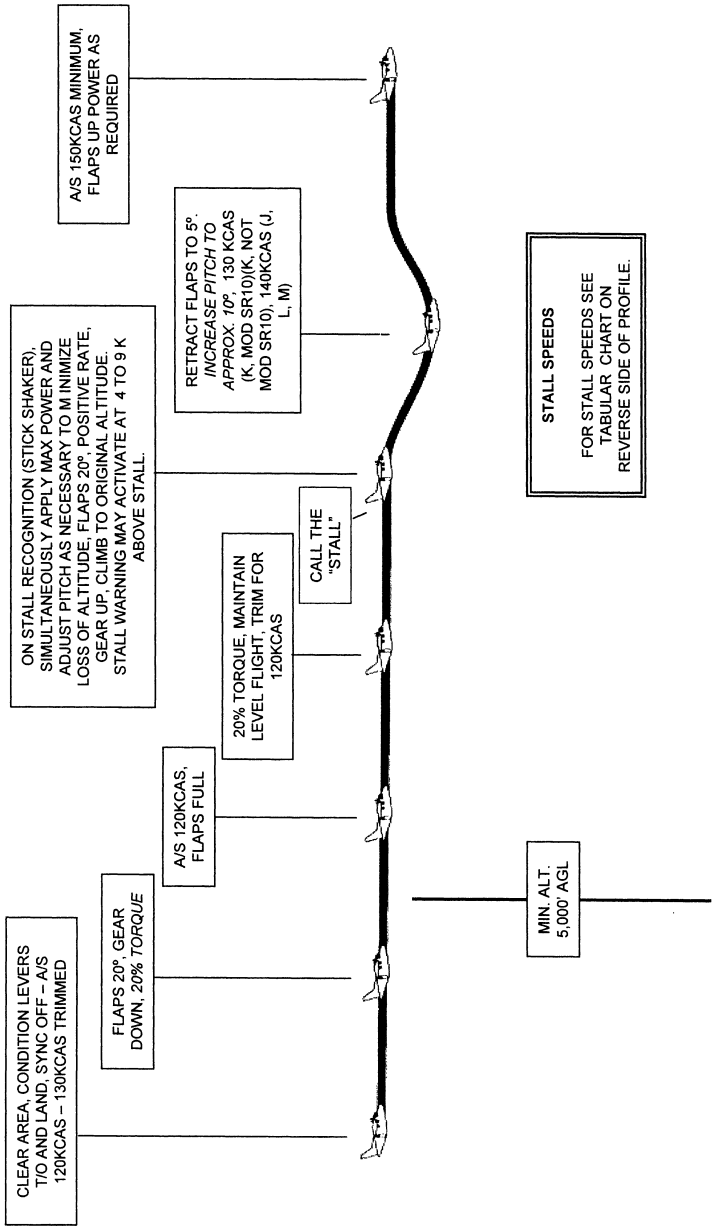
| BANK ANGLE | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|
| FLAPS | J/L/K/M | J/L/K/M | J/L/K/M | J/L/K/M | J/L/K/M | J/L/K/M |
| UP | 106/107/102/105 | 108/109/105/108 | 112/114/109/112 | 120/121/116/120 | 130/132/126/130 | 148/150/143/147 |
| 5° | 99/100/ 96/ 98 | 101/102/ 98/101 | 105/107/102/105 | 112/113/109/112 | 122/123/119/122 | 138/140/134/138 |
| 20° | 87/ 88/ 86/ 88 | 89/ 90/ 88/ 90 | 92 /94/ 92/ 94 | 98/100/ 97/100 | 108/109/107/109 | 122/123/120/123 |
| 40° | 81/ 82/ 77/ 79 | 83/ 84/ 79/ 81 | 86/ 87/ 82/ 84 | 92/ 93/ 87/ 90 | 100/102/ 96/ 98 | 112/115/108/110 |

B-9a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**APPROACH TO STALL**

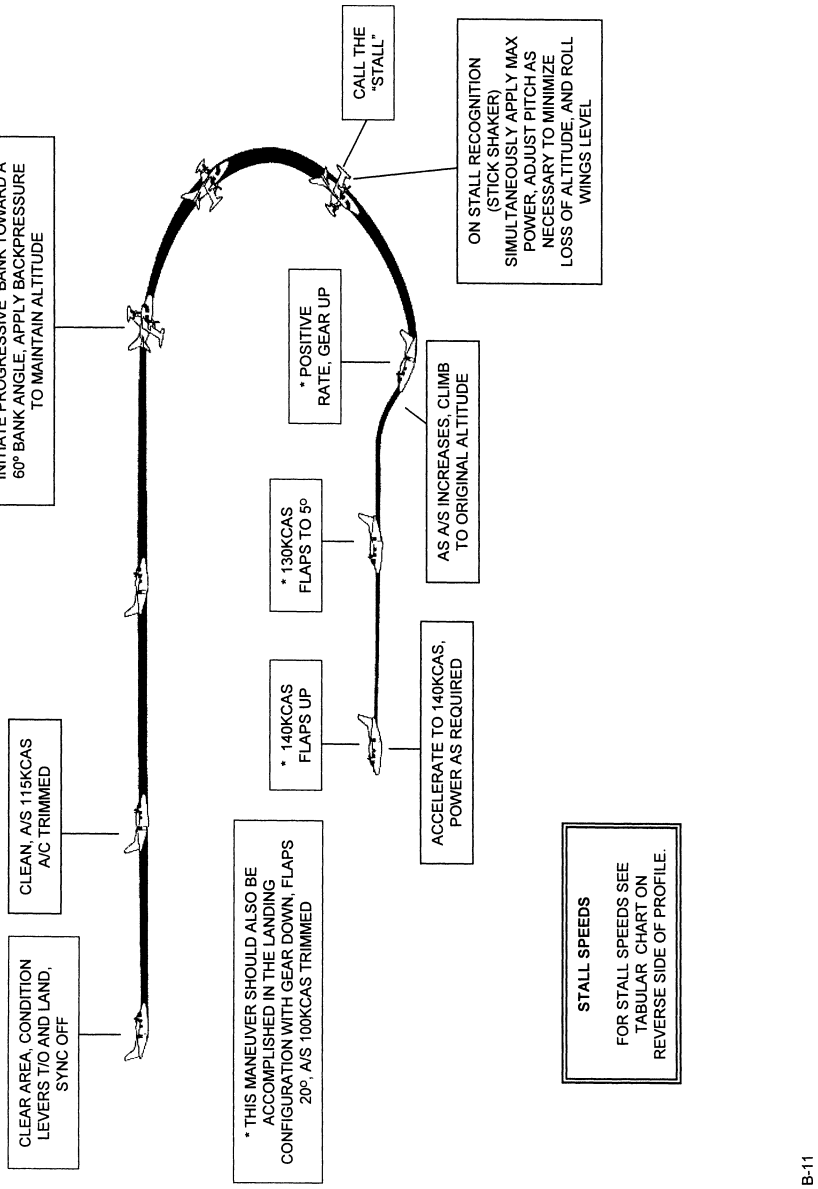
**GEAR DOWN – FULL FLAPS**




B-10

| STALL SPEEDS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FLAPS SET | 0 | | 5 | | 20 | | 40 | | |
| GR.WT. | K/M/J/L | | K/M/J/L | | K/M/J/L | | K/M/J/L | | |
| 7,000 | 85/ 85/ | | 80/ 80/ | | 72/ 72/ | | 64/ 64/ | | |
| 7,500 | 88 / 88/ | | 83/ 83/ | | 74/ 75/ | | 67/ 66/ | | |
| 8,000 | 91/ 91/ 90/ | | 86/ 85/ 84/ | | 77/ 77/ 74/ | | 69/ 68/ 69 | | |
| 8,500 | 94/ 94/ 93/ | | 89/ 88/ 87/ | | 79/ 79/ 77/ | | 71/ 70/ 71/ | | |
| 9,000 | 97/ 96/ 95/ 93 | | 91/ 91/ 89/ 88 | | 82/ 81/ 79/ 77 | | 73/ 72/ 73/ 72 | | |
| 9,500 | 99 /99/ 98/ 96 | | 93/ 93/ 92/ 90 | | 84/ 83/ 81/ 79 | | 75/ 74/ 75/ 74 | | |
| 9,920 | 101/ | | 95/ | | 85/ | | 76/ | | |
| 10,000 | /102/100/ 98 | | / 96/ 94/ 92 | | / 86/ 84/ 81 | | / 76/ 77/ 76 | | |
| 10,470 | /104/ | | / 98/ | | / 88/ | | / 78/ | | |
| 10,500 | /103/101 | | / 96/ 94 | | / 85/ 83 | | / 79/ 77 | | |
| 10,800 | /104/ | | / 97/ | | / 86/ | | / 80/ 78 | | |
| 11,000 | /103 | | / 97 | | / 85 | | / 79 | | |
| 11,500 | /106 | | / 99 | | / 87 | | / 81 | | |

B-10a

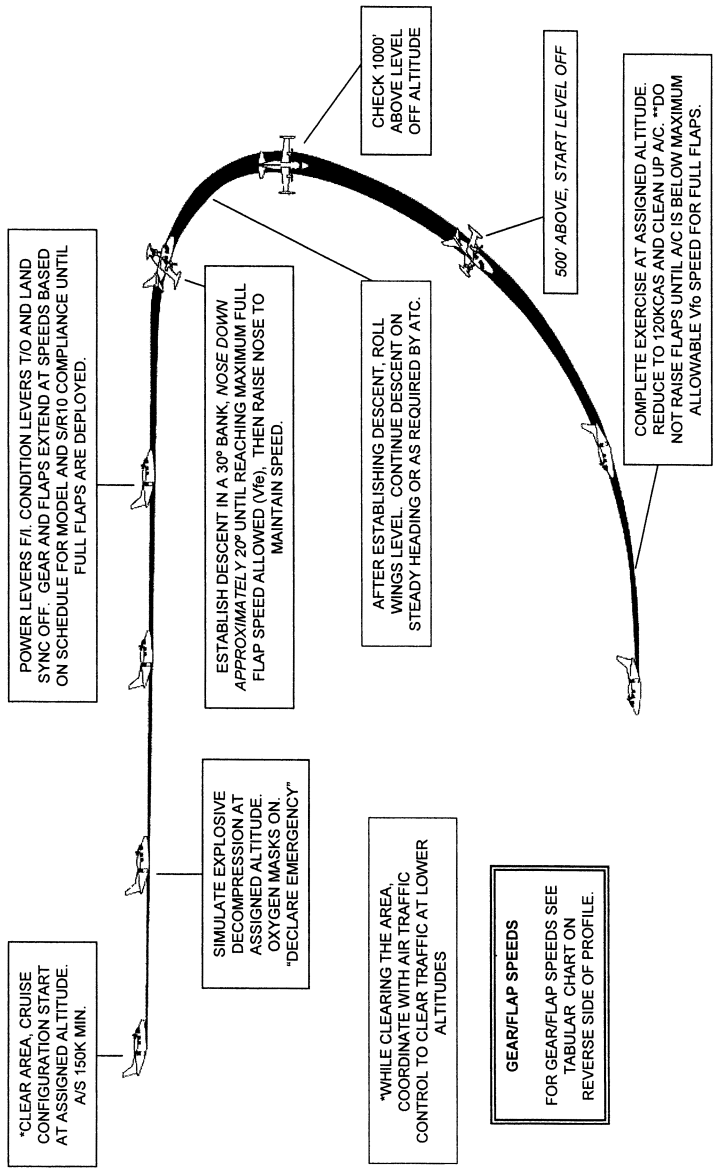

MU-2B J (-35), K (-25), L (-36), M (-26)
ACCELERATED STALLS
CLEAR AREA, CONDITION LEVERS T/O AND LAND, SYNC OFF
CLEAN, A/S 115KCAS A/C TRIMMED
INITIATE PROGRESSIVE BANK TOWARD A 60° BANK ANGLE, APPLY BACKPRESSURE TO MAINTAIN ALTITUDE
* THIS MANEUVER SHOULD ALSO BE ACCOMPLISHED IN THE LANDING CONFIGURATION WITH GEAR DOWN, FLAPS 20°, A/S 100KCAS TRIMMED
* 140KCAS FLAPS UP
* 130KCAS FLAPS TO 5°
* POSITIVE RATE, GEAR UP
ACCELERATE TO 140KCAS, POWER AS REQUIRED
AS A/S INCREASES, CLIMB TO ORIGINAL ALTITUDE
CALL THE "STALL"
ON STALL RECOGNITION (STICK SHAKER) SIMULTANEOUSLY APPLY MAX POWER, ADJUST PITCH AS NECESSARY TO MINIMIZE LOSS OF ALTITUDE, AND ROLL WINGS LEVEL
STALL SPEEDS
FOR STALL SPEEDS SEE TABULAR CHART ON REVERSE SIDE OF PROFILE.
B-11

STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
J, K, L, M

| BANK ANGLE | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|
| FLAPS | J/L/K/M | J/L/K/M | J/L/K/M | J/L/K/M | J/L/K/M | J/L/K/M |
| UP | 106/107/102/105 | 108/109/105/108 | 112/114/109/112 | 120/121/116/120 | 130/132/126/130 | 148/150/143/147 |
| 5° | 99/100/ 96/ 98 | 101/102/ 98/101 | 105/107/102/105 | 112/113/109/112 | 122/123/119/122 | 138/140/134/138 |
| 20° | 87/ 88/ 86/ 88 | 89/ 90/ 88/ 90 | 92 /94/ 92/ 94 | 98/100/ 97/100 | 108/109/107/109 | 122/123/120/123 |
| 40° | 81/ 82/ 77/ 79 | 83/ 84/ 79/ 81 | 86/ 87/ 82/ 84 | 92/ 93/ 87/ 90 | 100/102/ 96/ 98 | 112/115/108/110 |

B-11a

**MU-2B J (-35), K (-25), L (-36), M (-26)**
**EMERGENCY DESCENT (LOW SPEED)**




B-12

**GEAR AND FLAP EXTEND SCHEDULE**

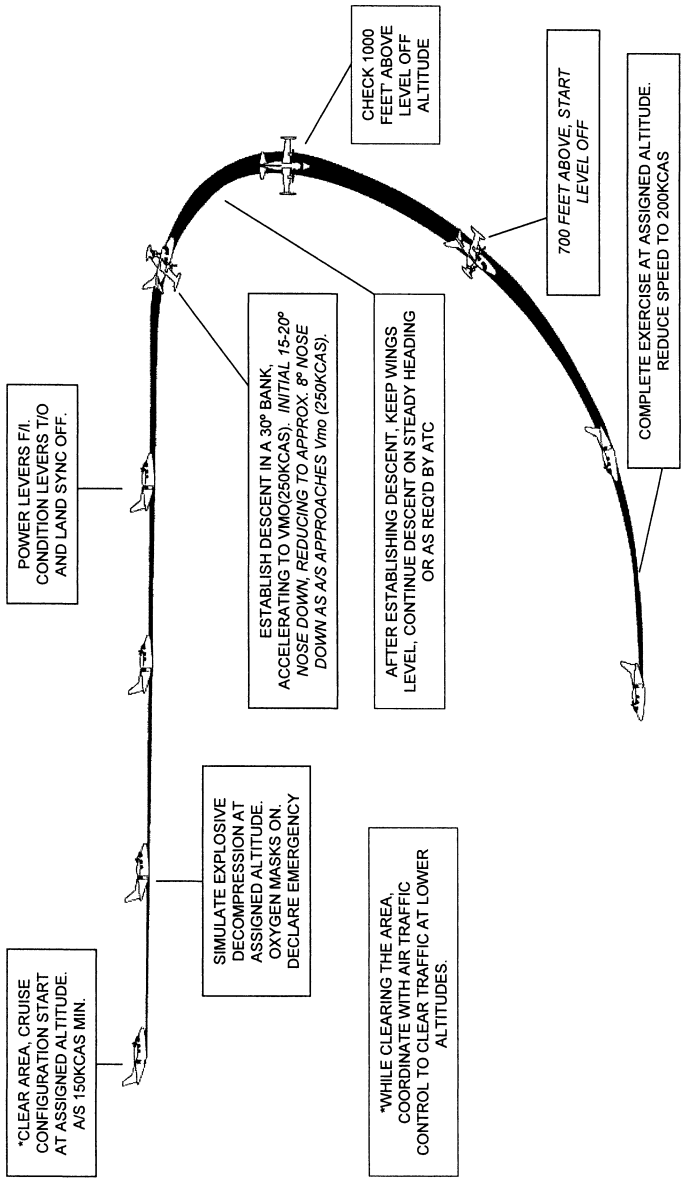
**(K+ AND J+ ARE MODIFIED BY S/R10)**

| GEAR | |
|---|---|
| K, K+: | 160KCAS |
| M, J, J+: | 170KCAS |
| L: | 175KCAS |

| FLAPS | 5° | 20° | 40° |
|---|---|---|---|
| J: S/N 548 – 609 NOT MODIFIED BY S/R10 | 146KCAS | 146KCAS | 120KCAS |
| J+: S/N 548 – 609 MODIFIED BY S/R10 AND S/N 610 - 654 | 175KCAS | 146KCAS | 120KCAS |
| K: S/N 239 – 279 NOT MODIFIED BY S/R10 | 140KCAS | 140KCAS | 120KCAS |
| K+: S/N 239 – 279 MODIFIED BY S/R10 AND S/N 280 - 318 | 175KCAS | 140KCAS | 120KCAS |
| L / M | 175KCAS | 155KCAS | 120KCAS |

B-12a

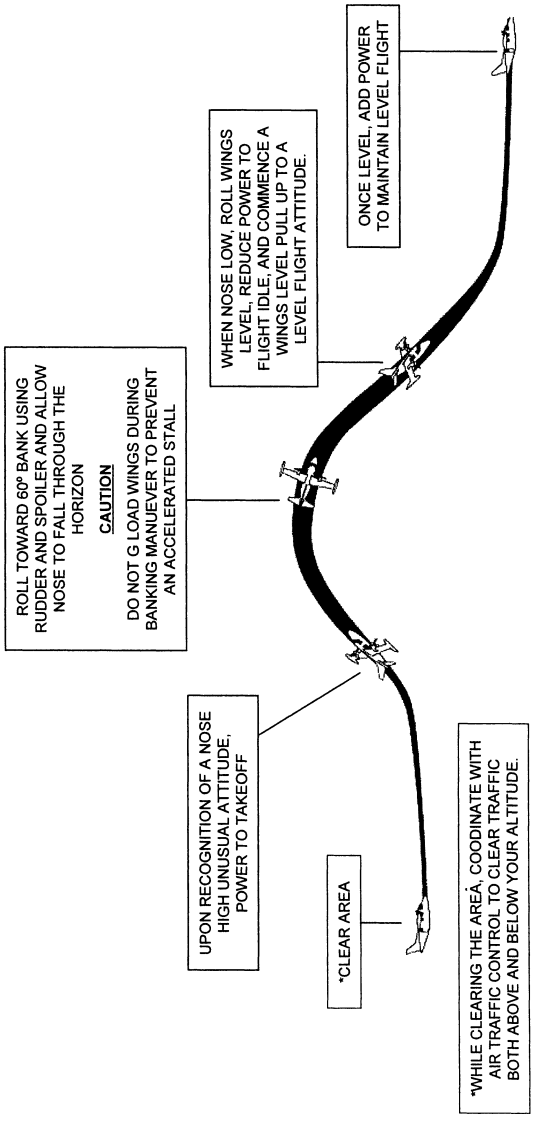
**MU-2B J (-35), K (-25), L (-36), M (-26)**
**EMERGENCY DESCENT (HIGH SPEED)**




B-13

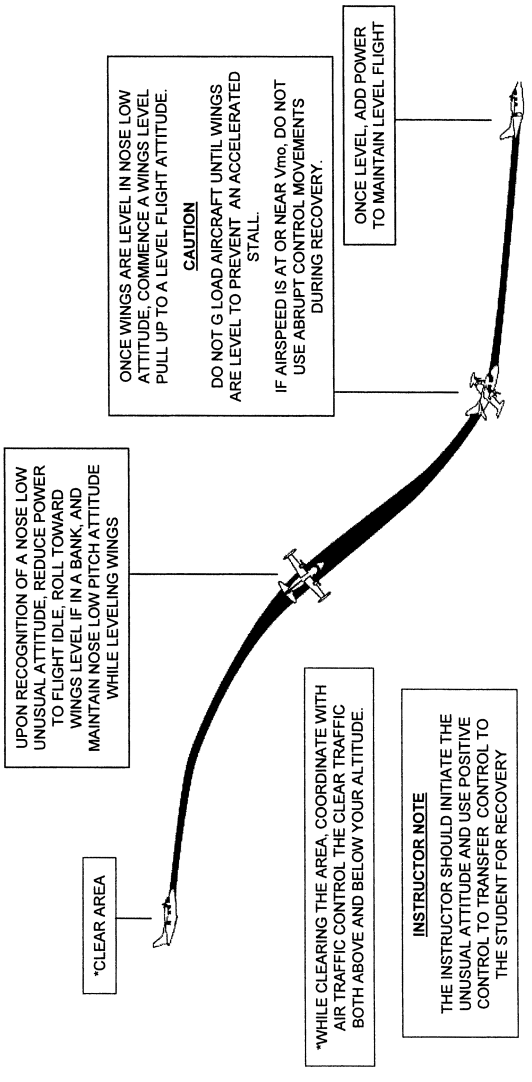
**MU-2B J (-35), K (-25), L (-36), M (-26)**

**UNUSUAL ATTITUDE RECOVERY (NOSE HIGH)**




B-14

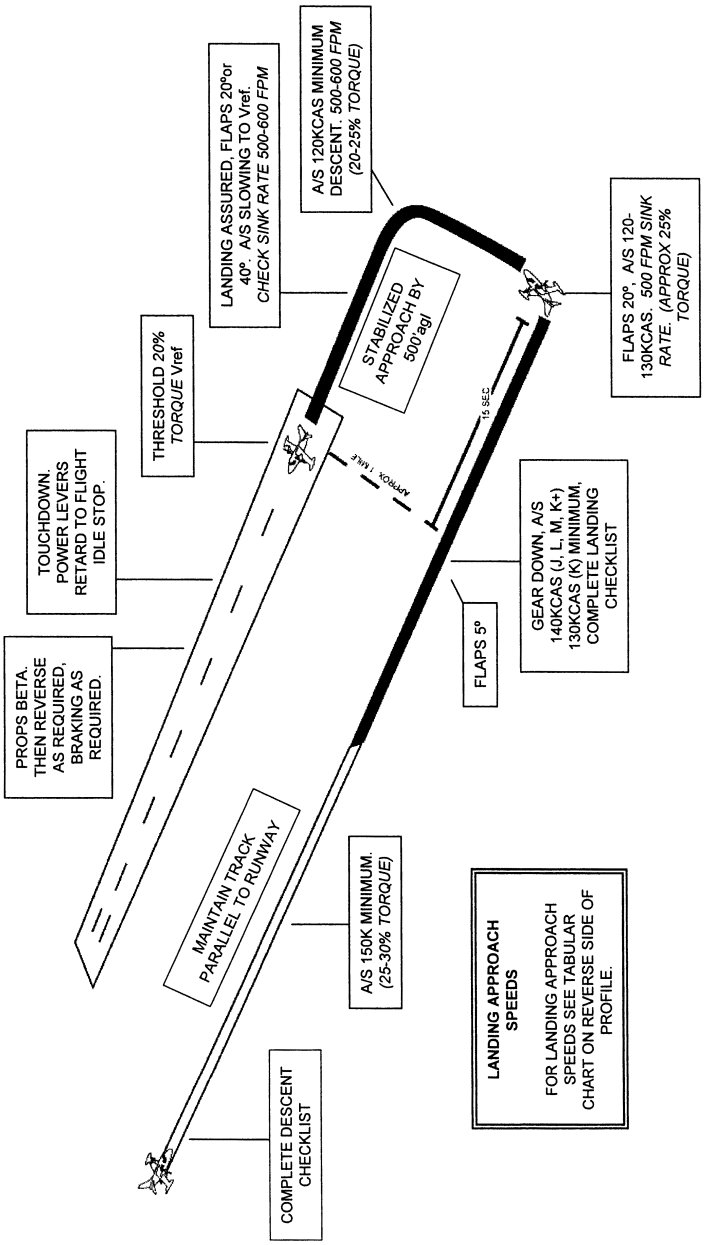
**MU-2B J (-35), K (-25), L (-36), M (-26)**
**UNUSUAL ATTITUDE RECOVERY (NOSE LOW)**




B-15

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**NORMAL LANDING (20°or 40° FLAPS)**




B-16

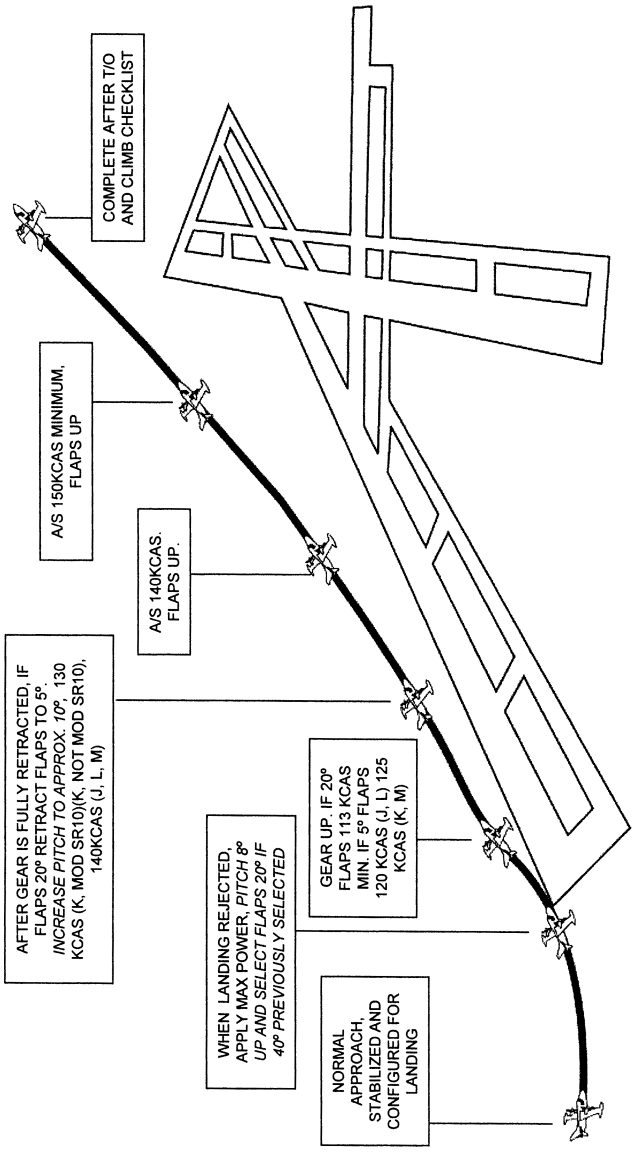
LANDING APPROACH SPEEDS Vref
J, K, L, M

| | FLAPS 20° (1.3 VS1) | | | FLAPS 40° (1.5 VS1) | | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | K | M | J | L | K | M | J | L |
| 7,000 | 93 | 96 | | | | 96 | | |
| 7,500 | 96 | 100 | 93 | | 99 | 100 | 100 | |
| 8,000 | 100 | 103 | 96 | | 103 | 103 | 103 | |
| 8,500 | 103 | 106 | 100 | 99 | 106 | 106 | 106 | 105 |
| 9,000 | 106 | 109 | 103 | 99 | 109 | 109 | 109 | 108 |
| 9,435 | 108 | | | | 112 | | | |
| 9,500 | | 112 | 106 | 103 | | 112 | 112 | 111 |
| 9,955 | | 115 | | | | 115 | | |
| 10,000 | | | 109 | 105 | | | 115 | 114 |
| 10,260 | | | 110 | | | | 117 | |
| 10,500 | | | | 108 | | | | 117 |
| 11,000 | | | | 110 | | | | 119 |
| 11,025 | | | | 110 | | | | 119 |

B-16a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

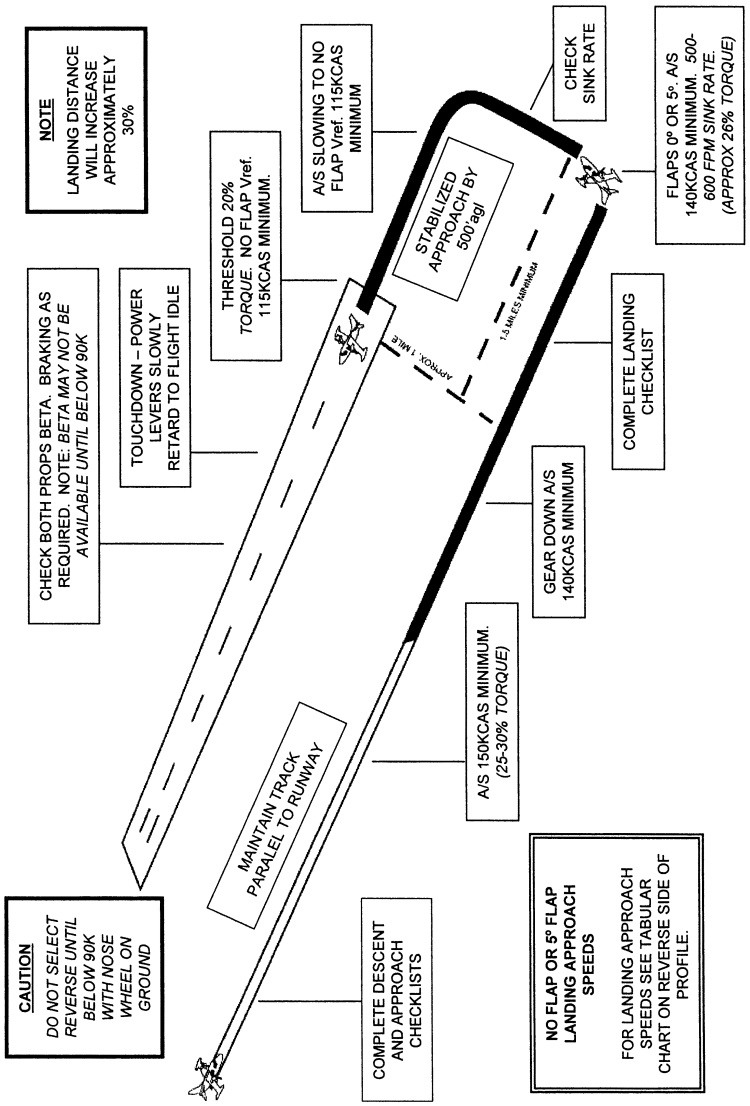
**GO AROUND - REJECTED LANDING**




B-17

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**NO FLAP OR 5° FLAP LANDING**




B-18

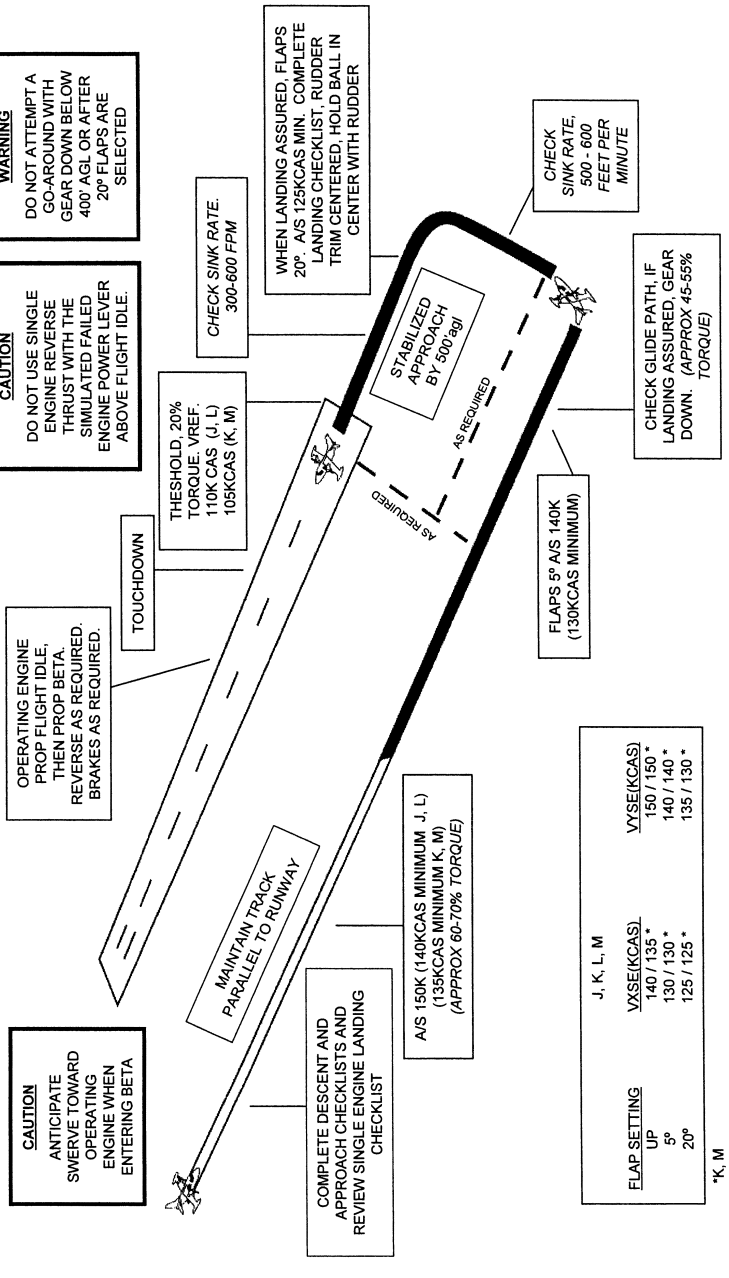
NO FLAP Vref 1.25 VS1
(BUT NOT BELOW 115KCAS)
USE FOR FLAP UP OR 5°
J, K, L, M

| | FLAPS UP | | | | FLAPS 5° | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | J | K | L | M | J | K | L | M |
| 7,500 | | 115 | | | | 115 | | |
| 8.000 | 115 | 115 | | 115 | 115 | 115 | | 115 |
| 8.500 | 117 | 118 | | 118 | 115 | 115 | | 115 |
| 9.000 | 119 | 122 | 117 | 120 | 115 | 115 | 115 | 115 |
| 9,435 | | 124 | | | | 117 | | |
| 9.500 | 123 | | 120 | 124 | 115 | | 115 | 117 |
| 9.955 | | | | 127 | | | | 119 |
| 10.000 | 125 | | 123 | | 118 | | 115 | |
| 10.260 | 128 | | | | | | | |
| 10.500 | | | 127 | | | | 118 | |
| 11,000 | | | 129 | | | | 124 | |
| 11.025 | | | 129 | | | | 124 | |

B-18a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

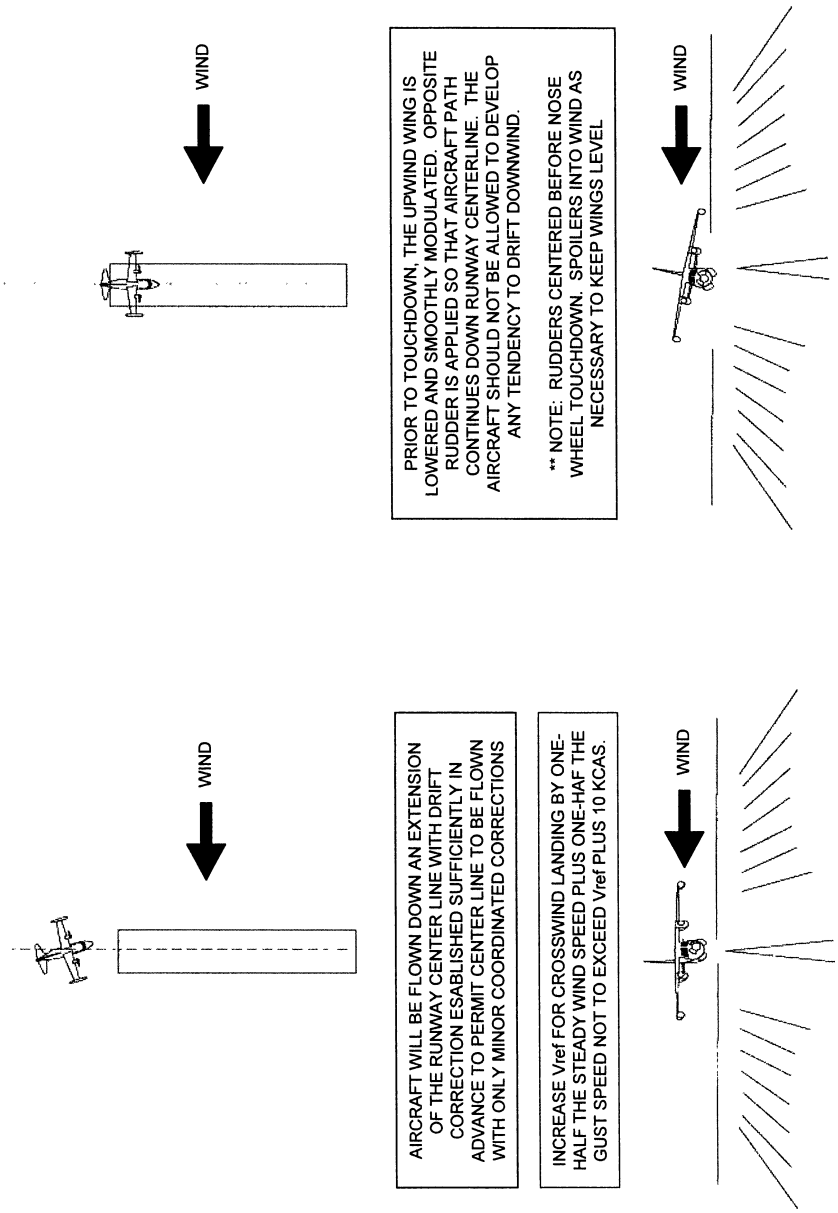
**ONE ENGINE INOPERATIVE LANDING**




B-19

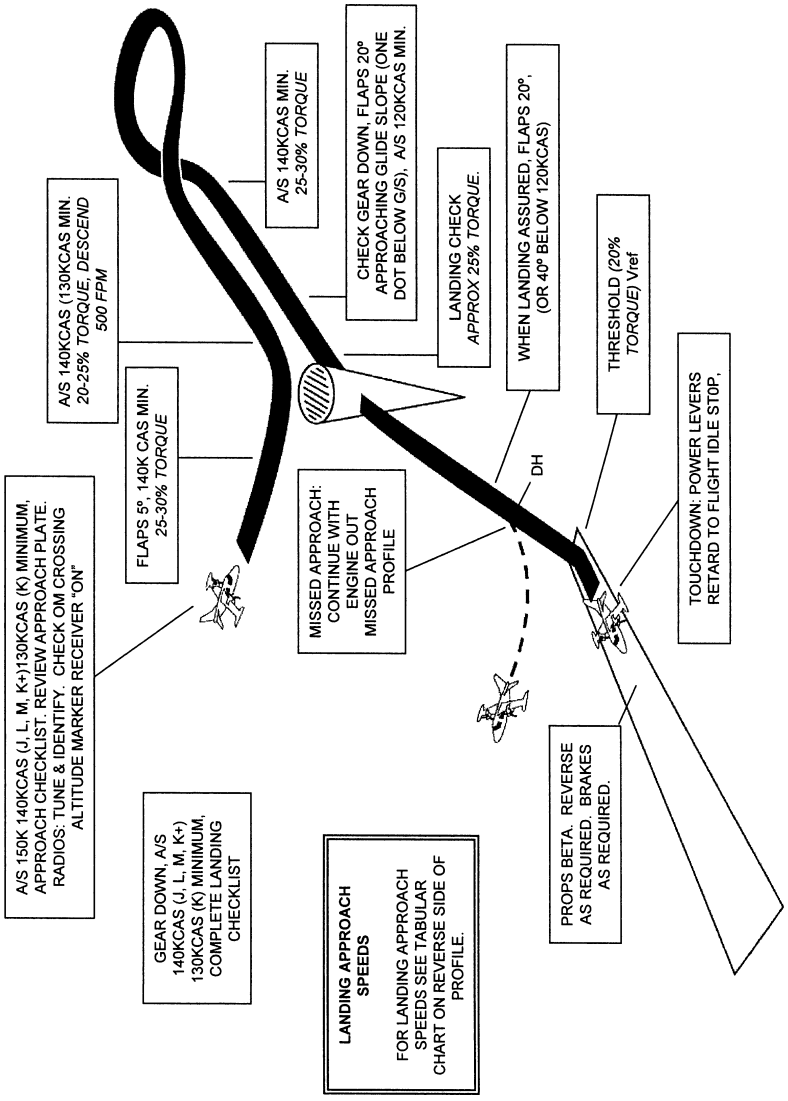
**MU-2B J (-35), K (-25), L (-36), M (-26)**

**CROSSWIND LANDING**



**MU-2B J (-35), K (-25), L (-36), M (-26)**

**ILS AND MISSED APPROACH**




B-21

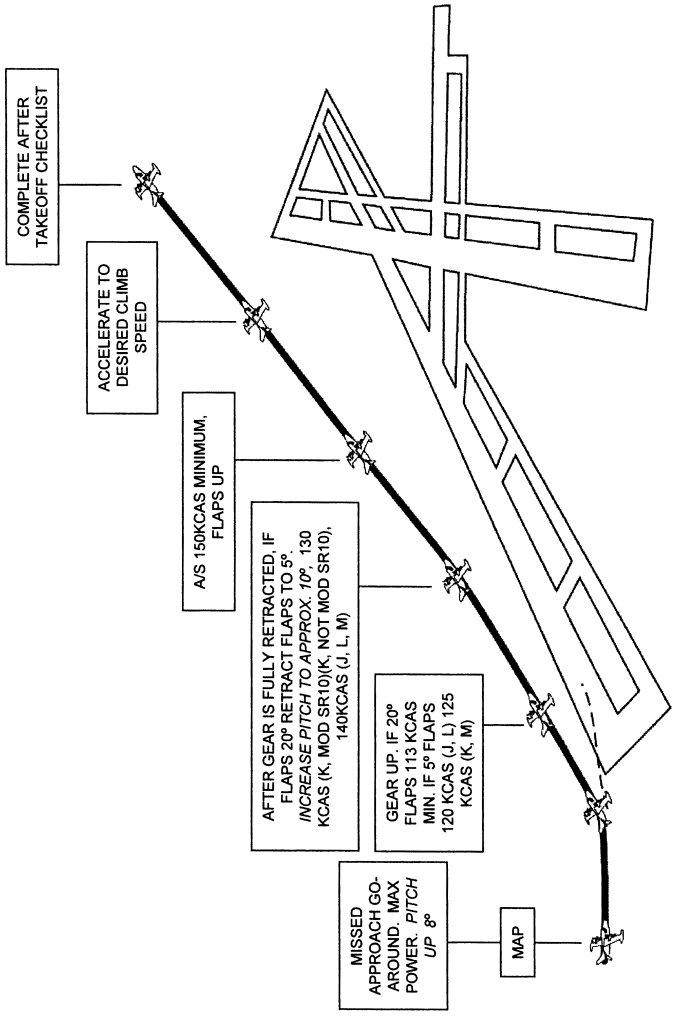
LANDING APPROACH SPEEDS Vref
J, K, L, M

| | FLAPS 20° (1.3 VS1) | | | FLAPS 40° (1.5 VS1) | | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | K | M | J | L | K | M | J | L |
| 7,000 | 93 | 96 | | | | 96 | | |
| 7,500 | 96 | 100 | 93 | | 99 | 100 | 100 | |
| 8,000 | 100 | 103 | 96 | | 103 | 103 | 103 | |
| 8,500 | 103 | 106 | 100 | 99 | 106 | 106 | 106 | 105 |
| 9,000 | 106 | 109 | 103 | 99 | 109 | 109 | 109 | 108 |
| 9,435 | 108 | | | | 112 | | | |
| 9,500 | | 112 | 106 | 103 | | 112 | 112 | 111 |
| 9,955 | | 115 | | | | 115 | | |
| 10,000 | | | 109 | 105 | | | 115 | 114 |
| 10,260 | | | 110 | | | | 117 | |
| 10,500 | | | | 108 | | | | 117 |
| 11,000 | | | | 110 | | | | 119 |
| 11,025 | | | | 110 | | | | 119 |

B-21a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

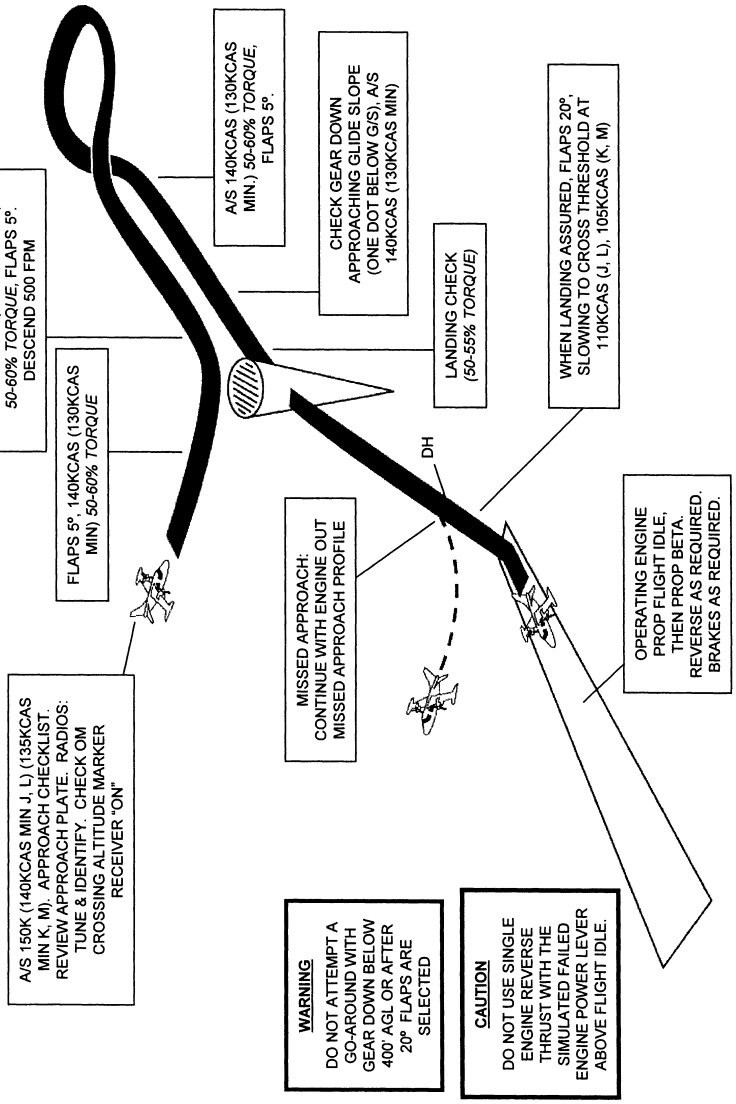
**TWO ENGINE MISSED APPROACH**




B-22

MU-2B J (-35), K (-25), L (-36), M (-26)

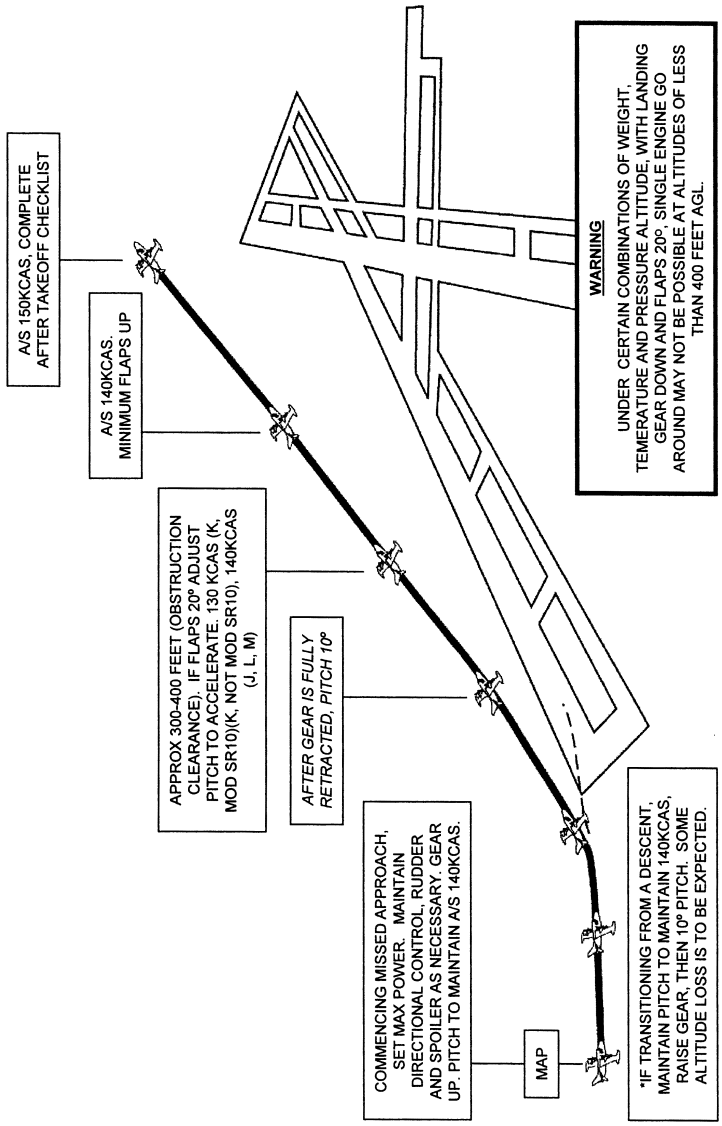
ONE ENGINE INOPERATIVE ILS AND MISSED APPROACH




B-23

**MU-2B J (-35), K (-25), L (-36), M (-26)**

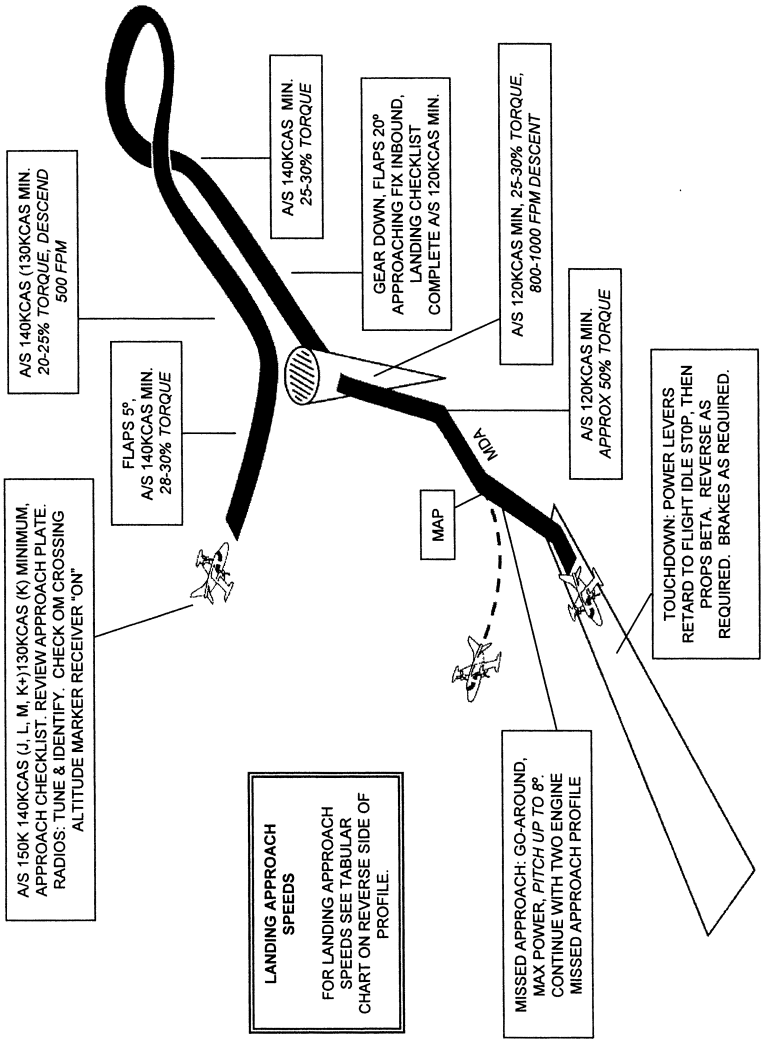
**ONE ENGINE INOPERATIVE MISSED APPROACH**




B-24

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**NON-PRECISION AND MISSED APPROACH**




B-25

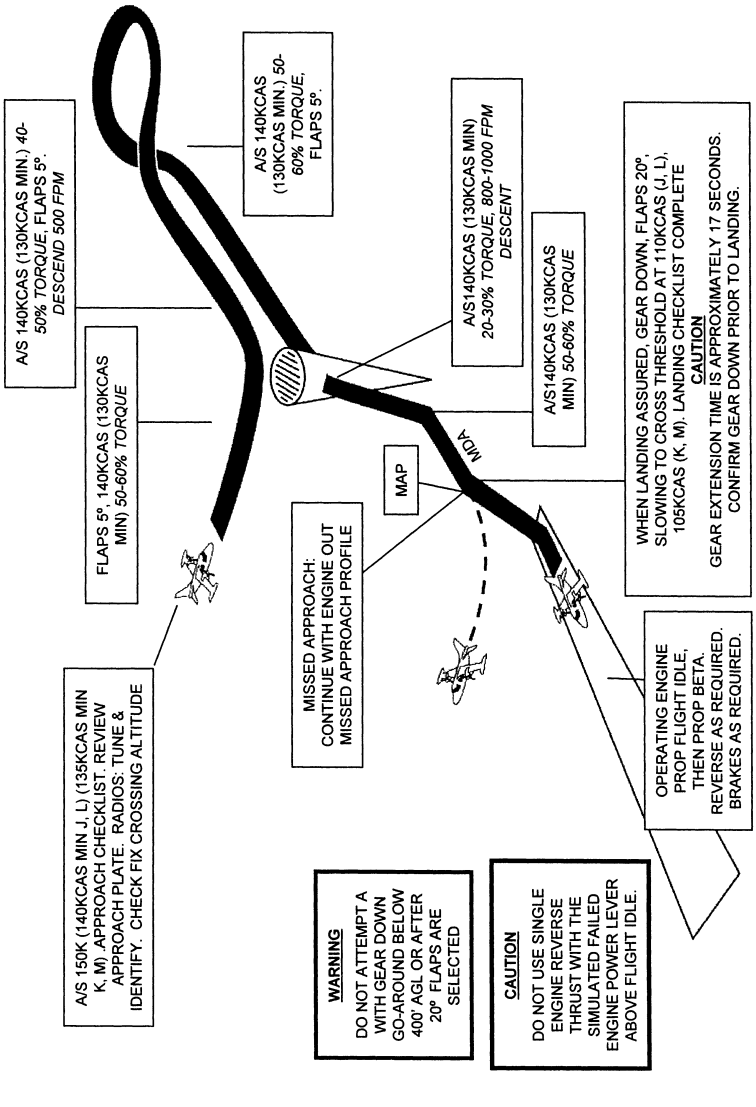
LANDING APPROACH SPEEDS Vref
J, K, L, M

| | FLAPS 20° (1.3 VS1) | | | | FLAPS 40° (1.5 VS1) | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | K | M | J | L | K | M | J | L |
| 7,000 | 93 | 96 | | | | 96 | | |
| 7,500 | 96 | 100 | 93 | | 99 | 100 | 100 | |
| 8,000 | 100 | 103 | 96 | | 103 | 103 | 103 | |
| 8,500 | 103 | 106 | 100 | 99 | 106 | 106 | 106 | 105 |
| 9,000 | 106 | 109 | 103 | 99 | 109 | 109 | 109 | 108 |
| 9,435 | 108 | | | | 112 | | | |
| 9,500 | | 112 | 106 | 103 | | 112 | 112 | 111 |
| 9,955 | | 115 | | | | 115 | | |
| 10,000 | | | 109 | 105 | | | 115 | 114 |
| 10,260 | | | 110 | | | | 117 | |
| 10,500 | | | | 108 | | | | 117 |
| 11,000 | | | | 110 | | | | 119 |
| 11,025 | | | | 110 | | | | 119 |

B-25a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

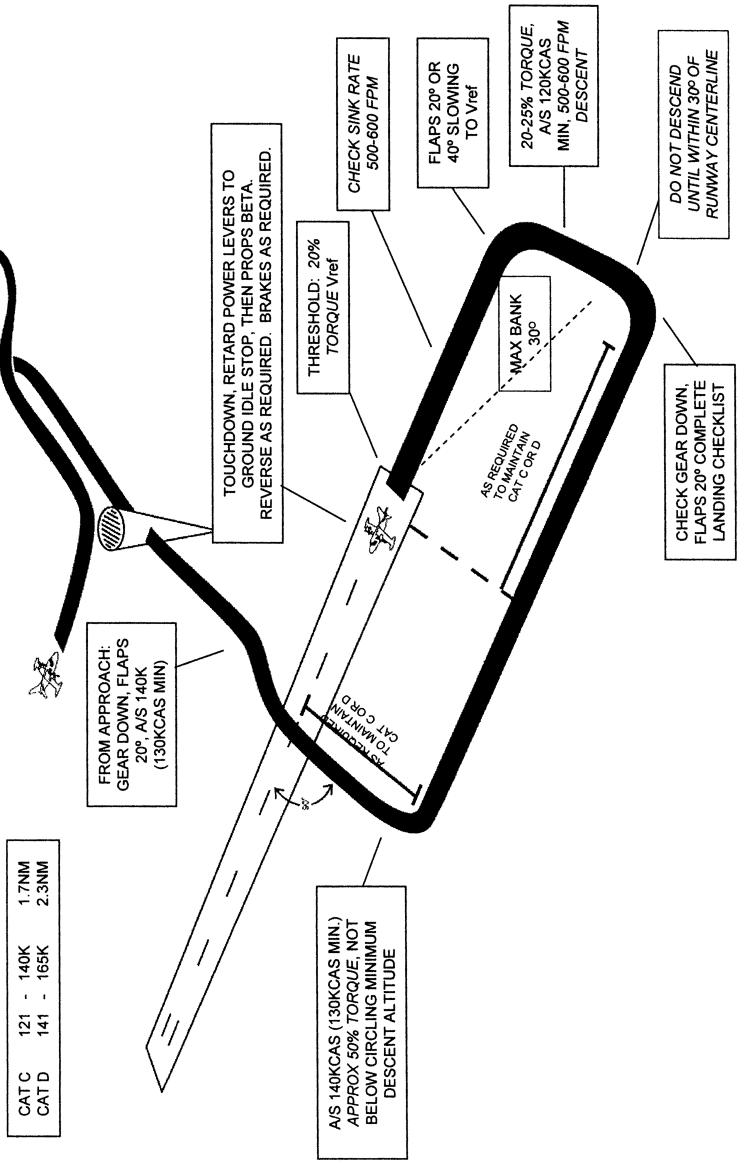
**ONE ENGINE INOPERATIVE NON-PRECISION AND MISSED APPROACH**




B-26

**MU-2B J (-35), K (-25), L (-36), M (-26)**

**CIRCLING APPROACH AT WEATHER MINIMUMS**




B-27

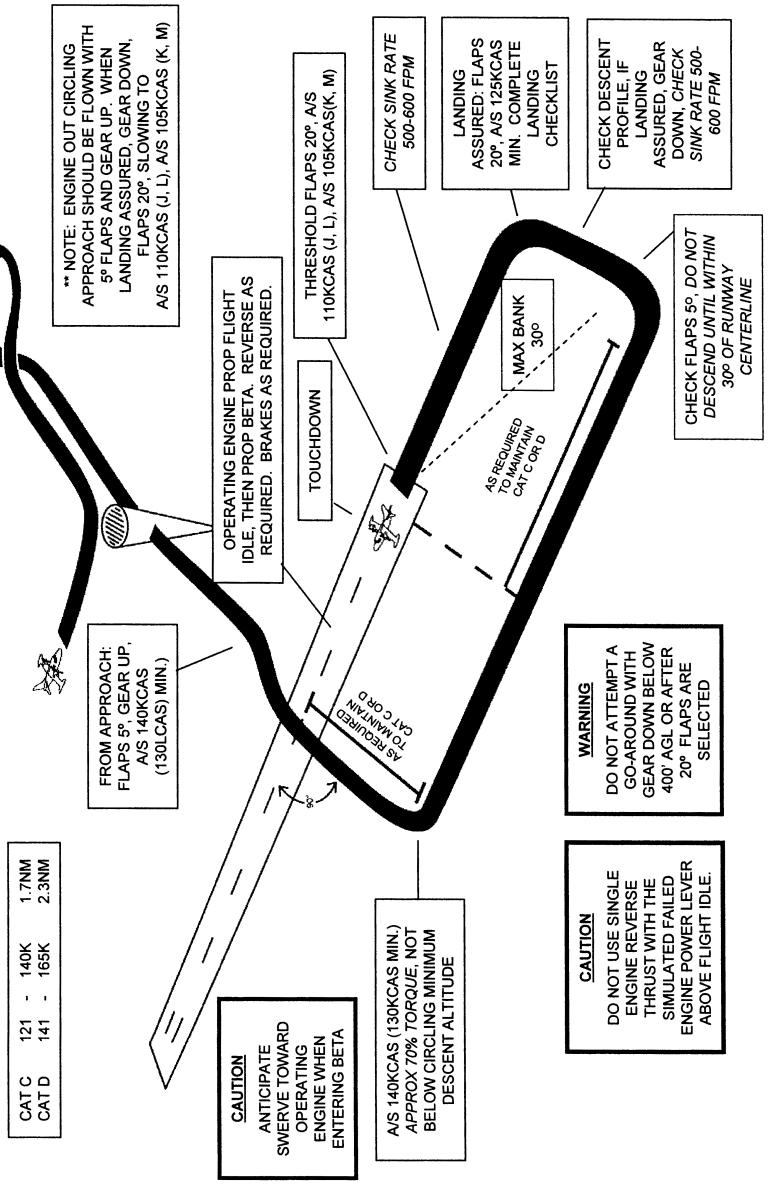
LANDING APPROACH SPEEDS Vref
J, K, L, M

| | FLAPS 20° (1.3 VS1) | | | FLAPS 40° (1.5 VS1) | | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | K | M | J | L | K | M | J | L |
| 7,000 | 93 | 96 | | | | 96 | | |
| 7,500 | 96 | 100 | 93 | | 99 | 100 | 100 | |
| 8,000 | 100 | 103 | 96 | | 103 | 103 | 103 | |
| 8,500 | 103 | 106 | 100 | 99 | 106 | 106 | 106 | 105 |
| 9,000 | 106 | 109 | 103 | 99 | 109 | 109 | 109 | 108 |
| 9,435 | 108 | | | | 112 | | | |
| 9,500 | | 112 | 106 | 103 | | 112 | 112 | 111 |
| 9,955 | | 115 | | | | 115 | | |
| 10,000 | | | 109 | 105 | | | 115 | 114 |
| 10,260 | | | 110 | | | | 117 | |
| 10,500 | | | | 108 | | | | 117 |
| 11,000 | | | | 110 | | | | 119 |
| 11,025 | | | | 110 | | | | 119 |

B-27a

**MU-2B J (-35), K (-25), L (-36), M (-26)**

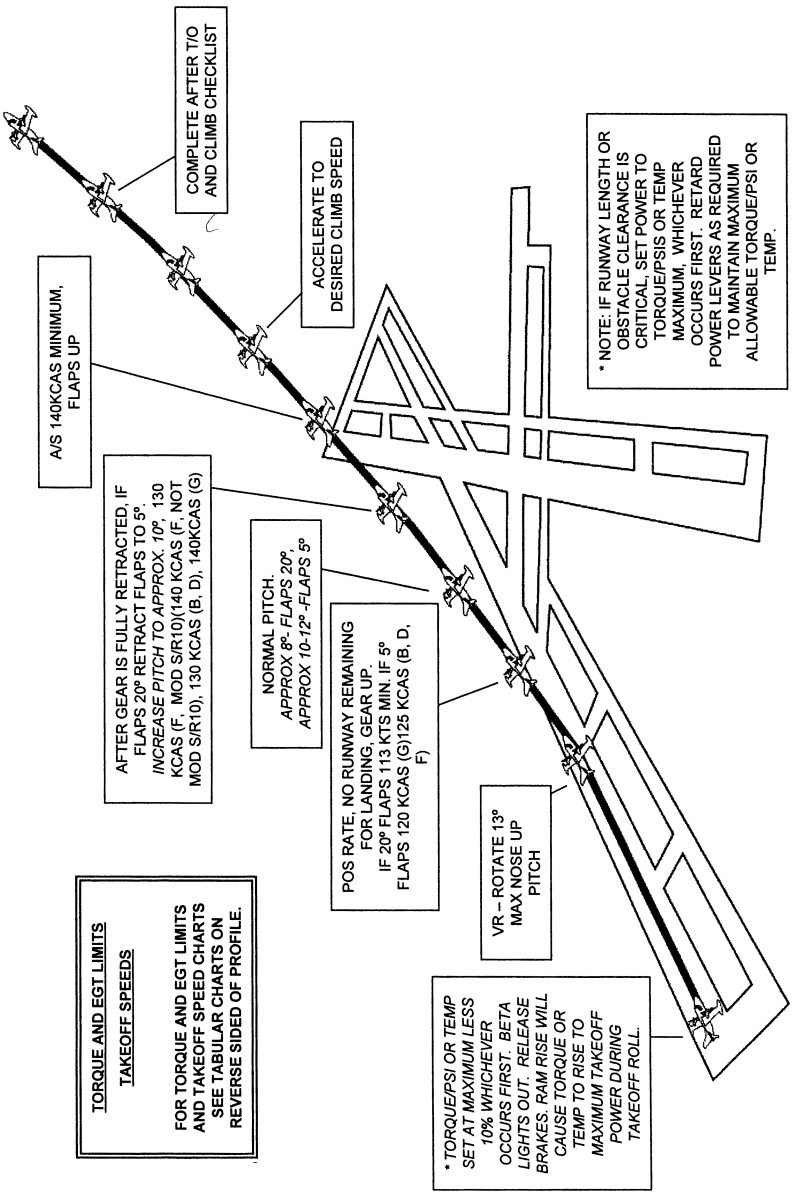
**ONE ENGINE INOPERATIVE CIRCLING APPROACH AT WEATHER MINIMUMS**




B-28

**MU-2B B, D (-10), F (-20), G (-30)**

**NORMAL TAKE-OFF, 5° OR 20° FLAPS**




C-1

**TORQUE LIMITS**

**B, D** **64 PSI**

**F, G** **60 PSI (STATIC)**

**64 PSI (RAM CONDITIONS 5 MINUTES**

**EGT LIMITS DEPEND ON OUTSIDE AIR TEMPERATURE, CHECK EGT LIMITS PRIOR TO DEPARTURE.**

**TAKE OFF SPEEDS**
ROTATE

| FLAPS 5° | B | B+ | D | F | G |
|---|---|---|---|---|---|
| 10,800 LBS | | | | | 109 |
| 10,000 LBS | | | | | 105 |
| 9,920 LBS | | | | 108 | |
| 9,500 LBS | | | | 107 | 103 |
| 9,350 LBS | | 111 | 111 | | |
| 9,000 LBS | | 110 | 110 | 106 | 101 |
| 8,930 LBS | 109 | | | | |
| 8,000 LBS | 107 | 107 | 107 | 104 | 100 |
| 7,500 LBS | 106 | 106 | 106 | 102 | |
| 7,000 LBS | 104 | 104 | 104 | | |

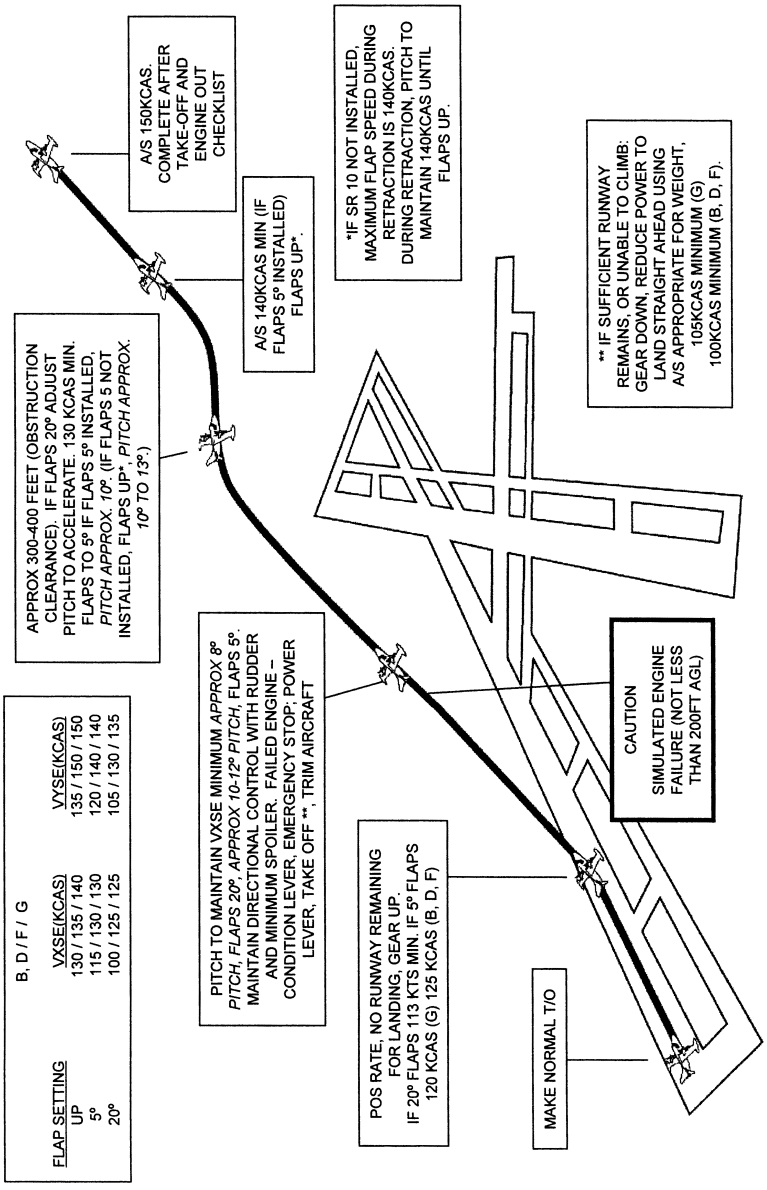
| FLAPS 20° | B | B+ | D | F | G |
|---|---|---|---|---|---|
| 10,800 LBS | | | | | 105 |
| 10,000 LBS | | | | | 102 |
| 9,920 LBS | | | | 102 | |
| 9,500 LBS | | | | 101 | 101 |
| 9,350 LBS | | 104 | 104 | | |
| 9,000 LBS | | 103 | 103 | 100 | 100 |
| 8,930 LBS | 103 | | | | |
| 8,000 LBS | 101 | 101 | 101 | 99 | 100 |
| 7,500 LBS | 100 | 100 | 100 | 98 | |
| 7,000 LBS | 99 | 99 | 99 | | |

B: NOT MODIFIED BYH S/B 036 AND S/B 092
B+: MODIFIED BY S/B 036 AND S/B 092

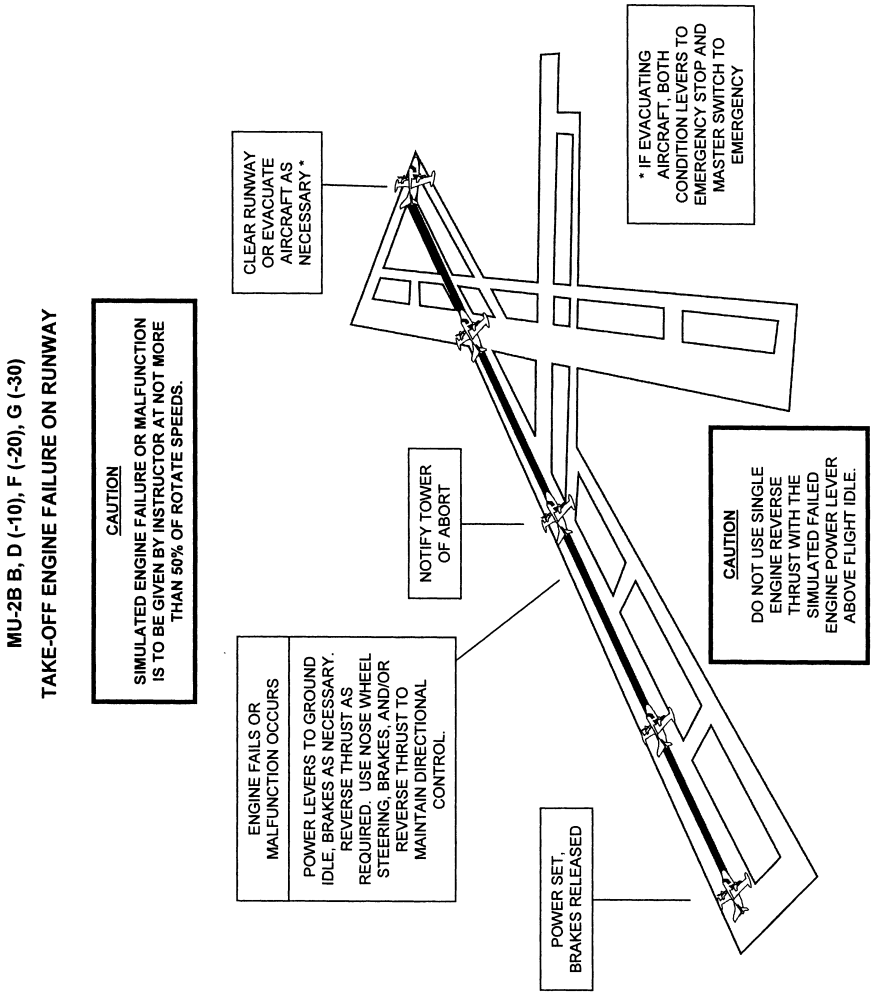
C-1a

**MU-2B B, D (-10), F (-20), G (-30)**

**TAKE-OFF ENGINE FAILURE – FLAPS 5° OR 20°**



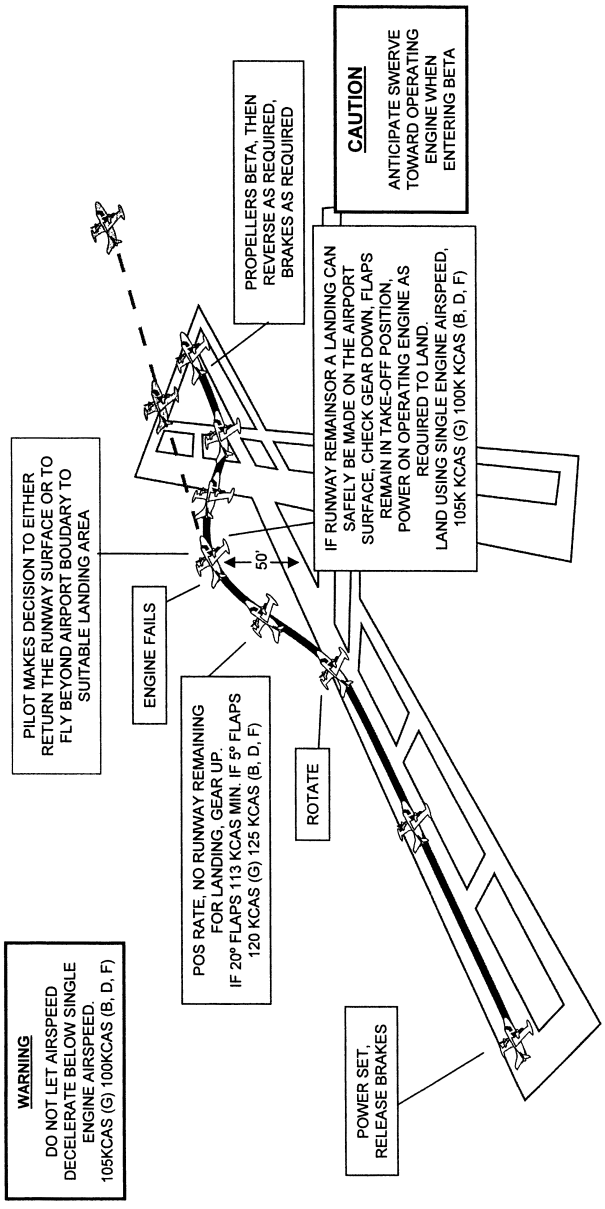

C-2


MU-2B B, D (-10), F (-20), G (-30)
TAKE-OFF ENGINE FAILURE ON RUNWAY
CAUTION
SIMULATED ENGINE FAILURE OR MALFUNCTION IS TO BE GIVEN BY INSTRUCTOR AT NOT MORE THAN 50% OF ROTATE SPEEDS.
CLEAR RUNWAY OR EVACUATE AIRCRAFT AS NECESSARY *
* IF EVACUATING AIRCRAFT, BOTH CONDITION LEVERS TO EMERGENCY STOP AND MASTER SWITCH TO EMERGENCY
NOTIFY TOWER OF ABORT
ENGINE FAILS OR MALFUNCTION OCCURS
POWER LEVERS TO GROUND IDLE, BRAKES AS NECESSARY. REVERSE THRUST AS REQUIRED. USE NOSE WHEEL STEERING, BRAKES, AND/OR REVERSE THRUST TO MAINTAIN DIRECTIONAL CONTROL.
CAUTION
DO NOT USE SINGLE ENGINE REVERSE THRUST WITH THE SIMULATED FAILED ENGINE POWER LEVER ABOVE FLIGHT IDLE.
POWER SET, BRAKES RELEASED
C-3

**MU-2B B, D (-10), F (-20), G (-30)**

**TAKE-OFF ENGINE FAILURE - UNABLE TO CLIMB**

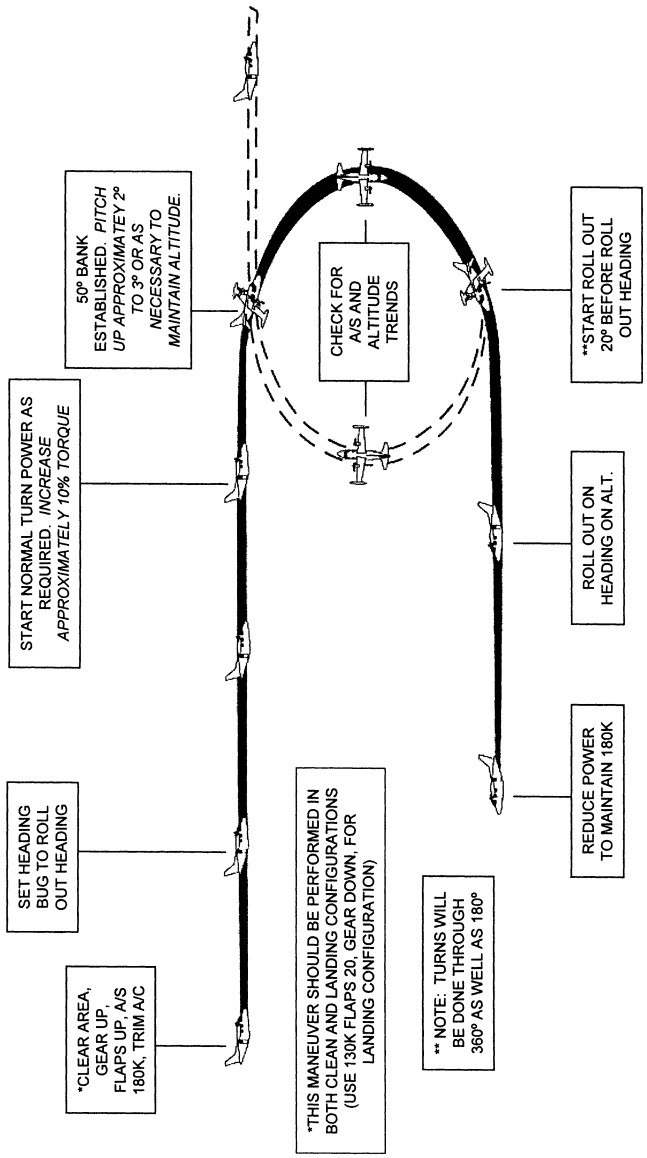
***CLASSROOM DISCUSSION OR FTD USE ONLY***




C-4

**MU-2B B, D (-10), F (-20), G (-30)**

**STEEP TURNS**




C-5

## MU-2B B, D (-10), F (-20), G (-30)

## SLOW FLIGHT MANEUVERING

## MINIMUM CONTROLLABLE AIRSPEED

SLOW FLIGHT MANEUVERING IS CONDUCTED AS FOLLOWS:

CLEAR THE AREA PRIOR TO BEGINNING THE MANEUVER.

START WITH CLEAN CONFIGURATION AND CHANGE AIRCRAFT CONFIGURATION FROM CLEAN TO FULL FLAP AND GEAR IN STAGES. USE A MAXIMUM OF 15° BANK AND PERFORM HEADING CHANGES OF 90° LEFT AND RIGHT. CONSTANT ALTITUDE IS REQUIRED THROUGHOUT.
MAINTAIN 115K IN ALL CONFIGURATIONS.

**APPROXIMATE POWER SETTINGS ARE:

| | | |
|---|---|---|
| *CLEAN* | *TORQUE (35%) OR PSI (23) PER ENGINE* | *APPROX PITCH +12* |
| *5° FLAP* | *TORQUE (32%) OR PSI (21) PER ENGINE* | *APPROX PITCH +8* |
| *5° FLAP & GEAR* | *TORQUE (44%) OR PSI (29) PER ENGINE* | *APPROX PITCH +9* |
| *20° FLAP & GEAR* | *TORQUE (42%) OR PSI (27) PER ENGINE* | *APPROX PITCH +4* |
| *40° FLAP & GEAR* | *TORQUE (54%) OR PSI (35) PER ENGINE* | *APPROX PITCH 0* |

** NOTE: POWER SETTINGS WILL VARY WITH AIRCRAFT WEIGHT AND ALTITUDE.

STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
B, B+, D, F, G

| ANGLE OF BANK | B/ B+ / D / F / G 0° | B / B+ / D / F / G 15° |
|---|---|---|
| FLAPS | | |
| UP | 95/ 98 / 98/102/104 | 98/ 99/ 99/104/106 |
| 5° | 85/ 88/ 88/ 95/ 98 | 88/ 89/ 89/ 97/100 |
| 20° | 80/ 81/ 81/ 85/ 86 | 81/ 83/ 83/ 87/ 88 |
| 40° | 72/ 73/ 73/ 77/ 80 | 73/ 74/ 74/ 78/ 81 |

**Vmc: 20° FLAPS (90KCAS G, 93KCAS F, 89KCAS D, 89/91KCAS B )**
**5° FLAPS (99KCAS G, 100KCAS F, 97KCAS D, 97/99KCAS B)**
**(FOR B MODEL Vmc SPEED CONSULT SERIAL NUMBER APPLICABILITY IN AFM)**

**CAUTION**

STALL WARNING MAY ACTIVATE
4 TO 9 KTS ABOVE STALL

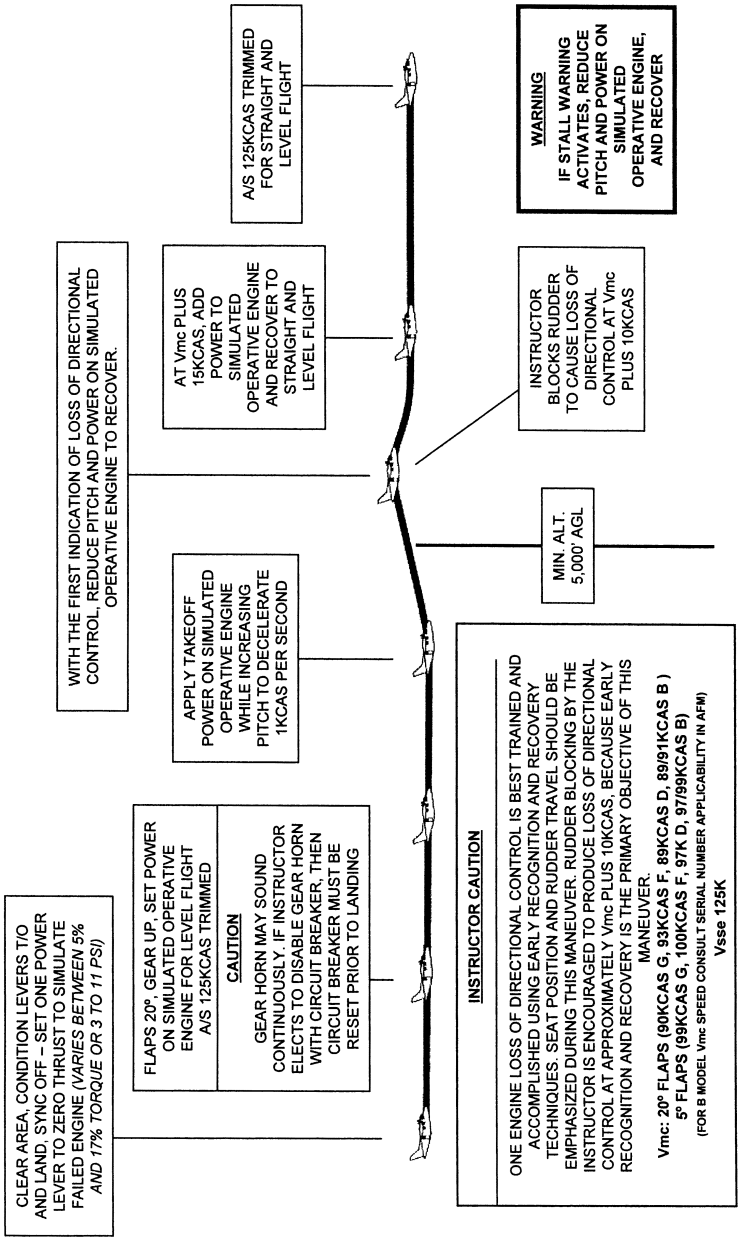
MINIMUM CONTROLLABLE AIRSPEED IS CONDUCTED AS FOLLOWS:

CLEAR THE AREA PRIOR TO BEGINNING THE MANEUVER.

THE MANEUVER MAY BE DONE IN ANY COMBINATION OF GEAR OR FLAP CONFIGURATIONS. IF BANK IS TO BE USED, IT SHOULD BE DONE AT BANK OF NOT MORE THAN 10°. BEGIN THE MANEUVER BY CONFIGURING THE AIRCRAFT IN THE DESIRED GEAR AND FLAP CONFIGURATION. SLOW THE AIRCRAFT UNTIL THE STALL WARNING (STICK SHAKER) IS ACTIVATED AND ADD POWER TO MAINTAIN ALTITUDE AND A SPEED JUST ABOVE AERODYNAMIC STALL. DO NOT ALLOW THE AIRCRAFT TO REACH AERODYNAMIC STALL BUFFET.

**MU-2B B, D (-10), F (-20), G (-30)**

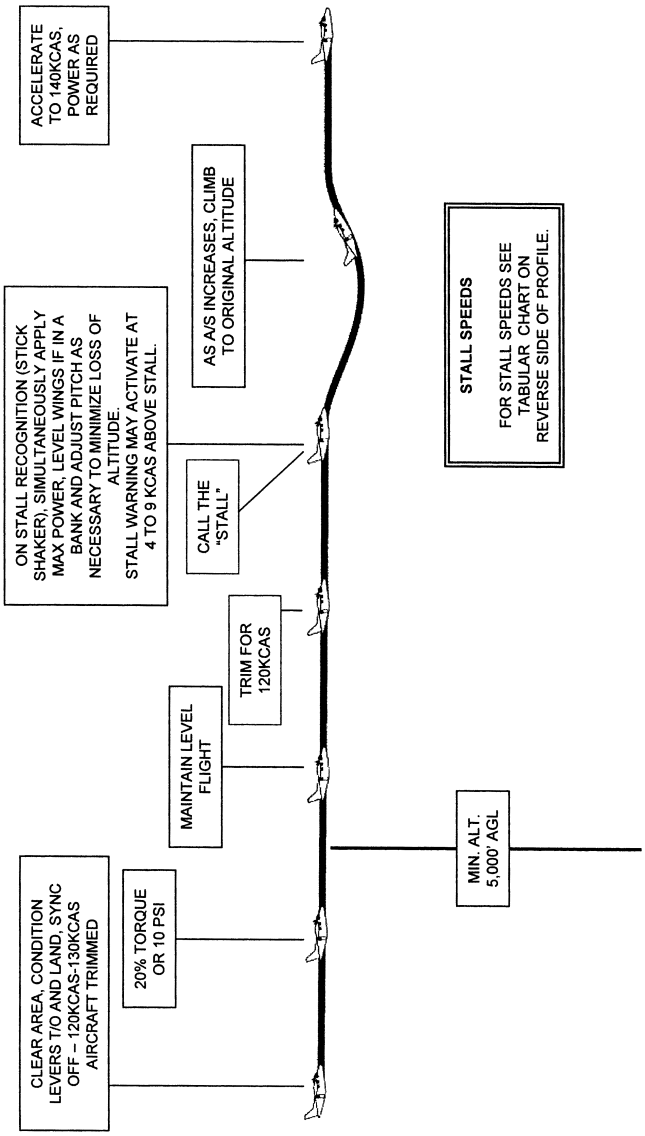
**ONE ENGINE INOPERATIVE MANEUVERING**
**LOSS OF DIRECTIONAL CONTROL**




C-7

**MU-2B B, D (-10), F (-20), G (-30)**

**APPROACH TO STALL CLEAN CONFIGURATION / WINGS LEVEL**




C-8

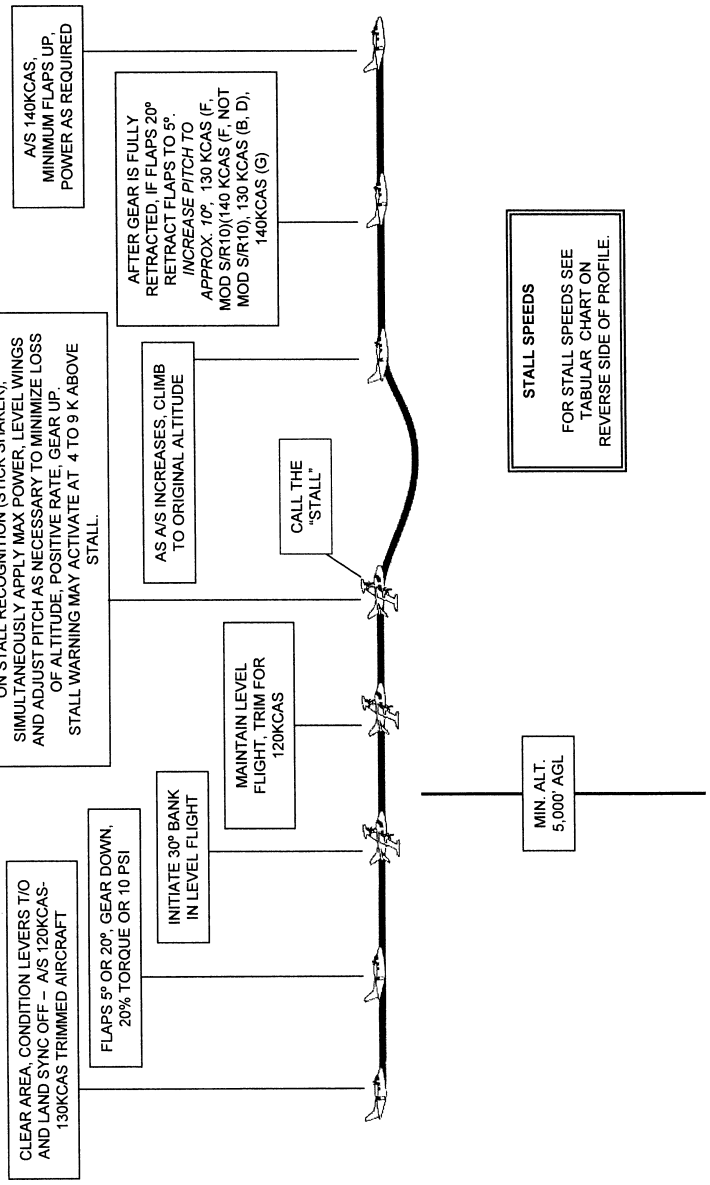
| | STALL SPEEDS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FLAPS SET | 0 | | 5 | | 20 | | 40 | | | |
| GR.WT. | B/ B+, D/ F/ G | | B/ B+, D/ F/ G | | B/ B+, D/ F/ G | | B/ B+, D/ F/ G | | | |
| 7,000 | 85/ 85/ 85 | | 76/ 76/ 80 | | 70/ 70/ 72 | | 63/ 63/ 64 | | | |
| 7,500 | 88/ 88/ 85/ | | 78/ 78/ 83/ | | 73/ 73/ 74/ | | 66/ 63/ 67/ | | | |
| 8,000 | 90/ 90/ 91/ | 90 | 81/ 81/ 86/ | 84 | 75/ 75/ 77/ | 74 | 68/ 68/ 69/ | 69 | | |
| 8,500 | 93/ 93/ 94/ | 93 | 83/ 83/ 88/ | 87 | 78/ 78/ 79/ | 77 | 70/ 70/ 71/ | 71 | | |
| 8,930 | 95/ | | 85/ | | 79/ | | 72/ | | | |
| 9,000 | / 95/ 97/ | 95 | / 86/ 91/ | 90 | / 80/ 81/ | 79 | / 72/ 73/ | 73 | | |
| 9,350 | / 97/ | | / 87/ | | / 81/ | | / 73/ | | | |
| 9,500 | / 99/ | 98 | | 93/ 92 | | / 83/ 81 | | / 75/ 75 | | |
| 9,920 | /101/ | | | 95/ | | / 85/ | | / 76/ | | |
| 10,000 | /101 | | | / 94 | | / 83 | | / 77 | | |
| 10,500 | /103 | | | / 97 | | / 85 | | / 79 | | |
| 10,800 | /105 | | | / 98 | | / 87 | | / 81 | | |

C-8a

**MU-2B B, D (-10), F (-20), G (-30)**

**APPROACH TO STALL**

**TAKEOFF CONFIGURATION 15-30° BANK**




C-9

STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
B, B+, D, F, G

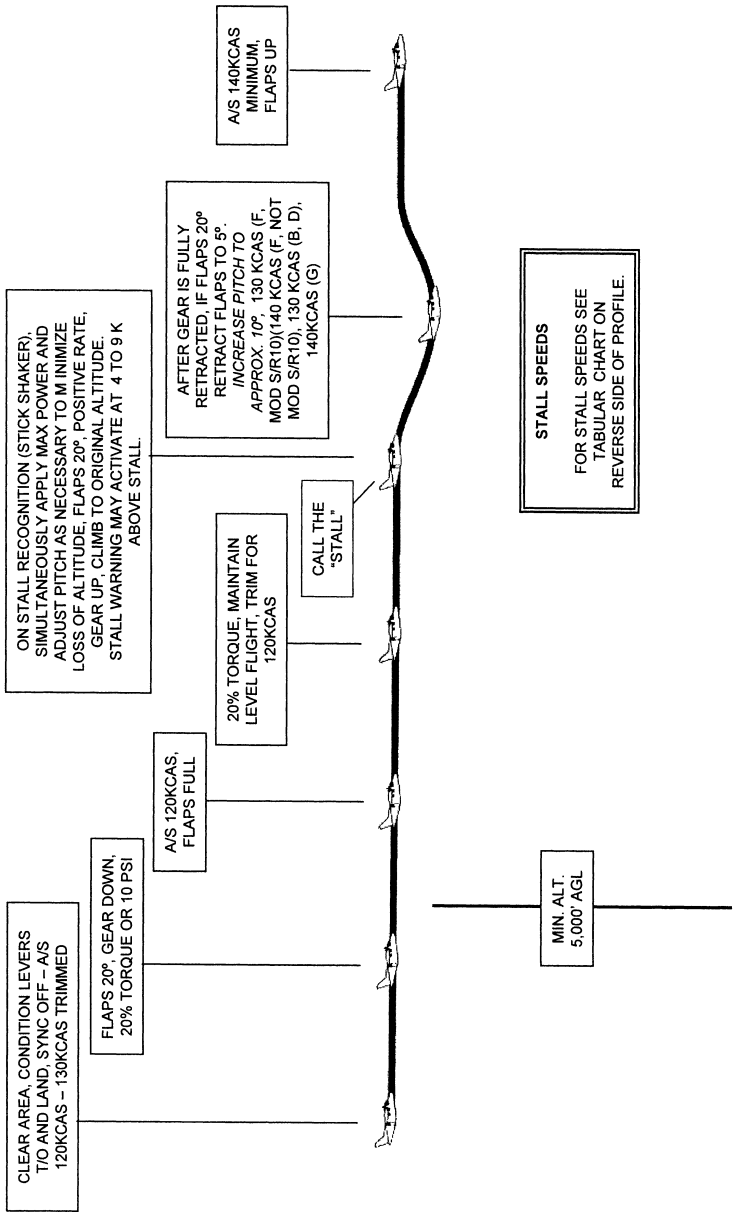
| BANK ANGLE | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|
| FLAPS | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G |
| UP | 96/ 99/102/106 | 99/ 101/105/108 | 103/105/109/112 | 109/111/116/120 | 120/122/126/130 | 136/138/143/148 |
| 5° | 87/ 88/ 96/ 99 | 89/ 90/ 98/101 | 92/ 94/102/105 | 98/100/109/112 | 107/109/119/122 | 120/124/135/138 |
| 20° | 80/ 82/ 86/ 87 | 82/ 84/ 88/ 89 | 86/ 87/ 92/ 93 | 91/ 93/ 97/ 98 | 99/101/107/108 | 113/114/120/122 |
| 40° | 72/ 74/ 77/ 81 | 74/ 75/ 79/ 82 | 77/ 79/ 82/ 86 | 82/ 83/ 87/ 91 | 90/ 91/ 95/100 | 102/103/108/113 |

C-9a

**MU-2B B, D (-10), F (-20), G (-30)**

**APPROACH TO STALL**

**GEAR DOWN – FULL FLAPS**



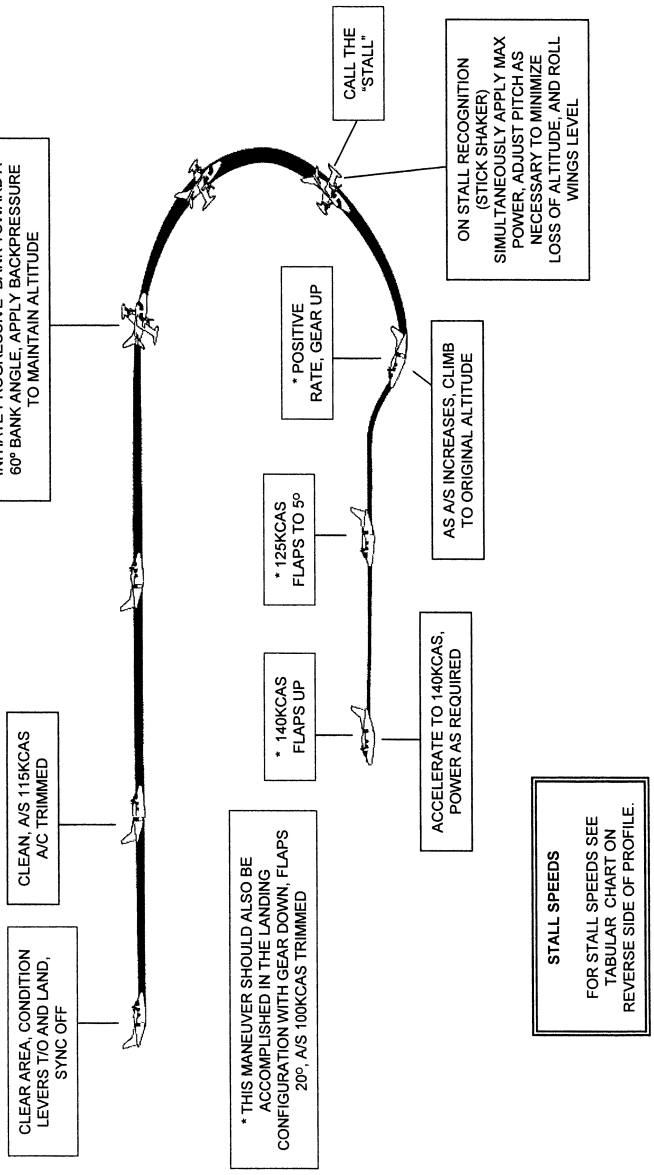

C-10

| | STALL SPEEDS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FLAPS SET | 0 | | 5 | | 20 | | 40 | | | |
| GR.WT. | B/ | B+, D/ F/ G | B/ | B+, D/ F/ G | B/ | B+, D/ F/ G | B/ | B+, D/ F/ G | | |
| 7,000 | 85/ | 85/ 85 | 76/ | 76/ 80 | 70/ | 70/ 72 | 63/ | 63/ 64 | | |
| 7,500 | 88/ | 88/ 85/ | 78/ | 78/ 83/ | 73/ | 73/ 74/ | 66/ | 63/ 67/ | | |
| 8,000 | 90/ | 90/ 91/ 90 | 81/ | 81/ 86/ 84 | 75/ | 75/ 77/ 74 | 68/ | 68/ 69/ 69 | | |
| 8,500 | 93/ | 93/ 94/ 93 | 83/ | 83/ 88/ 87 | 78/ | 78/ 79/ 77 | 70/ | 70/ 71/ 71 | | |
| 8,930 | 95/ | | 85/ | | 79/ | | 72/ | | | |
| 9,000 | / | 95/ 97/ 95 | / | 86/ 91/ 90 | / | 80/ 81/ 79 | / | 72/ 73/ 73 | | |
| 9,350 | / | 97/ | / | 87/ | / | 81/ | / | 73/ | | |
| 9,500 | | / 99/ 98 | | 93/ 92 | | / 83/ 81 | | / 75/ 75 | | |
| 9,920 | | /101/ | | 95/ | | / 85/ | | / 76/ | | |
| 10,000 | | /101 | | / 94 | | / 83 | | / 77 | | |
| 10,500 | | /103 | | / 97 | | / 85 | | / 79 | | |
| 10,800 | | /105 | | / 98 | | / 87 | | / 81 | | |

C-10a

**MU-2B B, D (-10), F (-20), G (-30)**

**ACCELERATED STALLS**




C-11

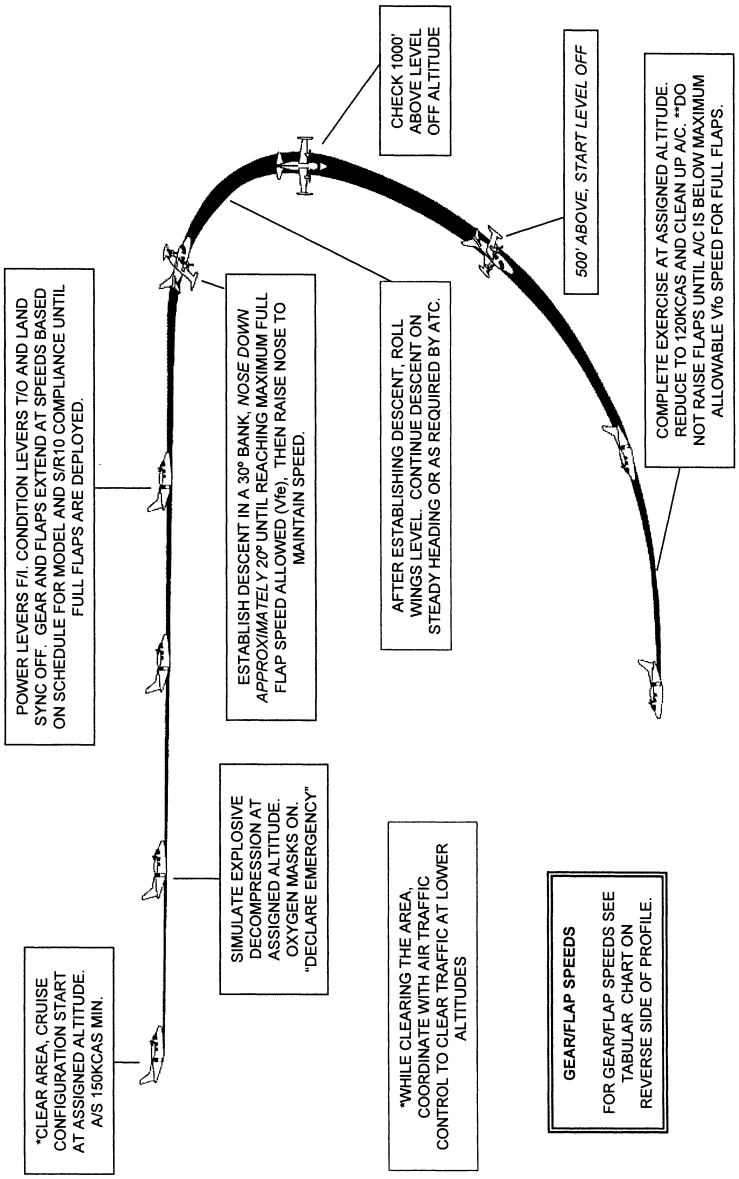
STALL SPEEDS (APPROXIMATE)
AT MAXIMUM GROSS TAKEOFF WEIGHT
B, B+, D, F, G

| BANK ANGLE | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|
| FLAPS | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G | B/ B+, D/ F/ G |
| UP | 96/ 99/102/106 | 99/ 101/105/108 | 103/105/109/112 | 109/111/116/120 | 120/122/126/130 | 136/138/143/148 |
| 5° | 87/ 88/ 96/ 99 | 89/ 90/ 98/101 | 92/ 94/102/105 | 98/100/109/112 | 107/109/119/122 | 120/124/135/138 |
| 20° | 80/ 82/ 86/ 87 | 82/ 84/ 88/ 89 | 86/ 87/ 92/ 93 | 91/ 93/ 97/ 98 | 99/101/107/108 | 113/114/120/122 |
| 40° | 72/ 74/ 77/ 81 | 74/ 75/ 79/ 82 | 77/ 79/ 82/ 86 | 82/ 83/ 87/ 91 | 90/ 91/ 95/100 | 102/103/108/113 |

C-11a

**MU-2B B, D (-10), F (-20), G (-30)**

**EMERGENCY DESCENT (LOW SPEED)**




C-12

**GEAR AND FLAP EXTEND SCHEDULE**

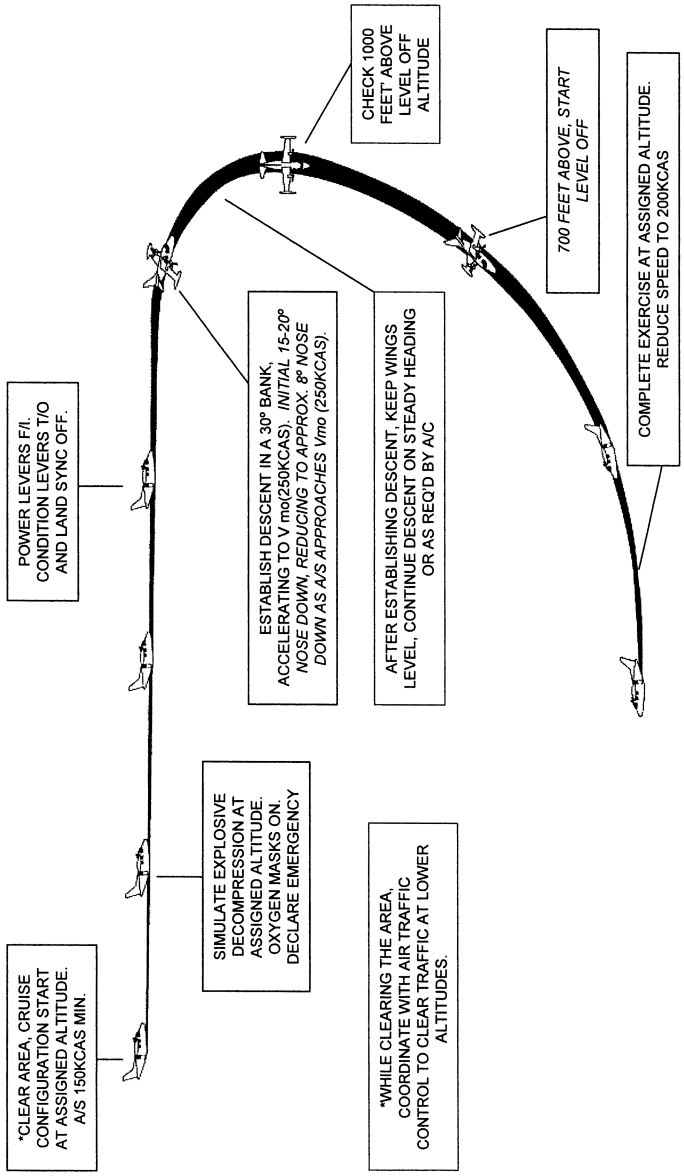
**(F+ AND G+ ARE MODIFIED BY S/R10)**

| GEAR | | | |
|---|---|---|---|
| B, D, F, F+: | 160KCAS | | |
| G, G+: | 170KCAS | | |
| FLAPS | 5° | 20° | 40° |
| G: NOT MODIFIED BY S/R10 | 146KCAS | 146KCAS | 120KCAS |
| G+: MODIFIED BY S/R10 AND | 175KCAS | 146KCAS | 120KCAS |
| F: NOT MODIFIED BY S/R10 | 140KCAS | 140KCAS | 120KCAS |
| F+: MODIFIED BY S/R10 AND | 175KCAS | 140KCAS | 120KCAS |
| B, D, F | 140KCAS | 140KCAS | 120KCAS |

C-12a

**MU-2B B, D (-10), F (-20), G (-30)**

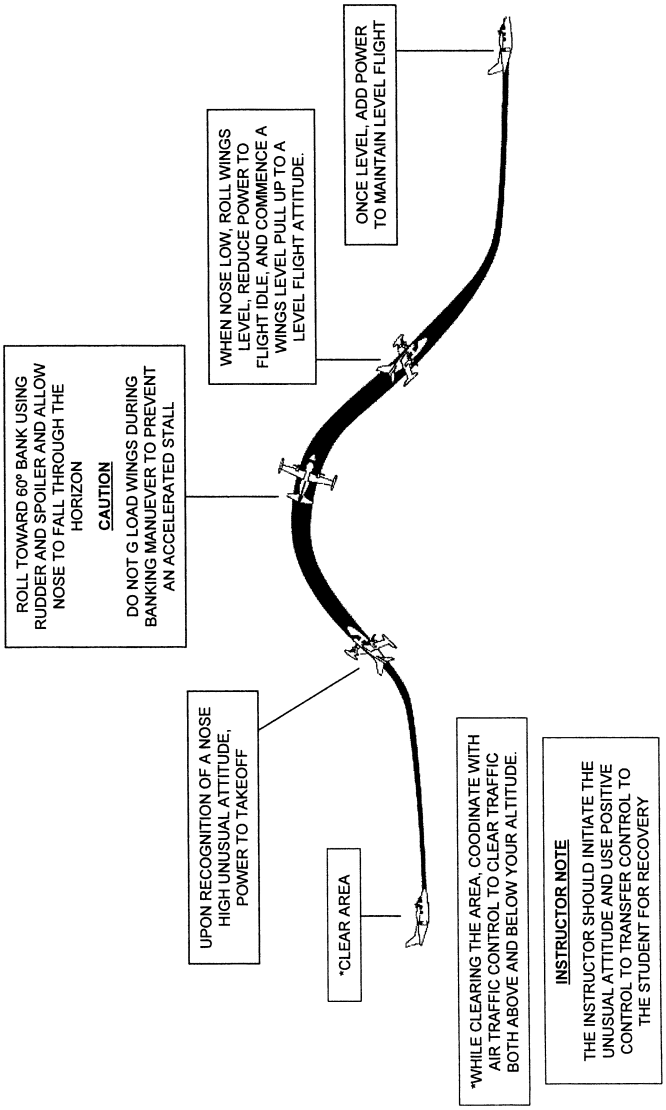
**EMERGENCY DESCENT (HIGH SPEED)**




C-13

**MU-2B B, D (-10), F (-20), G (-30)**

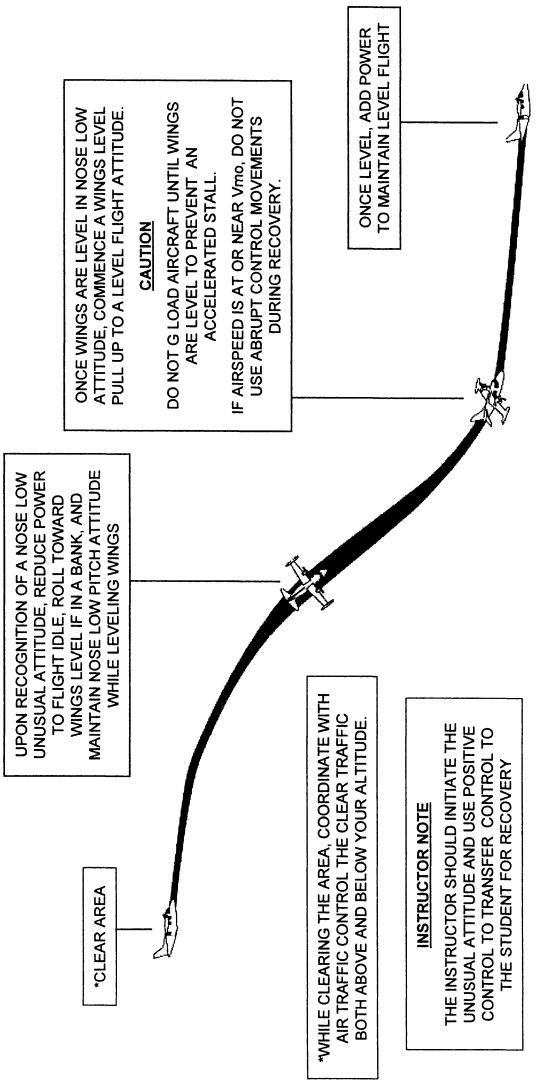
**UNUSUAL ATTITUDE RECOVERY (NOSE HIGH)**




C-14

**MU-2B B, D (-10), F (-20), G (-30)**

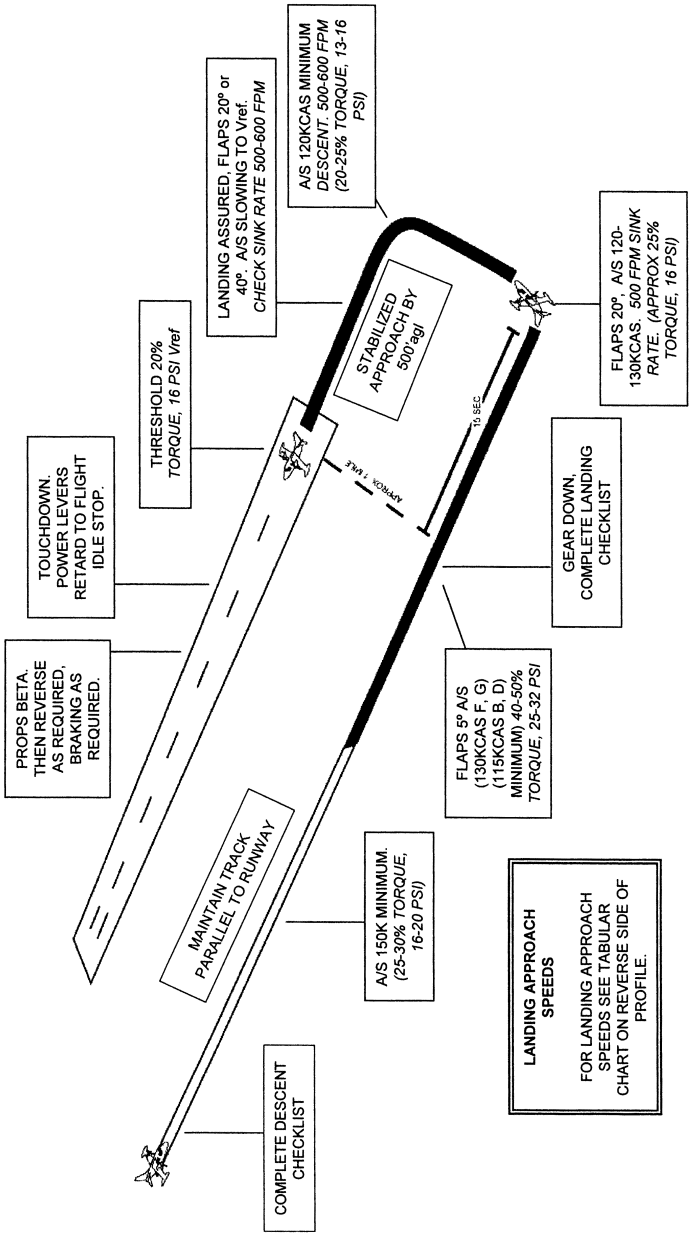
**UNUSUAL ATTITUDE RECOVERY (NOSE LOW)**




C-15

**MU-2B B, D (-10), F (-20), G (-30)**

**NORMAL LANDING (20°or 40° FLAPS)**



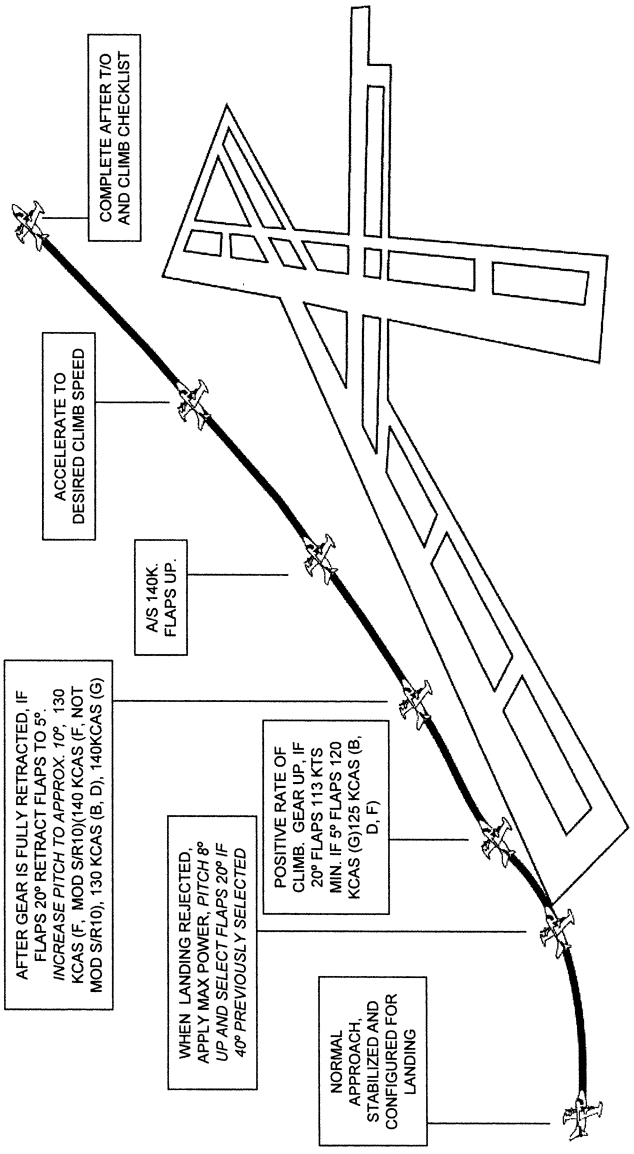

C-16

LANDING APPROACH SPEEDS Vref
B, B+, D, F, G

| | FLAPS 20° (1.3 VSI) | | | | FLAPS 40° (1.5 VSI) | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | B | B+, D | F | G | B | B+, D | F | G |
| 7,000 | 92 | 92 | 93 | | 94 | 94 | | |
| 7,500 | 95 | 95 | 96 | 94 | 98 | 98 | 99 | 100 |
| 8,000 | 98 | 98 | 100 | 97 | 101 | 101 | 103 | 103 |
| 8,500 | | 101 | 103 | 100 | | 104 | 106 | 106 |
| 8,490 | 101 | | | | 104 | | | |
| 8,930 | | 103 | | | | 107 | | |
| 9,000 | | | 106 | 103 | | | 109 | 109 |
| 9,435 | | | 108 | | | | 112 | |
| 9,500 | | | | 105 | | | | 112 |
| 10,000 | | | | 108 | | | | 115 |
| 10,260 | | | | 109 | | | | 117 |

C-16a

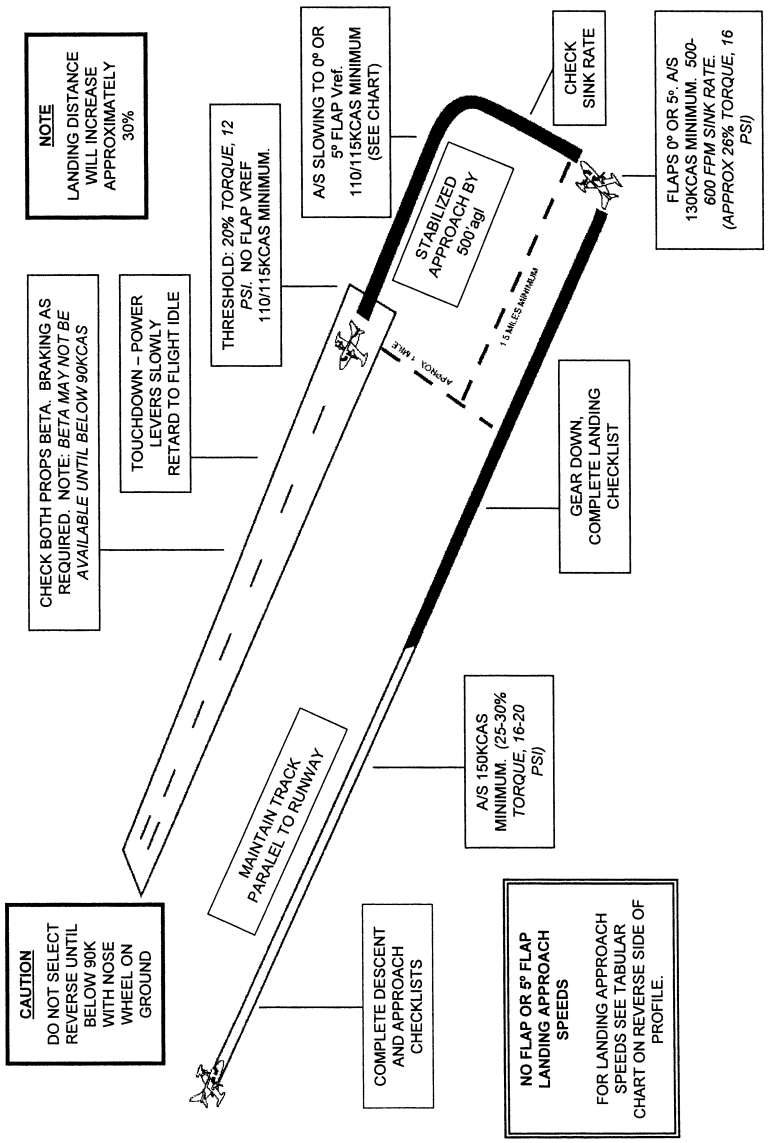
**MU-2B B, D (-10), F (-20), G (-30)**
**GO AROUND - REJECTED LANDING**




C-17

**MU-2B B, D (-10), F (-20), G (-30)**

**NO FLAP OR 5° FLAP LANDING**



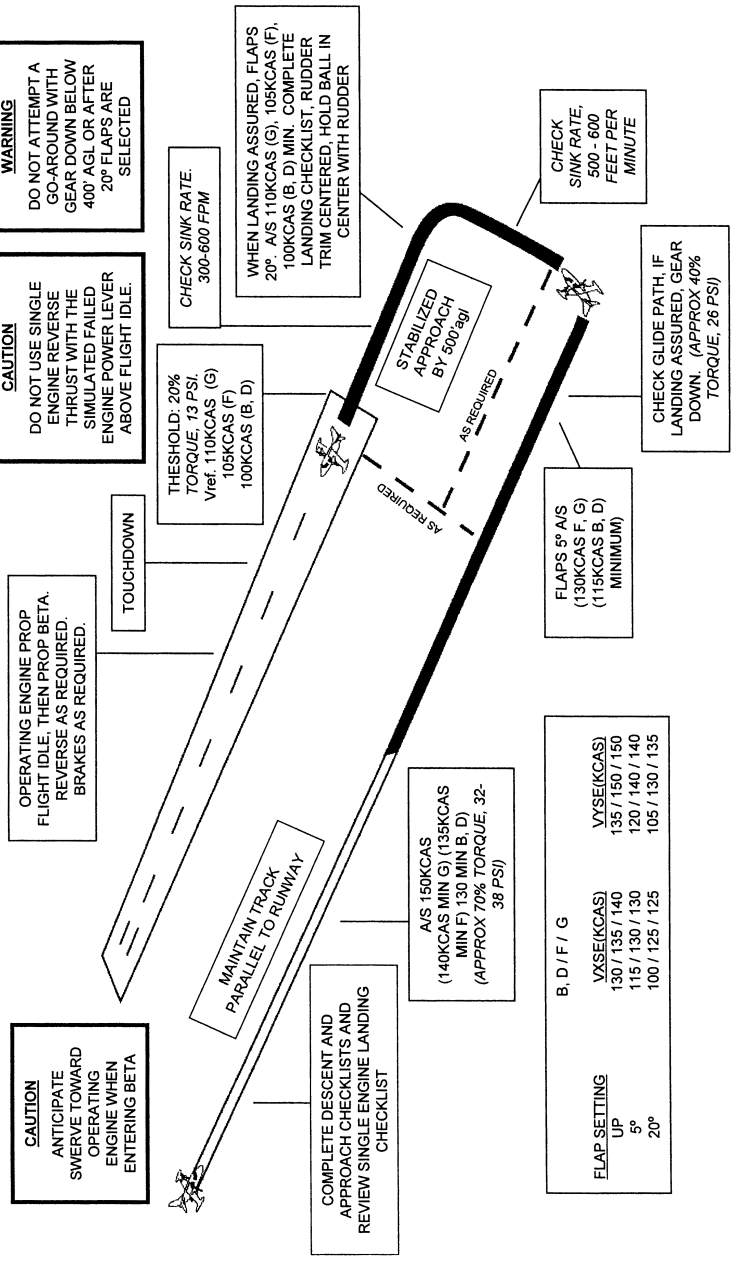

A-18

NO FLAP Vref 1.25 VS1
(BUT NOT BELOW 110KCAS (B, B+, D, F) 115KCAS (G))
USE FOR FLAP UP OR 5°

| | B, B+, D, F, G | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FLAPS UP | | | | | FLAPS 5° | | | | |
| WEIGHT | B | B+ | D | F | G | B | B+ | D | F | G |
| 7,500 | 110 | 110 | 110 | 110 | | 110 | 110 | 110 | 110 | |
| 8.000 | 113 | 113 | 113 | 114 | 115 | 110 | 110 | 110 | 110 | 115 |
| 8,490 | 117 | | | | | 110 | | | | |
| 8.500 | | 117 | 117 | 118 | 117 | | 110 | 110 | 110 | 115 |
| 8,930 | | 119 | 119 | | | | 110 | 110 | | |
| 9.000 | | | | 122 | 119 | | | | 114 | 115 |
| 9,435 | | | | 124 | | | | | 117 | |
| 9.500 | | | | | 123 | | | | | 115 |
| 10.000 | | | | | 127 | | | | | 118 |
| 10.260 | | | | | 128 | | | | | 120 |

C-18a

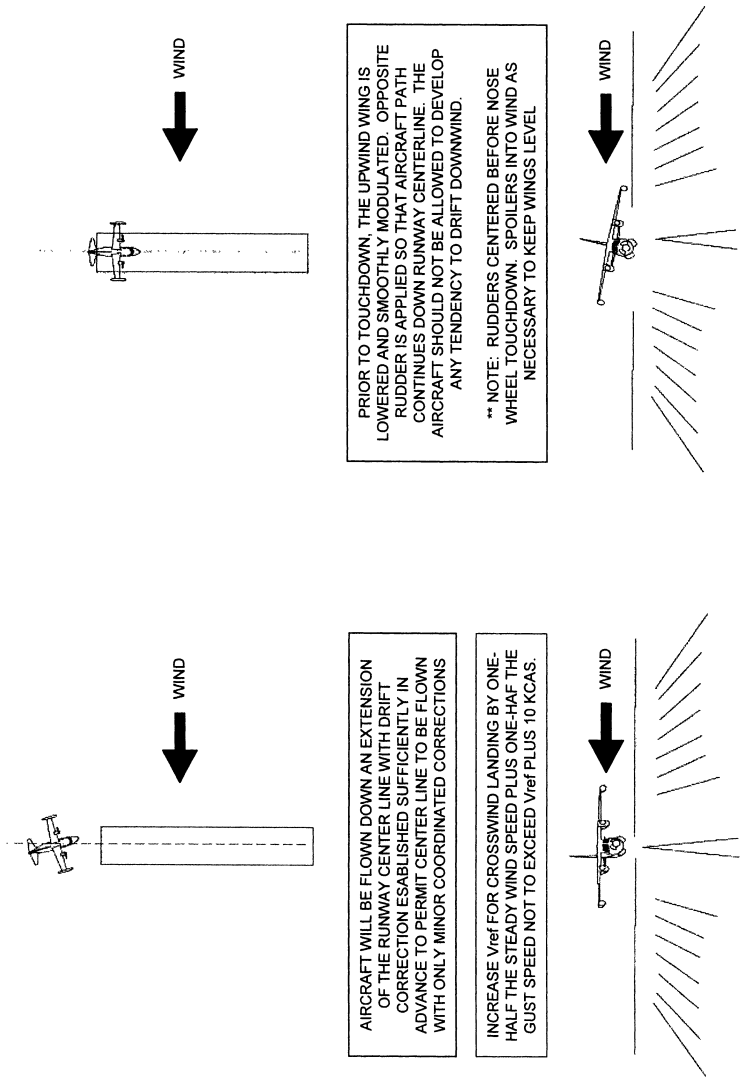
**MU-2B B, D (-10), F (-20), G (-30)**
**ONE ENGINE INOPERATIVE LANDING**




C-19

**MU-2B B, D (-10), F (-20), G (-30)**

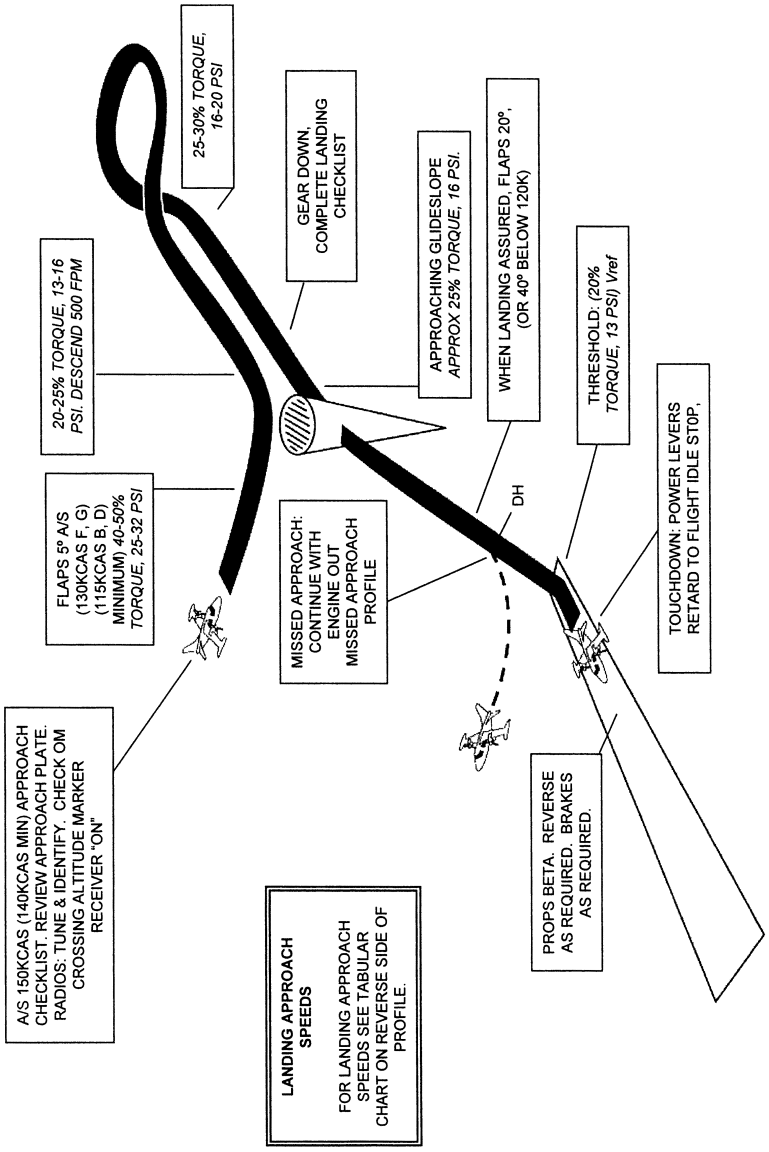
**CROSSWIND LANDING**




C-20

**MU-2B B, D (-10), F (-20), G (-30)**

**ILS AND MISSED APPROACH**



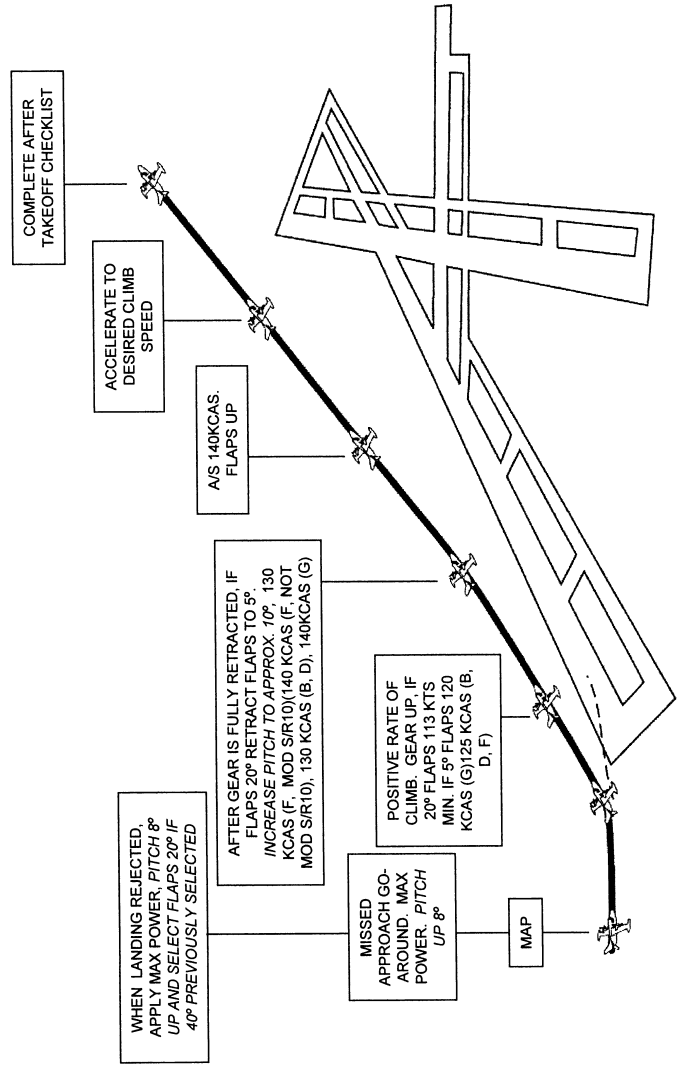

C-21

LANDING APPROACH SPEEDS Vref
B, B+, D, F, G

| | FLAPS 20° (1.3 VSI) | | | | FLAPS 40° (1.5 VSI) | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | B | B+, D | F | G | B | B+, D | F | G |
| 7,000 | 92 | 92 | 93 | | 94 | 94 | | |
| 7,500 | 95 | 95 | 96 | 94 | 98 | 98 | 99 | 100 |
| 8,000 | 98 | 98 | 100 | 97 | 101 | 101 | 103 | 103 |
| 8,500 | | 101 | 103 | 100 | | 104 | 106 | 106 |
| 8,490 | 101 | | | | 104 | | | |
| 8,930 | | 103 | | | | 107 | | |
| 9,000 | | | 106 | 103 | | | 109 | 109 |
| 9,435 | | | 108 | | | | 112 | |
| 9,500 | | | | 105 | | | | 112 |
| 10,000 | | | | 108 | | | | 115 |
| 10,260 | | | | 109 | | | | 117 |

C-21a

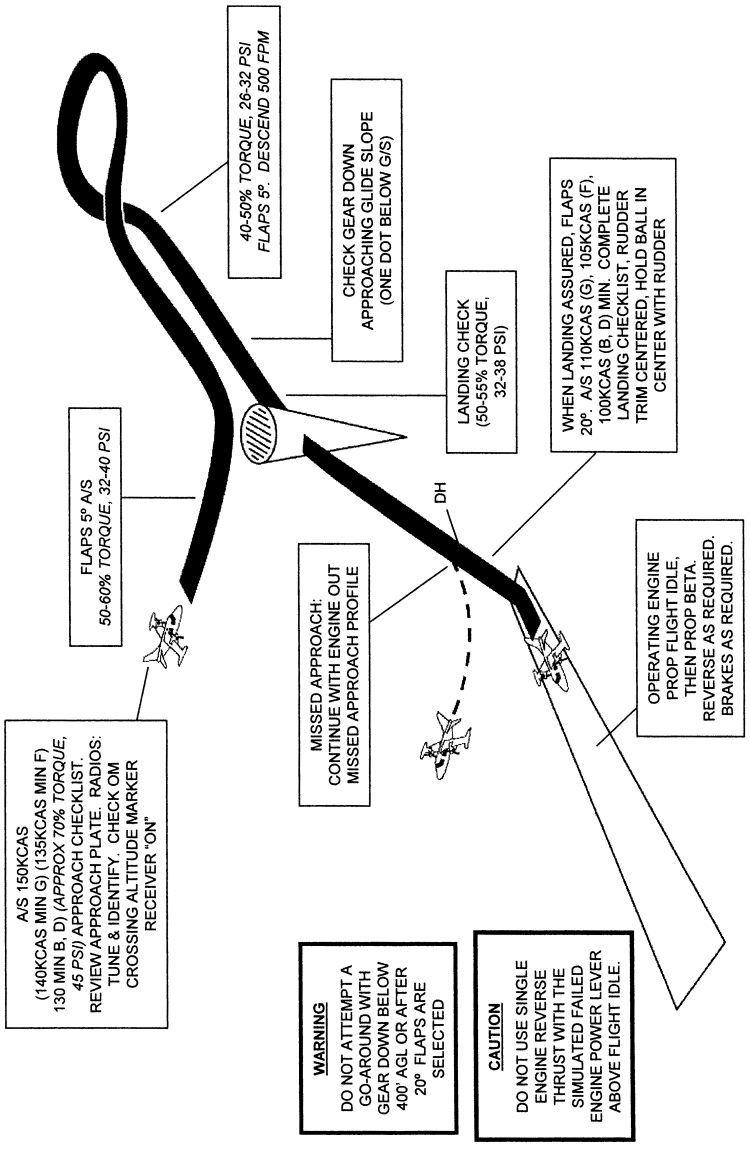
**MU-2B B, D (-10), F (-20), G (-30)**
**TWO ENGINE MISSED APPROACH**




C-22

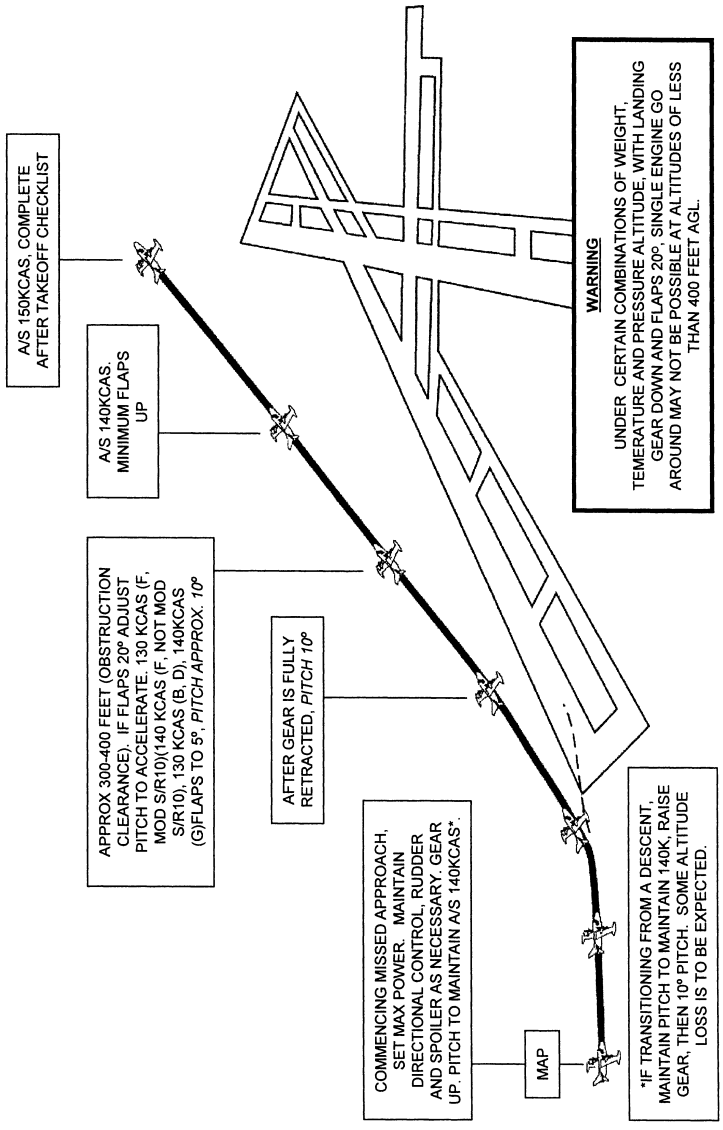
**MU-2B B, D (-10), F (-20), G (-30)**

**ONE ENGINE INOPERATIVE ILS AND MISSED APPROACH**




C-23

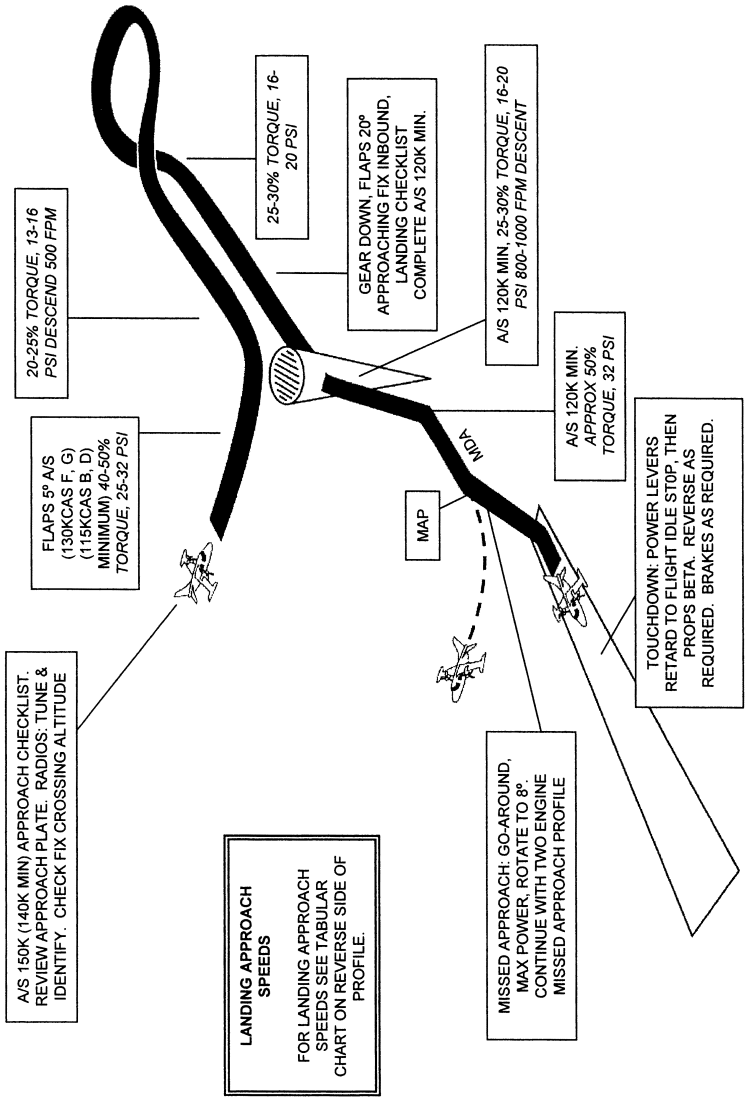
**MU-2B B, D (-10), F (-20), G (-30)**
**ONE ENGINE INOPERATIVE MISSED APPROACH**




C-24

**MU-2B B, D (-10), F (-20), G (-30)**

**NON-PRECISION AND MISSED APPROACH**




C-25

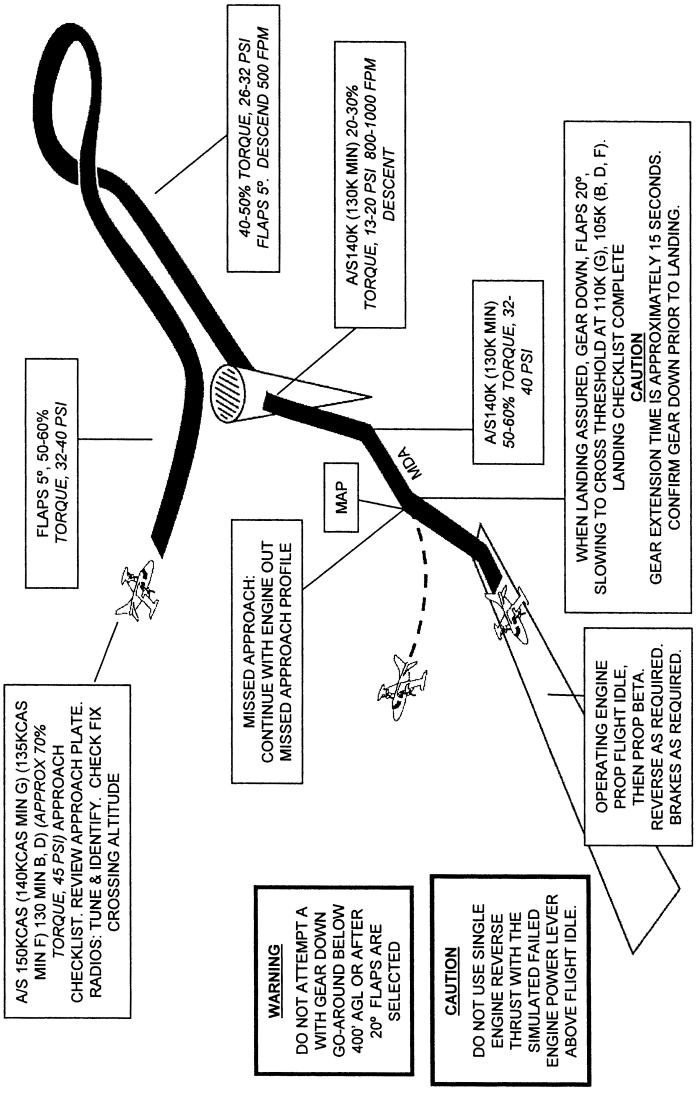
LANDING APPROACH SPEEDS Vref
B, B+, D, F, G

| | FLAPS 20° (1.3 VSI) | | | | FLAPS 40° (1.5 VSI) | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | B | B+, D | F | G | B | B+, D | F | G |
| 7,000 | 92 | 92 | 93 | | 94 | 94 | | |
| 7,500 | 95 | 95 | 96 | 94 | 98 | 98 | 99 | 100 |
| 8,000 | 98 | 98 | 100 | 97 | 101 | 101 | 103 | 103 |
| 8,500 | | 101 | 103 | 100 | | 104 | 106 | 106 |
| 8,490 | 101 | | | | 104 | | | |
| 8,930 | | 103 | | | | 107 | | |
| 9,000 | | | 106 | 103 | | | 109 | 109 |
| 9,435 | | | 108 | | | | 112 | |
| 9,500 | | | | 105 | | | | 112 |
| 10,000 | | | | 108 | | | | 115 |
| 10,260 | | | | 109 | | | | 117 |

C-25a

**MU-2B B, D (-10), F (-20), G (-30)**

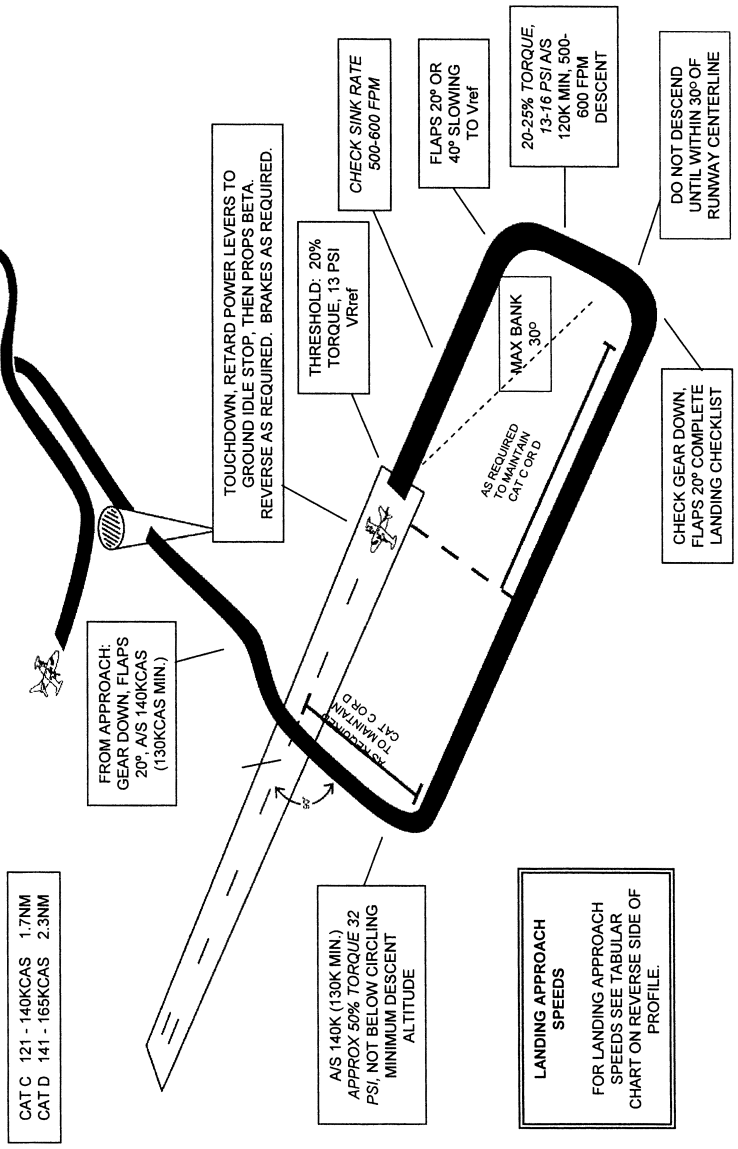
**ONE ENGINE INOPERATIVE NON-PRECISION AND MISSED APPROACH**




C-26

**MU-2B B, D (-10), F (-20), G (-30)**

**CIRCLING APPROACH AT WEATHER MINIMUMS**



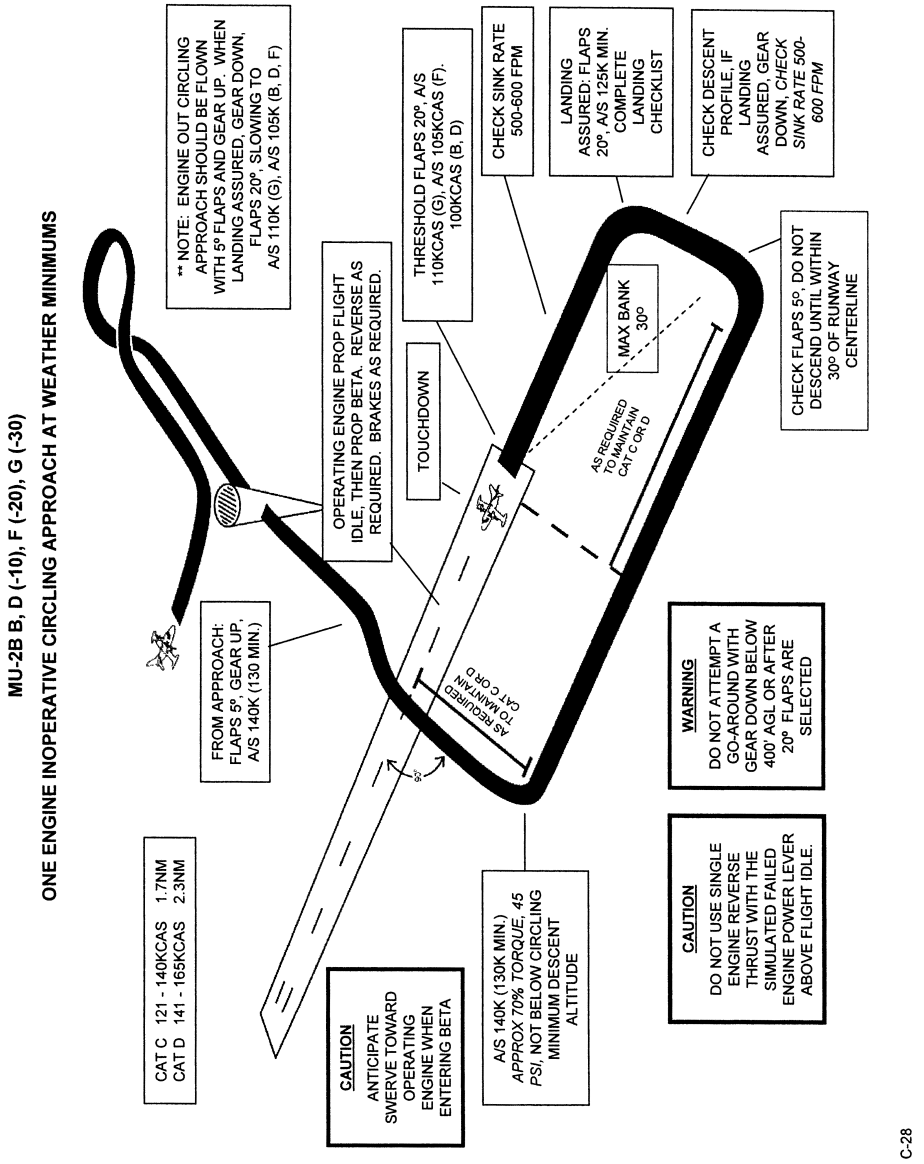

C-27

LANDING APPROACH SPEEDS Vref

B, B+, D, F, G

| | FLAPS 20° (1.3 VSI) | | | | FLAPS 40° (1.5 VSI) | | | |
|---|---|---|---|---|---|---|---|---|
| WEIGHT | B | B+, D | F | G | B | B+, D | F | G |
| 7,000 | 92 | 92 | 93 | | 94 | 94 | | |
| 7,500 | 95 | 95 | 96 | 94 | 98 | 98 | 99 | 100 |
| 8,000 | 98 | 98 | 100 | 97 | 101 | 101 | 103 | 103 |
| 8,500 | | 101 | 103 | 100 | | 104 | 106 | 106 |
| 8,490 | 101 | | | | 104 | | | |
| 8,930 | | 103 | | | | 107 | | |
| 9,000 | | | 106 | 103 | | | 109 | 109 |
| 9,435 | | | 108 | | | | 112 | |
| 9,500 | | | | 105 | | | | 112 |
| 10,000 | | | | 108 | | | | 115 |
| 10,260 | | | | 109 | | | | 117 |

C-27a




(D) Each MU–2B profile in its respective section follows the outline below.

(1) Normal Takeoff (5- and 20-degrees flaps).

(2) Takeoff Engine Failure (5- and 20-degrees flaps).

(3) Takeoff Engine Failure on Runway or Rejected Takeoff.

(4) Takeoff Engine Failure after Liftoff—Unable to Climb (Classroom or FTD only).

(5) Steep Turns.

(6) Slow Flight Maneuvers.

(7) One Engine Inoperative Maneuvering/Loss of Directional Control.

(8) Approach to Stall (clean configuration/wings level).

(9) Approach to Stall (takeoff configuration/15- to 30-degrees bank).
(10) Approach to Stall (landing configuration/gear down/40-degrees flaps).
(11) Accelerated Stall (no flaps).
(12) Emergency Descent (low speed).
(13) Emergency Descent (high speed).
(14) Unusual Altitude Recovery (nose high).
(15) Unusual Altitude Recovery (nose low).
(16) Normal Landing (20- and 40-degrees flaps).
(17) Go Around/Rejected Landing.
(18) No Flap or 5-degrees flaps Landing.
(19) One Engine Inoperative Landing (5- and 20-degrees flaps).
(20) Crosswind Landing.
(21) ILS and Missed Approach.
(22) Two Engine Missed Approach.
(23) One Engine Inoperative ILS and Missed Approach.
(24) One Engine Inoperative Missed Approach.
(25) Non-Precision and Missed Approach.
(26) One Engine Inoperative Non-Precision and Missed Approach.
(27) Circling Approach at Weather Minimums.
(28) One Engine Inoperative Circling Approach at Weather Minimums.

*Engine Performance*

(A) The following should be considered in reference to power settings and airspeeds:
(1) Power settings shown in *italics* are provided as guidance only during training and are not referenced in the AFM. Power setting guidance is provided to show the approximate power setting that will produce the desired airspeed or flight condition. Actual power settings may be different from those stated and should be noted by the instructor and student for reference during other maneuvers. Power settings in the profiles are stated in torque or PSI and will vary with aircraft model, engine model, weight, and density altitude. Power settings are based on standard atmospheric conditions.
(2) Some pilots prefer to set power initially using fuel flow, because the fuel flow system is not field adjustable. Fuel flow settings refer to engine operations only. If fuel flow is used to set power for takeoff, check torque and temperature after setting fuel flow and adjust torque or temperature, whichever is limiting, for maximum takeoff power prior to liftoff.
(3) Improperly adjusted torque or improperly calibrated temperatures are a safety of flight issue and must be checked and corrected prior to conducting flight training.
(4) The pilot should refer to the performance section of the airplane flight manual to determine actual speeds required for his/her particular model and specific weight for any given operation.

*In Flight Maneuvering*

(A) Maneuvers conducted at altitude such as stalls and steep turns must always be preceded by clearing turns and at least one crew member must continually clear the flying area during the maneuver. The instructor must emphasize the importance of clearing the area, even if the maneuvers are being done in an FTD or simulator. This will create the habit pattern in the pilot to clear the area before practicing maneuvers.
(B) During stalling maneuvers and upon recognition of the indication of a stall, the pilot must call the ''stall'' to the instructor and then proceed with the recovery. In addition, during training, the pilot must announce the completion of the stall recovery maneuver. Instructors must exercise caution when conducting stall maneuvers and be prepared to take the controls if the safe outcome of the maneuver is in doubt.
(C) During accelerated stall maneuvers, it is important that the instructor pay close attention to the position of the ball throughout the maneuver and recovery so as to maintain coordinated flight. Stall recognition and recovery is the completion criteria, and it is not necessary to continue the stall beyond the stick shaker to aerodynamic buffet.
(D) When demonstrating a loss of directional control with one engine inoperative, the engine failure must only be simulated. During the slowing of the aircraft to demonstrate loss of directional control, the instructor should use the rudder block method to allow the student to experience the loss of directional control associated with VMC, at a speed of approximately 10 knots above actual VMC.

NOTE: To accurately simulate single engine operations, zero thrust must be established. The zero thrust torque setting will vary greatly from model to model. It is important to establish to zero thrust torque setting for your aircraft. This requires that the aircraft be flown on one engine to establish the zero thrust setting. This is accomplished by establishing single engine flight with one propeller feathered and noting the performance with the operating engine at maximum torque or temperature. It is suggested that two airspeeds be established for zero thrust power settings. They are 120 kts, flaps 20, gear up for takeoff and 140 knots, flaps 5, gear up for in-flight and approach maneuvering. Once performance has been established and recorded for each airspeed, restart the other engine and find the torque setting that duplicates the performance (climb or descent rate, airspeed) as was recorded with that propeller feathered. This torque setting will be zero thrust for the simulated inoperative engine. The student/pilot should note that the performance experienced with one engine operating at flight idle, may produce

greater performance than if the engine were stopped and the propeller feathered.

Pre-maneuver briefings for any maneuver that requires either an actual engine shutdown or a simulated engine failure must be undertaken when using an aircraft. In the case of an actual engine shutdown, a minimum altitude of 3,000 ft above ground level (agl) must be used and done in a position where a safe landing can be made at an airport in the event of difficulty.

*Takeoff and Landing*

(A) When using the profiles to establish the procedure for configuring the aircraft for takeoff or landing, it is important to understand that each task for the procedure, as noted on the procedure diagram, establishes the point at which each task should have been completed and not the exact point at which the task should be accomplished unless otherwise stated in the task box. Numbers which represent performance such as descent rates or other maneuvering information that is not contained in the aircraft flight manual are shown in *italics*.

(B) In all takeoff profiles the prompt for the gear to be retracted is ''No Runway Remaining, Gear Up''. This should set the decision point for making a landback after an engine failure and should normally be reached at altitudes of less than 100 ft AGL. It is impractical to attempt a landback from above 100 ft AGL, because it can require distances up to 10,000 ft from the beginning of the takeoff run to bring the aircraft to a stop. But, even on very long runways, landback will not be necessary above 100 ft AGL and above Vyse for the flap configurations, if the single engine climb capability found in the POM charts, with the gear up, is positive (250 fpm or better) and obstacles clearance is not an issue.

(C) The manufacturers FAA-accepted checklists and checklist in Appendix C to this SFAR No. 108 describe a procedure for the discontinuance of flight following an engine failure after takeoff and the realization that the aircraft cannot climb. The corresponding flight profile in this training program is ''Takeoff Engine Failure, Unable to Climb''. This maneuver must not be attempted in the aircraft, but must be the subject of a classroom discussion or be demonstrated in the FTD.

(D) The focus of all landing procedures, whether two engine or engine out, is on a stabilized approach from an altitude of 500 feet. This will not be possible for all approach procedure maneuvering, especially during non-precision or circle to land approaches. Approach procedures for these two approaches should be stabilized from the point at which the pilot leaves the Minimum Descent Altitude for the landing.

(E) When performing one engine inoperative approaches, landings or missed approaches, the instructor must be prepared to add power to the simulated failed engine at the first sign of deteriorating airspeed or other situation that indicates the student's inability to correctly perform the maneuver.

(F) While maneuvering in the pattern or during instrument approach procedures with one engine inoperative, a 30° bank angle must not be exceeded. This will become especially important when executing non-precision and circle to land approaches.

*Emergency and Abnormal Procedures*

(A) During training, either in the FTD or in the aircraft, the performance of emergency and abnormal procedures is critical to the completion of the training program. All emergency and abnormal procedures should be simulated when training in the MU–2B airplane.

(B) When presenting emergency scenarios to the student, the instructor must not introduce multiple emergencies concurrently.

*Scenario Based Training (SBT)*

SBT flight training creates an environment of realism. The SBT programs utilize a highly structured flight operation scenario to simulate the overall flight environment. The pilot is required to plan a routine, point-to-point flight and initiate the flight. During the conduct of the flight, ''reality-based'' abnormal or emergency events are introduced without warning. Because the pilot is constantly operating in the world of unknowns, this type of training also builds in the ''startle factor'', and just as in the real-world, the consequences of the pilot's actions (decisions, judgment, airmanship, tactile skills, etc.) will continue to escalate and affect the outcome of the planned flight. Although flying skills are an integral part of this type of training, SBT enables the pilot to gain experience in dealing with unexpected events and more importantly further enhances the development of good judgment and decisionmaking.

[Doc. No. FAA–2006–24981, 73 FR 7051, Feb. 6, 2008, as amended by Amdt. 91–324, 76 FR 54107, Aug. 31, 2011]

## Subpart A—General

SOURCE: Docket No. 18334, 54 FR 34292, Aug. 18, 1989, unless otherwise noted.

### § 91.1 Applicability.

(a) Except as provided in paragraphs (b) and (c) of this section and §§ 91.701 and 91.703, this part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free

balloons, which are governed by part 101 of this chapter, and ultralight vehicles operated in accordance with part 103 of this chapter) within the United States, including the waters within 3 nautical miles of the U.S. coast.

(b) Each person operating an aircraft in the airspace overlying the waters between 3 and 12 nautical miles from the coast of the United States must comply with §§91.1 through 91.21; §§91.101 through 91.143; §§91.151 through 91.159; §§91.167 through 91.193; §91.203; §91.205; §§91.209 through 91.217; §91.221, §91.225; §§91.303 through 91.319; §§91.323 through 91.327; §91.605; §91.609; §§91.703 through 91.715; and §91.903.

(c) This part applies to each person on board an aircraft being operated under this part, unless otherwise specified.

(d) This part also establishes requirements for operators to take actions to support the continued airworthiness of each airplane.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–257, 64 FR 1079, Jan. 7, 1999; Amdt. 91–282, 69 FR 44880, July 27, 2004; Amdt. 91–297, 72 FR 63410, Nov. 8, 2007; Amdt. 91–314, 75 FR 30193, May 28, 2010]

### §91.3 Responsibility and authority of the pilot in command.

(a) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.

(b) In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.

(c) Each pilot in command who deviates from a rule under paragraph (b) of this section shall, upon the request of the Administrator, send a written report of that deviation to the Administrator.

(Approved by the Office of Management and Budget under control number 2120–0005)

### §91.5 Pilot in command of aircraft requiring more than one required pilot.

No person may operate an aircraft that is type certificated for more than one required pilot flight crewmember unless the pilot in command meets the requirements of §61.58 of this chapter.

### §91.7 Civil aircraft airworthiness.

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

(b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.

### §91.9 Civil aircraft flight manual, marking, and placard requirements.

(a) Except as provided in paragraph (d) of this section, no person may operate a civil aircraft without complying with the operating limitations specified in the approved Airplane or Rotorcraft Flight Manual, markings, and placards, or as otherwise prescribed by the certificating authority of the country of registry.

(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 of this chapter 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 of this chapter, 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.

(c) No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with part 45 of this chapter.

(d) Any person taking off or landing a helicopter certificated under part 29 of this chapter at a heliport constructed over water may make such momentary flight as is necessary for takeoff or landing through the prohibited range of the limiting height-speed envelope established for the helicopter if that flight through the prohibited range takes place over water on which a safe ditching can be accomplished and if the helicopter is amphibious or

is equipped with floats or other emergency flotation gear adequate to accomplish a safe emergency ditching on open water.

### § 91.11 Prohibition on interference with crewmembers.

No person may assault, threaten, intimidate, or interfere with a crewmember in the performance of the crewmember's duties aboard an aircraft being operated.

### § 91.13 Careless or reckless operation.

(a) *Aircraft operations for the purpose of air navigation.* No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.

(b) *Aircraft operations other than for the purpose of air navigation.* No person may operate an aircraft, other than for the purpose of air navigation, on any part of the surface of an airport used by aircraft for air commerce (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner so as to endanger the life or property of another.

### § 91.15 Dropping objects.

No pilot in command of a civil aircraft may allow any object to be dropped from that aircraft in flight that creates a hazard to persons or property. However, this section does not prohibit the dropping of any object if reasonable precautions are taken to avoid injury or damage to persons or property.

### § 91.17 Alcohol or drugs.

(a) No person may act or attempt to act as a crewmember of a civil aircraft—

(1) Within 8 hours after the consumption of any alcoholic beverage;

(2) While under the influence of alcohol;

(3) While using any drug that affects the person's faculties in any way contrary to safety; or

(4) While having an alcohol concentration of 0.04 or greater in a blood or breath specimen. Alcohol concentration means grams of alcohol per deciliter of blood or grams of alcohol per 210 liters of breath.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care) to be carried in that aircraft.

(c) A crewmember shall do the following:

(1) On request of a law enforcement officer, submit to a test to indicate the alcohol concentration in the blood or breath, when—

(i) The law enforcement officer is authorized under State or local law to conduct the test or to have the test conducted; and

(ii) The law enforcement officer is requesting submission to the test to investigate a suspected violation of State or local law governing the same or substantially similar conduct prohibited by paragraph (a)(1), (a)(2), or (a)(4) of this section.

(2) Whenever the FAA has a reasonable basis to believe that a person may have violated paragraph (a)(1), (a)(2), or (a)(4) of this section, on request of the FAA, that person must furnish to the FAA the results, or authorize any clinic, hospital, or doctor, or other person to release to the FAA, the results of each test taken within 4 hours after acting or attempting to act as a crewmember that indicates an alcohol concentration in the blood or breath specimen.

(d) Whenever the Administrator has a reasonable basis to believe that a person may have violated paragraph (a)(3) of this section, that person shall, upon request by the Administrator, furnish the Administrator, or authorize any clinic, hospital, doctor, or other person to release to the Administrator, the results of each test taken within 4 hours after acting or attempting to act as a crewmember that indicates the presence of any drugs in the body.

(e) Any test information obtained by the Administrator under paragraph (c) or (d) of this section may be evaluated in determining a person's qualifications for any airman certificate or possible violations of this chapter and may be used as evidence in any legal

proceeding under section 602, 609, or 901 of the Federal Aviation Act of 1958.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–291, June 21, 2006]

### § 91.19 Carriage of narcotic drugs, marihuana, and depressant or stimulant drugs or substances.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft within the United States with knowledge that narcotic drugs, marihuana, and depressant or stimulant drugs or substances as defined in Federal or State statutes are carried in the aircraft.

(b) Paragraph (a) of this section does not apply to any carriage of narcotic drugs, marihuana, and depressant or stimulant drugs or substances authorized by or under any Federal or State statute or by any Federal or State agency.

### § 91.21 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S.-registered civil aircraft:

(1) Aircraft operated by a holder of an air carrier operating certificate or an operating certificate; or

(2) Any other aircraft while it is operated under IFR.

(b) Paragraph (a) of this section does not apply to—

(1) Portable voice recorders;

(2) Hearing aids;

(3) Heart pacemakers;

(4) Electric shavers; or

(5) Any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

(c) In the case of an aircraft operated by a holder of an air carrier operating certificate or an operating certificate, the determination required by paragraph (b)(5) of this section shall be made by that operator of the aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the pilot in command or other operator of the aircraft.

### § 91.23 Truth-in-leasing clause requirement in leases and conditional sales contracts.

(a) Except as provided in paragraph (b) of this section, the parties to a lease or contract of conditional sale involving a U.S.-registered large civil aircraft and entered into after January 2, 1973, shall execute a written lease or contract and include therein a written truth-in-leasing clause as a concluding paragraph in large print, immediately preceding the space for the signature of the parties, which contains the following with respect to each such aircraft:

(1) Identification of the Federal Aviation Regulations under which the aircraft has been maintained and inspected during the 12 months preceding the execution of the lease or contract of conditional sale, and certification by the parties thereto regarding the aircraft's status of compliance with applicable maintenance and inspection requirements in this part for the operation to be conducted under the lease or contract of conditional sale.

(2) The name and address (printed or typed) and the signature of the person responsible for operational control of the aircraft under the lease or contract of conditional sale, and certification that each person understands that person's responsibilities for compliance with applicable Federal Aviation Regulations.

(3) A statement that an explanation of factors bearing on operational control and pertinent Federal Aviation Regulations can be obtained from the nearest FAA Flight Standards district office.

(b) The requirements of paragraph (a) of this section do not apply—

(1) To a lease or contract of conditional sale when—

(i) The party to whom the aircraft is furnished is a foreign air carrier or certificate holder under part 121, 125, 135, or 141 of this chapter, or

(ii) The party furnishing the aircraft is a foreign air carrier or a person operating under part 121, 125, and 141 of this chapter, or a person operating under

part 135 of this chapter having authority to engage in on-demand operations with large aircraft.

(2) To a contract of conditional sale, when the aircraft involved has not been registered anywhere prior to the execution of the contract, except as a new aircraft under a dealer's aircraft registration certificate issued in accordance with § 47.61 of this chapter.

(c) No person may operate a large civil aircraft of U.S. registry that is subject to a lease or contract of conditional sale to which paragraph (a) of this section applies, unless—

(1) The lessee or conditional buyer, or the registered owner if the lessee is not a citizen of the United States, has mailed a copy of the lease or contract that complies with the requirements of paragraph (a) of this section, within 24 hours of its execution, to the Aircraft Registration Branch, Attn: Technical Section, P.O. Box 25724, Oklahoma City, OK 73125;

(2) A copy of the lease or contract that complies with the requirements of paragraph (a) of this section is carried in the aircraft. The copy of the lease or contract shall be made available for review upon request by the Administrator, and

(3) The lessee or conditional buyer, or the registered owner if the lessee is not a citizen of the United States, has notified by telephone or in person the FAA Flight Standards district office nearest the airport where the flight will originate. Unless otherwise authorized by that office, the notification shall be given at least 48 hours before takeoff in the case of the first flight of that aircraft under that lease or contract and inform the FAA of—

(i) The location of the airport of departure;

(ii) The departure time; and

(iii) The registration number of the aircraft involved.

(d) The copy of the lease or contract furnished to the FAA under paragraph (c) of this section is commercial or financial information obtained from a person. It is, therefore, privileged and confidential and will not be made available by the FAA for public inspection or copying under 5 U.S.C. 552(b)(4) unless recorded with the FAA under part 49 of this chapter.

(e) For the purpose of this section, a lease means any agreement by a person to furnish an aircraft to another person for compensation or hire, whether with or without flight crewmembers, other than an agreement for the sale of an aircraft and a contract of conditional sale under section 101 of the Federal Aviation Act of 1958. The person furnishing the aircraft is referred to as the lessor, and the person to whom it is furnished the lessee.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–212, 54 FR 39293, Sept. 25, 1989; Amdt. 91–253, 62 FR 13253, Mar. 19, 1997; Amdt. 91–267, 66 FR 21066, Apr. 27, 2001]

### § 91.25 Aviation Safety Reporting Program: Prohibition against use of reports for enforcement purposes.

The Administrator of the FAA will not use reports submitted to the National Aeronautics and Space Administration under the Aviation Safety Reporting Program (or information derived therefrom) in any enforcement action except information concerning accidents or criminal offenses which are wholly excluded from the Program.

### §§ 91.27–91.99 [Reserved]

## Subpart B—Flight Rules

SOURCE: Docket No. 18334, 54 FR 34294, Aug. 18, 1989, unless otherwise noted.

GENERAL

### § 91.101 Applicability.

This subpart prescribes flight rules governing the operation of aircraft within the United States and within 12 nautical miles from the coast of the United States.

### § 91.103 Preflight action.

Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include—

(a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if

the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by ATC;

(b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:

(1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and

(2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

### § 91.105 Flight crewmembers at stations.

(a) During takeoff and landing, and while en route, each required flight crewmember shall—

(1) Be at the crewmember station unless the absence is necessary to perform duties in connection with the operation of the aircraft or in connection with physiological needs; and

(2) Keep the safety belt fastened while at the crewmember station.

(b) Each required flight crewmember of a U.S.-registered civil aircraft shall, during takeoff and landing, keep his or her shoulder harness fastened while at his or her assigned duty station. This paragraph does not apply if—

(1) The seat at the crewmember's station is not equipped with a shoulder harness; or

(2) The crewmember would be unable to perform required duties with the shoulder harness fastened.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–231, 57 FR 42671, Sept. 15, 1992]

### § 91.107 Use of safety belts, shoulder harnesses, and child restraint systems.

(a) Unless otherwise authorized by the Administrator—

(1) No pilot may take off a U.S.-registered civil aircraft (except a free balloon that incorporates a basket or gondola, or an airship type certificated before November 2, 1987) unless the pilot in command of that aircraft ensures that each person on board is briefed on how to fasten and unfasten that person's safety belt and, if installed, shoulder harness.

(2) No pilot may cause to be moved on the surface, take off, or land a U.S.-registered civil aircraft (except a free balloon that incorporates a basket or gondola, or an airship type certificated before November 2, 1987) unless the pilot in command of that aircraft ensures that each person on board has been notified to fasten his or her safety belt and, if installed, his or her shoulder harness.

(3) Except as provided in this paragraph, each person on board a U.S.-registered civil aircraft (except a free balloon that incorporates a basket or gondola or an airship type certificated before November 2, 1987) must occupy an approved seat or berth with a safety belt and, if installed, shoulder harness, properly secured about him or her during movement on the surface, takeoff, and landing. For seaplane and float equipped rotorcraft operations during movement on the surface, the person pushing off the seaplane or rotorcraft from the dock and the person mooring the seaplane or rotorcraft at the dock are excepted from the preceding seating and safety belt requirements. Notwithstanding the preceding requirements of this paragraph, a person may:

(i) Be held by an adult who is occupying an approved seat or berth, provided that the person being held has not reached his or her second birthday and does not occupy or use any restraining device;

(ii) Use the floor of the aircraft as a seat, provided that the person is on board for the purpose of engaging in sport parachuting; or

(iii) Notwithstanding any other requirement of this chapter, occupy an approved child restraint system furnished by the operator or one of the persons described in paragraph (a)(3)(iii)(A) of this section provided that:

(A) The child is accompanied by a parent, guardian, or attendant designated by the child's parent or guardian to attend to the safety of the child during the flight;

(B) Except as provided in paragraph (a)(3)(iii)(B)(*4*) of this action, the approved child restraint system bears one or more labels as follows:

(*1*) Seats manufactured to U.S. standards between January 1, 1981, and February 25, 1985, must bear the label: ''This child restraint system conforms to all applicable Federal motor vehicle safety standards'';

(*2*) Seats manufactured to U.S. standards on or after February 26, 1985, must bear two labels:

(*i*) ''This child restraint system conforms to all applicable Federal motor vehicle safety standards''; and

(*ii*) ''THIS RESTRAINT IS CERTIFIED FOR USE IN MOTOR VEHICLES AND AIRCRAFT'' in red lettering;

(*3*) Seats that do not qualify under paragraphs (a)(3)(iii)(B)(*1*) and (a)(3)(iii)(B)(*2*) of this section must bear a label or markings showing:

(*ii*) That the seat was manufactured under the standards of the United Nations;

(*iii*) That the seat or child restraint device furnished by the operator was approved by the FAA through Type Certificate or Supplemental Type Certificate; or

(*iv*) That the seat or child restraint device furnished by the operator, or one of the persons described in paragraph (a)(3)(iii)(A) of this section, was approved by the FAA in accordance with §21.8(d) of this chapter or Technical Standard Order C–100b or a later version. The child restraint device manufactured by AmSafe, Inc. (CARES, Part No. 4082) and approved by the FAA in accordance with §21.305(d) (2010 ed.) of this chapter may continue to bear a label or markings showing FAA approval in accordance with §21.305(d) (2010 ed.) of this chapter.

(*4*) Except as provided in §91.107(a)(3)(iii)(B)(*3*)(*iii*) and §91.107(a)(3)(iii)(B)(*3*)(*iv*), booster-type child restraint systems (as defined in Federal Motor Vehicle Safety Standard No. 213 (49 CFR 571.213)), vest- and harness-type child restraint systems, and lap held child restraints are not approved for use in aircraft; and

(C) The operator complies with the following requirements:

(*1*) The restraint system must be properly secured to an approved forward-facing seat or berth;

(*2*) The child must be properly secured in the restraint system and must not exceed the specified weight limit for the restraint system; and

(*3*) The restraint system must bear the appropriate label(s).

(b) Unless otherwise stated, this section does not apply to operations conducted under part 121, 125, or 135 of this chapter. Paragraph (a)(3) of this section does not apply to persons subject to §91.105.

[Doc. No. 26142, 57 FR 42671, Sept. 15, 1992, as amended by Amdt. 91–250, 61 FR 28421, June 4, 1996; Amdt. 91–289, 70 FR 50906, Aug. 26, 2005; Amdt. 91–292, 71 FR 40009, July 14, 2006; Amdt. 91–317, 75 FR 48857, Aug. 12, 2010; Amdt. 91–332, 79 FR 28812, May 20, 2014]

### §91.109 Flight instruction; Simulated instrument flight and certain flight tests.

(a) No person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. However, instrument flight instruction may be given in an airplane that is equipped with a single, functioning throwover control wheel that controls the elevator and ailerons, in place of fixed, dual controls, when—

(1) The instructor has determined that the flight can be conducted safely; and

(2) The person manipulating the controls has at least a private pilot certificate with appropriate category and class ratings.

(b) An airplane equipped with a single, functioning throwover control wheel that controls the elevator and ailerons, in place of fixed, dual controls may be used for flight instruction to conduct a flight review required by §61.56 of this chapter, or to obtain recent flight experience or an instrument proficiency check required by §61.57 when—

(1) The airplane is equipped with operable rudder pedals at both pilot stations;

(2) The pilot manipulating the controls is qualified to serve and serves as pilot in command during the entire flight;

(3) The instructor is current and qualified to serve as pilot in command of the airplane, meets the requirements of §61.195(b), and has logged at least 25 hours of pilot-in-command flight time in the make and model of airplane; and

(4) The pilot in command and the instructor have determined the flight can be conducted safely.

(c) No person may operate a civil aircraft in simulated instrument flight unless—

(1) The other control seat is occupied by a safety pilot who possesses at least a private pilot certificate with category and class ratings appropriate to the aircraft being flown.

(2) The safety pilot has adequate vision forward and to each side of the aircraft, or a competent observer in the aircraft adequately supplements the vision of the safety pilot; and

(3) Except in the case of lighter-than-air aircraft, that aircraft is equipped with fully functioning dual controls. However, simulated instrument flight may be conducted in a single-engine airplane, equipped with a single, functioning, throwover control wheel, in place of fixed, dual controls of the elevator and ailerons, when—

(i) The safety pilot has determined that the flight can be conducted safely; and

(ii) The person manipulating the controls has at least a private pilot certificate with appropriate category and class ratings.

(d) No person may operate a civil aircraft that is being used for a flight test for an airline transport pilot certificate or a class or type rating on that certificate, or for a part 121 proficiency flight test, unless the pilot seated at the controls, other than the pilot being checked, is fully qualified to act as pilot in command of the aircraft.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–324, 76 FR 54107, Aug. 31, 2011]

### §91.111 Operating near other aircraft.

(a) No person may operate an aircraft so close to another aircraft as to create a collision hazard.

(b) No person may operate an aircraft in formation flight except by arrangement with the pilot in command of each aircraft in the formation.

(c) No person may operate an aircraft, carrying passengers for hire, in formation flight.

### §91.113 Right-of-way rules: Except water operations.

(a) *Inapplicability.* This section does not apply to the operation of an aircraft on water.

(b) *General.* When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.

(c) *In distress.* An aircraft in distress has the right-of-way over all other air traffic.

(d) *Converging.* When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way. If the aircraft are of different categories—

(1) A balloon has the right-of-way over any other category of aircraft;

(2) A glider has the right-of-way over an airship, powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.

(3) An airship has the right-of-way over a powered parachute, weight-shift-control aircraft, airplane, or rotorcraft.

However, an aircraft towing or refueling other aircraft has the right-of-way over all other engine-driven aircraft.

(e) *Approaching head-on.* When aircraft are approaching each other head-on, or nearly so, each pilot of each aircraft shall alter course to the right.

(f) *Overtaking.* Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(g) *Landing.* Aircraft, while on final approach to land or while landing, have

the right-of-way over other aircraft in flight or operating on the surface, except that they shall not take advantage of this rule to force an aircraft off the runway surface which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–282, 69 FR 44880, July 27, 2004]

### § 91.115 Right-of-way rules: Water operations.

(a) *General.* Each person operating an aircraft on the water shall, insofar as possible, keep clear of all vessels and avoid impeding their navigation, and shall give way to any vessel or other aircraft that is given the right-of-way by any rule of this section.

(b) *Crossing.* When aircraft, or an aircraft and a vessel, are on crossing courses, the aircraft or vessel to the other's right has the right-of-way.

(c) *Approaching head-on.* When aircraft, or an aircraft and a vessel, are approaching head-on, or nearly so, each shall alter its course to the right to keep well clear.

(d) *Overtaking.* Each aircraft or vessel that is being overtaken has the right-of-way, and the one overtaking shall alter course to keep well clear.

(e) *Special circumstances.* When aircraft, or an aircraft and a vessel, approach so as to involve risk of collision, each aircraft or vessel shall proceed with careful regard to existing circumstances, including the limitations of the respective craft.

### § 91.117 Aircraft speed.

(a) Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.).

(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class C or Class D airspace area at an indicated airspeed of more than 200 knots (230 mph.). This paragraph (b) does not apply to any operations within a Class B airspace area. Such operations shall comply with paragraph (a) of this section.

(c) No person may operate an aircraft in the airspace underlying a Class B airspace area designated for an airport or in a VFR corridor designated through such a Class B airspace area, at an indicated airspeed of more than 200 knots (230 mph).

(d) If the minimum safe airspeed for any particular operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–219, 55 FR 34708, Aug. 24, 1990; Amdt. 91–227, 56 FR 65657, Dec. 17, 1991; Amdt. 91–233, 58 FR 43554, Aug. 17, 1993]

### § 91.119 Minimum safe altitudes: General.

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) *Anywhere.* An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) *Over other than congested areas.* An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) *Helicopters, powered parachutes, and weight-shift-control aircraft.* If the operation is conducted without hazard to persons or property on the surface—

(1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and

(2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–311, 75 FR 5223, Feb. 1, 2010]

### § 91.121 Altimeter settings.

(a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating—

(1) Below 18,000 feet MSL, to—

(i) The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;

(ii) If there is no station within the area prescribed in paragraph (a)(1)(i) of this section, the current reported altimeter setting of an appropriate available station; or

(iii) In the case of an aircraft not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure; or

(2) At or above 18,000 feet MSL, to 29.92″ Hg.

(b) The lowest usable flight level is determined by the atmospheric pressure in the area of operation as shown in the following table:

| Current altimeter setting | Lowest usable flight level |
|---|---|
| 29.92 (or higher) | 180 |
| 29.91 through 29.42 | 185 |
| 29.41 through 28.92 | 190 |
| 28.91 through 28.42 | 195 |
| 28.41 through 27.92 | 200 |
| 27.91 through 27.42 | 205 |
| 27.41 through 26.92 | 210 |

(c) To convert minimum altitude prescribed under §§ 91.119 and 91.177 to the minimum flight level, the pilot shall take the flight level equivalent of the minimum altitude in feet and add the appropriate number of feet specified below, according to the current reported altimeter setting:

| Current altimeter setting | Adjustment factor |
|---|---|
| 29.92 (or higher) | None |
| 29.91 through 29.42 | 500 |
| 29.41 through 28.92 | 1,000 |
| 28.91 through 28.42 | 1,500 |
| 28.41 through 27.92 | 2,000 |
| 27.91 through 27.42 | 2,500 |
| 27.41 through 26.92 | 3,000 |

### § 91.123 Compliance with ATC clearances and instructions.

(a) When an ATC clearance has been obtained, no pilot in command may deviate from that clearance unless an amended clearance is obtained, an emergency exists, or the deviation is in response to a traffic alert and collision avoidance system resolution advisory. However, except in Class A airspace, a pilot may cancel an IFR flight plan if the operation is being conducted in VFR weather conditions. When a pilot is uncertain of an ATC clearance, that pilot shall immediately request clarification from ATC.

(b) Except in an emergency, no person may operate an aircraft contrary to an ATC instruction in an area in which air traffic control is exercised.

(c) Each pilot in command who, in an emergency, or in response to a traffic alert and collision avoidance system resolution advisory, deviates from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible.

(d) Each pilot in command who (though not deviating from a rule of this subpart) is given priority by ATC in an emergency, shall submit a detailed report of that emergency within 48 hours to the manager of that ATC facility, if requested by ATC.

(e) Unless otherwise authorized by ATC, no person operating an aircraft may operate that aircraft according to any clearance or instruction that has been issued to the pilot of another aircraft for radar air traffic control purposes.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18834, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–227, 56 FR 65658, Dec. 17, 1991; Amdt. 91–244, 60 FR 50679, Sept. 29, 1995]

### § 91.125 ATC light signals.

ATC light signals have the meaning shown in the following table:

| Color and type of signal | Meaning with respect to aircraft on the surface | Meaning with respect to aircraft in flight |
|---|---|---|
| Steady green | Cleared for takeoff | Cleared to land. |
| Flashing green | Cleared to taxi | Return for landing (to be followed by steady green at proper time). |
| Steady red | Stop | Give way to other aircraft and continue circling. |
| Flashing red | Taxi clear of runway in use. | Airport unsafe—do not land. |
| Flashing white | Return to starting point on airport. | Not applicable. |
| Alternating red and green. | Exercise extreme caution. | Exercise extreme caution. |

### § 91.126 Operating on or in the vicinity of an airport in Class G airspace.

(a) *General.* Unless otherwise authorized or required, each person operating an aircraft on or in the vicinity of an airport in a Class G airspace area must comply with the requirements of this section.

(b) *Direction of turns.* When approaching to land at an airport without an operating control tower in Class G airspace—

(1) Each pilot of an airplane must make all turns of that airplane to the left unless the airport displays approved light signals or visual markings indicating that turns should be made to the right, in which case the pilot must make all turns to the right; and

(2) Each pilot of a helicopter or a powered parachute must avoid the flow of fixed-wing aircraft.

(c) *Flap settings.* Except when necessary for training or certification, the pilot in command of a civil turbojet-powered aircraft must use, as a final flap setting, the minimum certificated landing flap setting set forth in the approved performance information in the Airplane Flight Manual for the applicable conditions. However, each pilot in command has the final authority and responsibility for the safe operation of the pilot's airplane, and may use a different flap setting for that airplane if the pilot determines that it is necessary in the interest of safety.

(d) *Communications with control towers.* Unless otherwise authorized or required by ATC, no person may operate an aircraft to, from, through, or on an airport having an operational control tower unless two-way radio communications are maintained between that aircraft and the control tower. Communications must be established prior to 4 nautical miles from the airport, up to and including 2,500 feet AGL. However, if the aircraft radio fails in flight, the pilot in command may operate that aircraft and land if weather conditions are at or above basic VFR weather minimums, visual contact with the tower is maintained, and a clearance to land is received. If the aircraft radio fails while in flight under IFR, the pilot must comply with § 91.185.

[Doc. No. 24458, 56 FR 65658, Dec. 17, 1991, as amended by Amdt. 91–239, 59 FR 11693, Mar. 11, 1994; Amdt. 91–282, 69 FR 44880, July 27, 2004]

### § 91.127 Operating on or in the vicinity of an airport in Class E airspace.

(a) Unless otherwise required by part 93 of this chapter or unless otherwise authorized or required by the ATC facility having jurisdiction over the Class E airspace area, each person operating an aircraft on or in the vicinity of an airport in a Class E airspace area must comply with the requirements of § 91.126.

(b) *Departures.* Each pilot of an aircraft must comply with any traffic patterns established for that airport in part 93 of this chapter.

(c) *Communications with control towers.* Unless otherwise authorized or required by ATC, no person may operate an aircraft to, from, through, or on an airport having an operational control tower unless two-way radio communications are maintained between that aircraft and the control tower. Communications must be established prior to 4 nautical miles from the airport, up to and including 2,500 feet AGL. However, if the aircraft radio fails in flight, the pilot in command may operate that aircraft and land if weather conditions are at or above basic VFR weather minimums, visual contact with the tower is maintained, and a clearance to land is received. If the aircraft radio

fails while in flight under IFR, the pilot must comply with § 91.185.

[Doc. No. 24458, 56 FR 65658, Dec. 17, 1991, as amended by Amdt. 91–239, 59 FR 11693, Mar. 11, 1994]

### § 91.129 Operations in Class D airspace.

(a) *General.* Unless otherwise authorized or required by the ATC facility having jurisdiction over the Class D airspace area, each person operating an aircraft in Class D airspace must comply with the applicable provisions of this section. In addition, each person must comply with §§ 91.126 and 91.127. For the purpose of this section, the primary airport is the airport for which the Class D airspace area is designated. A satellite airport is any other airport within the Class D airspace area.

(b) *Deviations.* An operator may deviate from any provision of this section under the provisions of an ATC authorization issued by the ATC facility having jurisdiction over the airspace concerned. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

(c) *Communications.* Each person operating an aircraft in Class D airspace must meet the following two-way radio communications requirements:

(1) *Arrival or through flight.* Each person must establish two-way radio communications with the ATC facility (including foreign ATC in the case of foreign airspace designated in the United States) providing air traffic services prior to entering that airspace and thereafter maintain those communications while within that airspace.

(2) *Departing flight.* Each person—

(i) From the primary airport or satellite airport with an operating control tower must establish and maintain two-way radio communications with the control tower, and thereafter as instructed by ATC while operating in the Class D airspace area; or

(ii) From a satellite airport without an operating control tower, must establish and maintain two-way radio communications with the ATC facility having jurisdiction over the Class D airspace area as soon as practicable after departing.

(d) *Communications failure.* Each person who operates an aircraft in a Class D airspace area must maintain two-way radio communications with the ATC facility having jurisdiction over that area.

(1) If the aircraft radio fails in flight under IFR, the pilot must comply with § 91.185 of the part.

(2) If the aircraft radio fails in flight under VFR, the pilot in command may operate that aircraft and land if—

(i) Weather conditions are at or above basic VFR weather minimums;

(ii) Visual contact with the tower is maintained; and

(iii) A clearance to land is received.

(e) *Minimum altitudes when operating to an airport in Class D airspace.* (1) Unless required by the applicable distance-from-cloud criteria, each pilot operating a large or turbine-powered airplane must enter the traffic pattern at an altitude of at least 1,500 feet above the elevation of the airport and maintain at least 1,500 feet until further descent is required for a safe landing.

(2) Each pilot operating a large or turbine-powered airplane approaching to land on a runway served by an instrument approach procedure with vertical guidance, if the airplane is so equipped, must:

(i) Operate that airplane at an altitude at or above the glide path between the published final approach fix and the decision altitude (DA), or decision height (DH), as applicable; or

(ii) If compliance with the applicable distance-from-cloud criteria requires glide path interception closer in, operate that airplane at or above the glide path, between the point of interception of glide path and the DA or the DH.

(3) Each pilot operating an airplane approaching to land on a runway served by a visual approach slope indicator must maintain an altitude at or above the glide path until a lower altitude is necessary for a safe landing.

(4) Paragraphs (e)(2) and (e)(3) of this section do not prohibit normal bracketing maneuvers above or below the glide path that are conducted for the purpose of remaining on the glide path.

(f) *Approaches.* Except when conducting a circling approach under part 97 of this chapter or unless otherwise required by ATC, each pilot must—

(1) Circle the airport to the left, if operating an airplane; or

(2) Avoid the flow of fixed-wing aircraft, if operating a helicopter.

(g) *Departures.* No person may operate an aircraft departing from an airport except in compliance with the following:

(1) Each pilot must comply with any departure procedures established for that airport by the FAA.

(2) Unless otherwise required by the prescribed departure procedure for that airport or the applicable distance from clouds criteria, each pilot of a turbine-powered airplane and each pilot of a large airplane must climb to an altitude of 1,500 feet above the surface as rapidly as practicable.

(h) *Noise abatement.* Where a formal runway use program has been established by the FAA, each pilot of a large or turbine-powered airplane assigned a noise abatement runway by ATC must use that runway. However, consistent with the final authority of the pilot in command concerning the safe operation of the aircraft as prescribed in §91.3(a), ATC may assign a different runway if requested by the pilot in the interest of safety.

(i) *Takeoff, landing, taxi clearance.* No person may, at any airport with an operating control tower, operate an aircraft on a runway or taxiway, or take off or land an aircraft, unless an appropriate clearance is received from ATC.

[Doc. No. 24458, 56 FR 65658, Dec. 17, 1991, as amended by Amdt. 91–234, 58 FR 48793, Sept. 20, 1993; Amdt. 91–296, 72 FR 31678, June 7, 2007; 77 FR 28250, May 14, 2012]

### §91.130 Operations in Class C airspace.

(a) *General.* Unless otherwise authorized by ATC, each aircraft operation in Class C airspace must be conducted in compliance with this section and §91.129. For the purpose of this section, the primary airport is the airport for which the Class C airspace area is designated. A satellite airport is any other airport within the Class C airspace area.

(b) *Traffic patterns.* No person may take off or land an aircraft at a satellite airport within a Class C airspace area except in compliance with FAA arrival and departure traffic patterns.

(c) *Communications.* Each person operating an aircraft in Class C airspace must meet the following two-way radio communications requirements:

(1) *Arrival or through flight.* Each person must establish two-way radio communications with the ATC facility (including foreign ATC in the case of foreign airspace designated in the United States) providing air traffic services prior to entering that airspace and thereafter maintain those communications while within that airspace.

(2) *Departing flight.* Each person—

(i) From the primary airport or satellite airport with an operating control tower must establish and maintain two-way radio communications with the control tower, and thereafter as instructed by ATC while operating in the Class C airspace area; or

(ii) From a satellite airport without an operating control tower, must establish and maintain two-way radio communications with the ATC facility having jurisdiction over the Class C airspace area as soon as practicable after departing.

(d) *Equipment requirements.* Unless otherwise authorized by the ATC having jurisdiction over the Class C airspace area, no person may operate an aircraft within a Class C airspace area designated for an airport unless that aircraft is equipped with the applicable equipment specified in §91.215, and after January 1, 2020, §91.225.

(e) *Deviations.* An operator may deviate from any provision of this section under the provisions of an ATC authorization issued by the ATC facility having jurisdiction over the airspace concerned. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

[Doc. No. 24458, 56 FR 65659, Dec. 17, 1991, as amended by Amdt. 91–232, 58 FR 40736, July 30, 1993; Amdt. 91–239, 59 FR 11693, Mar. 11, 1994; Amdt. 91–314, 75 FR 30193, May 28, 2010]

### §91.131 Operations in Class B airspace.

(a) *Operating rules.* No person may operate an aircraft within a Class B airspace area except in compliance with §91.129 and the following rules:

(1) The operator must receive an ATC clearance from the ATC facility having

jurisdiction for that area before operating an aircraft in that area.

(2) Unless otherwise authorized by ATC, each person operating a large turbine engine-powered airplane to or from a primary airport for which a Class B airspace area is designated must operate at or above the designated floors of the Class B airspace area while within the lateral limits of that area.

(3) Any person conducting pilot training operations at an airport within a Class B airspace area must comply with any procedures established by ATC for such operations in that area.

(b) *Pilot requirements.* (1) No person may take off or land a civil aircraft at an airport within a Class B airspace area or operate a civil aircraft within a Class B airspace area unless—

(i) The pilot in command holds at least a private pilot certificate;

(ii) The pilot in command holds a recreational pilot certificate and has met—

(A) The requirements of § 61.101(d) of this chapter; or

(B) The requirements for a student pilot seeking a recreational pilot certificate in § 61.94 of this chapter;

(iii) The pilot in command holds a sport pilot certificate and has met—

(A) The requirements of § 61.325 of this chapter; or

(B) The requirements for a student pilot seeking a recreational pilot certificate in § 61.94 of this chapter; or

(iv) The aircraft is operated by a student pilot who has met the requirements of § 61.94 or § 61.95 of this chapter, as applicable.

(2) Notwithstanding the provisions of paragraphs (b)(1)(ii), (b)(1)(iii) and (b)(1)(iv) of this section, no person may take off or land a civil aircraft at those airports listed in section 4 of appendix D to this part unless the pilot in command holds at least a private pilot certificate.

(c) *Communications and navigation equipment requirements.* Unless otherwise authorized by ATC, no person may operate an aircraft within a Class B airspace area unless that aircraft is equipped with—

(1) *For IFR operation.* An operable VOR or TACAN receiver or an operable and suitable RNAV system; and

(2) *For all operations.* An operable two-way radio capable of communications with ATC on appropriate frequencies for that Class B airspace area.

(d) *Other equipment requirements.* No person may operate an aircraft in a Class B airspace area unless the aircraft is equipped with—

(1) The applicable operating transponder and automatic altitude reporting equipment specified in § 91.215 (a), except as provided in § 91.215 (e), and

(2) After January 1, 2020, the applicable Automatic Dependent Surveillance-Broadcast Out equipment specified in § 91.225.

[Doc. No. 24458, 56 FR 65658, Dec. 17, 1991, as amended by Amdt. 91–282, 69 FR 44880, July 27, 2004; Amdt. 91–296, 72 FR 31678, June 7, 2007; Amdt. 91–314, 75 FR 30193, May 28, 2010]

### § 91.133 Restricted and prohibited areas.

(a) No person may operate an aircraft within a restricted area (designated in part 73) contrary to the restrictions imposed, or within a prohibited area, unless that person has the permission of the using or controlling agency, as appropriate.

(b) Each person conducting, within a restricted area, an aircraft operation (approved by the using agency) that creates the same hazards as the operations for which the restricted area was designated may deviate from the rules of this subpart that are not compatible with the operation of the aircraft.

### § 91.135 Operations in Class A airspace.

Except as provided in paragraph (d) of this section, each person operating an aircraft in Class A airspace must conduct that operation under instrument flight rules (IFR) and in compliance with the following:

(a) *Clearance.* Operations may be conducted only under an ATC clearance received prior to entering the airspace.

(b) *Communications.* Unless otherwise authorized by ATC, each aircraft operating in Class A airspace must be equipped with a two-way radio capable of communicating with ATC on a frequency assigned by ATC. Each pilot

must maintain two-way radio communications with ATC while operating in Class A airspace.

(c) *Equipment requirements.* Unless otherwise authorized by ATC, no person may operate an aircraft within Class A airspace unless that aircraft is equipped with the applicable equipment specified in § 91.215, and after January 1, 2020, § 91.225.

(d) *ATC authorizations.* An operator may deviate from any provision of this section under the provisions of an ATC authorization issued by the ATC facility having jurisdiction of the airspace concerned. In the case of an inoperative transponder, ATC may immediately approve an operation within a Class A airspace area allowing flight to continue, if desired, to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made, or both. Requests for deviation from any provision of this section must be submitted in writing, at least 4 days before the proposed operation. ATC may authorize a deviation on a continuing basis or for an individual flight.

[Doc. No. 24458, 56 FR 65659, Dec. 17, 1991, as amended by Amdt. 91–314, 75 FR 30193, May 28, 2010]

### § 91.137 Temporary flight restrictions in the vicinity of disaster/hazard areas.

(a) The Administrator will issue a Notice to Airmen (NOTAM) designating an area within which temporary flight restrictions apply and specifying the hazard or condition requiring their imposition, whenever he determines it is necessary in order to—

(1) Protect persons and property on the surface or in the air from a hazard associated with an incident on the surface;

(2) Provide a safe environment for the operation of disaster relief aircraft; or

(3) Prevent an unsafe congestion of sightseeing and other aircraft above an incident or event which may generate a high degree of public interest.

The Notice to Airmen will specify the hazard or condition that requires the imposition of temporary flight restrictions.

(b) When a NOTAM has been issued under paragraph (a)(1) of this section, no person may operate an aircraft within the designated area unless that aircraft is participating in the hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities.

(c) When a NOTAM has been issued under paragraph (a)(2) of this section, no person may operate an aircraft within the designated area unless at least one of the following conditions are met:

(1) The aircraft is participating in hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities.

(2) The aircraft is carrying law enforcement officials.

(3) The aircraft is operating under the ATC approved IFR flight plan.

(4) The operation is conducted directly to or from an airport within the area, or is necessitated by the impracticability of VFR flight above or around the area due to weather, or terrain; notification is given to the Flight Service Station (FSS) or ATC facility specified in the NOTAM to receive advisories concerning disaster relief aircraft operations; and the operation does not hamper or endanger relief activities and is not conducted for the purpose of observing the disaster.

(5) The aircraft is carrying properly accredited news representatives, and, prior to entering the area, a flight plan is filed with the appropriate FAA or ATC facility specified in the Notice to Airmen and the operation is conducted above the altitude used by the disaster relief aircraft, unless otherwise authorized by the official in charge of on scene emergency response activities.

(d) When a NOTAM has been issued under paragraph (a)(3) of this section, no person may operate an aircraft within the designated area unless at least one of the following conditions is met:

(1) The operation is conducted directly to or from an airport within the area, or is necessitated by the impracticability of VFR flight above or

around the area due to weather or terrain, and the operation is not conducted for the purpose of observing the incident or event.

(2) The aircraft is operating under an ATC approved IFR flight plan.

(3) The aircraft is carrying incident or event personnel, or law enforcement officials.

(4) The aircraft is carrying properly accredited news representatives and, prior to entering that area, a flight plan is filed with the appropriate FSS or ATC facility specified in the NOTAM.

(e) Flight plans filed and notifications made with an FSS or ATC facility under this section shall include the following information:

(1) Aircraft identification, type and color.

(2) Radio communications frequencies to be used.

(3) Proposed times of entry of, and exit from, the designated area.

(4) Name of news media or organization and purpose of flight.

(5) Any other information requested by ATC.

### § 91.138 Temporary flight restrictions in national disaster areas in the State of Hawaii.

(a) When the Administrator has determined, pursuant to a request and justification provided by the Governor of the State of Hawaii, or the Governor's designee, that an inhabited area within a declared national disaster area in the State of Hawaii is in need of protection for humanitarian reasons, the Administrator will issue a Notice to Airmen (NOTAM) designating an area within which temporary flight restrictions apply. The Administrator will designate the extent and duration of the temporary flight restrictions necessary to provide for the protection of persons and property on the surface.

(b) When a NOTAM has been issued in accordance with this section, no person may operate an aircraft within the designated area unless at least one of the following conditions is met:

(1) That person has obtained authorization from the official in charge of associated emergency or disaster relief response activities, and is operating the aircraft under the conditions of that authorization.

(2) The aircraft is carrying law enforcement officials.

(3) The aircraft is carrying persons involved in an emergency or a legitimate scientific purpose.

(4) The aircraft is carrying properly accredited newspersons, and that prior to entering the area, a flight plan is filed with the appropriate FAA or ATC facility specified in the NOTAM and the operation is conducted in compliance with the conditions and restrictions established by the official in charge of on-scene emergency response activities.

(5) The aircraft is operating in accordance with an ATC clearance or instruction.

(c) A NOTAM issued under this section is effective for 90 days or until the national disaster area designation is terminated, whichever comes first, unless terminated by notice or extended by the Administrator at the request of the Governor of the State of Hawaii or the Governor's designee.

[Doc. No. 26476, 56 FR 23178, May 20, 1991, as amended by Amdt. 91–270, 66 FR 47377, Sept. 11, 2001]

### § 91.139 Emergency air traffic rules.

(a) This section prescribes a process for utilizing Notices to Airmen (NOTAMs) to advise of the issuance and operations under emergency air traffic rules and regulations and designates the official who is authorized to issue NOTAMs on behalf of the Administrator in certain matters under this section.

(b) Whenever the Administrator determines that an emergency condition exists, or will exist, relating to the FAA's ability to operate the air traffic control system and during which normal flight operations under this chapter cannot be conducted consistent with the required levels of safety and efficiency—

(1) The Administrator issues an immediately effective air traffic rule or regulation in response to that emergency condition; and

(2) The Administrator or the Associate Administrator for Air Traffic

may utilize the NOTAM system to provide notification of the issuance of the rule or regulation.

Those NOTAMs communicate information concerning the rules and regulations that govern flight operations, the use of navigation facilities, and designation of that airspace in which the rules and regulations apply.

(c) When a NOTAM has been issued under this section, no person may operate an aircraft, or other device governed by the regulation concerned, within the designated airspace except in accordance with the authorizations, terms, and conditions prescribed in the regulation covered by the NOTAM.

### § 91.141 Flight restrictions in the proximity of the Presidential and other parties.

No person may operate an aircraft over or in the vicinity of any area to be visited or traveled by the President, the Vice President, or other public figures contrary to the restrictions established by the Administrator and published in a Notice to Airmen (NOTAM).

### § 91.143 Flight limitation in the proximity of space flight operations.

When a Notice to Airmen (NOTAM) is issued in accordance with this section, no person may operate any aircraft of U.S. registry, or pilot any aircraft under the authority of an airman certificate issued by the Federal Aviation Administration, within areas designated in a NOTAM for space flight operation except when authorized by ATC.

[Doc. No. FAA–2004–19246, 69 FR 59753, Oct. 5, 2004]

### § 91.144 Temporary restriction on flight operations during abnormally high barometric pressure conditions.

(a) *Special flight restrictions.* When any information indicates that barometric pressure on the route of flight currently exceeds or will exceed 31 inches of mercury, no person may operate an aircraft or initiate a flight contrary to the requirements established by the Administrator and published in a Notice to Airmen issued under this section.

(b) *Waivers.* The Administrator is authorized to waive any restriction issued under paragraph (a) of this section to permit emergency supply, transport, or medical services to be delivered to isolated communities, where the operation can be conducted with an acceptable level of safety.

[Amdt. 91–240, 59 FR 17452, Apr. 12, 1994; 59 FR 37669, July 25, 1994]

### § 91.145 Management of aircraft operations in the vicinity of aerial demonstrations and major sporting events.

(a) The FAA will issue a Notice to Airmen (NOTAM) designating an area of airspace in which a temporary flight restriction applies when it determines that a temporary flight restriction is necessary to protect persons or property on the surface or in the air, to maintain air safety and efficiency, or to prevent the unsafe congestion of aircraft in the vicinity of an aerial demonstration or major sporting event. These demonstrations and events may include:

(1) United States Naval Flight Demonstration Team (Blue Angels);

(2) United States Air Force Air Demonstration Squadron (Thunderbirds);

(3) United States Army Parachute Team (Golden Knights);

(4) Summer/Winter Olympic Games;

(5) Annual Tournament of Roses Football Game;

(6) World Cup Soccer;

(7) Major League Baseball All-Star Game;

(8) World Series;

(9) Kodak Albuquerque International Balloon Fiesta;

(10) Sandia Classic Hang Gliding Competition;

(11) Indianapolis 500 Mile Race;

(12) Any other aerial demonstration or sporting event the FAA determines to need a temporary flight restriction in accordance with paragraph (b) of this section.

(b) In deciding whether a temporary flight restriction is necessary for an aerial demonstration or major sporting event not listed in paragraph (a) of this section, the FAA considers the following factors:

(1) Area where the event will be held.

(2) Effect flight restrictions will have on known aircraft operations.
(3) Any existing ATC airspace traffic management restrictions.
(4) Estimated duration of the event.
(5) Degree of public interest.
(6) Number of spectators.
(7) Provisions for spectator safety.
(8) Number and types of participating aircraft.
(9) Use of mixed high and low performance aircraft.
(10) Impact on non-participating aircraft.
(11) Weather minimums.
(12) Emergency procedures that will be in effect.

(c) A NOTAM issued under this section will state the name of the aerial demonstration or sporting event and specify the effective dates and times, the geographic features or coordinates, and any other restrictions or procedures governing flight operations in the designated airspace.

(d) When a NOTAM has been issued in accordance with this section, no person may operate an aircraft or device, or engage in any activity within the designated airspace area, except in accordance with the authorizations, terms, and conditions of the temporary flight restriction published in the NOTAM, unless otherwise authorized by:
(1) Air traffic control; or
(2) A Flight Standards Certificate of Waiver or Authorization issued for the demonstration or event.

(e) For the purpose of this section:
(1) *Flight restricted airspace area for an aerial demonstration*—The amount of airspace needed to protect persons and property on the surface or in the air, to maintain air safety and efficiency, or to prevent the unsafe congestion of aircraft will vary depending on the aerial demonstration and the factors listed in paragraph (b) of this section. The restricted airspace area will normally be limited to a 5 nautical mile radius from the center of the demonstration and an altitude 17000 mean sea level (for high performance aircraft) or 13000 feet above the surface (for certain parachute operations), but will be no greater than the minimum airspace necessary for the management of aircraft operations in the vicinity of the specified area.

(2) *Flight restricted area for a major sporting event*—The amount of airspace needed to protect persons and property on the surface or in the air, to maintain air safety and efficiency, or to prevent the unsafe congestion of aircraft will vary depending on the size of the event and the factors listed in paragraph (b) of this section. The restricted airspace will normally be limited to a 3 nautical mile radius from the center of the event and 2500 feet above the surface but will not be greater than the minimum airspace necessary for the management of aircraft operations in the vicinity of the specified area.

(f) A NOTAM issued under this section will be issued at least 30 days in advance of an aerial demonstration or a major sporting event, unless the FAA finds good cause for a shorter period and explains this in the NOTAM.

(g) When warranted, the FAA Administrator may exclude the following flights from the provisions of this section:
(1) Essential military.
(2) Medical and rescue.
(3) Presidential and Vice Presidential.
(4) Visiting heads of state.
(5) Law enforcement and security.
(6) Public health and welfare.

[Doc. No. FAA–2000–8274, 66 FR 47378, Sept. 11, 2001]

### § 91.146 Passenger-carrying flights for the benefit of a charitable, nonprofit, or community event.

(a) *Definitions.* For purposes of this section, the following definitions apply:

*Charitable event* means an event that raises funds for the benefit of a charitable organization recognized by the Department of the Treasury whose donors may deduct contributions under section 170 of the Internal Revenue Code (26 U.S.C. Section 170).

*Community event* means an event that raises funds for the benefit of any local or community cause that is not a charitable event or non-profit event.

*Non-profit event* means an event that raises funds for the benefit of a nonprofit organization recognized under State or Federal law, as long as one of the organization's purposes is the promotion of aviation safety.

(b) Passenger carrying flights for the benefit of a charitable, nonprofit, or community event identified in paragraph (c) of this section are not subject to the certification requirements of part 119 or the drug and alcohol testing requirements in part 120 of this chapter, provided the following conditions are satisfied and the limitations in paragraphs (c) and (d) are not exceeded:

(1) The flight is nonstop and begins and ends at the same airport and is conducted within a 25-statute mile radius of that airport;

(2) The flight is conducted from a public airport that is adequate for the airplane or helicopter used, or from another location the FAA approves for the operation;

(3) The airplane or helicopter has a maximum of 30 seats, excluding each crewmember seat, and a maximum payload capacity of 7,500 pounds;

(4) The flight is not an aerobatic or a formation flight;

(5) Each airplane or helicopter holds a standard airworthiness certificate, is airworthy, and is operated in compliance with the applicable requirements of subpart E of this part;

(6) Each flight is made during day VFR conditions;

(7) Reimbursement of the operator of the airplane or helicopter is limited to that portion of the passenger payment for the flight that does not exceed the pro rata cost of owning, operating, and maintaining the aircraft for that flight, which may include fuel, oil, airport expenditures, and rental fees;

(8) The beneficiary of the funds raised is not in the business of transportation by air;

(9) A private pilot acting as pilot in command has at least 500 hours of flight time;

(10) Each flight is conducted in accordance with the safety provisions of part 136, subpart A of this chapter; and

(11) Flights are not conducted over a national park, unit of a national park, or abutting tribal lands, unless the operator has secured a letter of agreement from the FAA, as specified under subpart B of part 136 of this chapter, and is operating in accordance with that agreement during the flights.

(c) (1) Passenger-carrying flights or series of flights are limited to a total of four charitable events or non-profit events per year, with no event lasting more than three consecutive days.

(2) Passenger-carrying flights or series of flights are limited to one community event per year, with no event lasting more than three consecutive days.

(d) Pilots and sponsors of events described in this section are limited to no more than 4 events per calendar year.

(e) At least seven days before the event, each sponsor of an event described in this section must furnish to the FAA Flight Standards District Office with jurisdiction over the geographical area where the event is scheduled:

(1) A signed letter detailing the name of the sponsor, the purpose of the event, the date and time of the event, the location of the event, all prior events under this section participated in by the sponsor in the current calendar year;

(2) A photocopy of each pilot in command's pilot certificate, medical certificate, and logbook entries that show the pilot is current in accordance with §§ 61.56 and 61.57 of this chapter and that any private pilot has at least 500 hours of flight time; and

(3) A signed statement from each pilot that lists all prior events under this section in which the pilot has participated during the current calendar year.

[Doc. No. FAA–1998–4521, 72 FR 6910, Feb. 13, 2007, as amended by Amdt. 91–308, 74 FR 32804, July 9, 2009]

### § 91.147 Passenger carrying flights for compensation or hire.

Each Operator conducting passenger-carrying flights for compensation or hire must meet the following requirements unless all flights are conducted under § 91.146.

(a) For the purposes of this section and for drug and alcohol testing, *Operator* means any person conducting nonstop passenger-carrying flights in an airplane or helicopter for compensation or hire in accordance with §§ 119.1(e)(2), 135.1(a)(5), or 121.1(d), of this chapter that begin and end at the same airport and are conducted within a 25-statute mile radius of that airport.

(b) An Operator must comply with the safety provisions of part 136, subpart A of this chapter, and apply for and receive a Letter of Authorization from the Flight Standards District Office nearest to its principal place of business.

(c) Each application for a Letter of Authorization must include the following information:

(1) Name of Operator, agent, and any d/b/a (doing-business-as) under which that Operator does business;

(2) Principal business address and mailing address;

(3) Principal place of business (if different from business address);

(4) Name of person responsible for management of the business;

(5) Name of person responsible for aircraft maintenance;

(6) Type of aircraft, registration number(s), and make/model/series; and

(7) An Antidrug and Alcohol Misuse Prevention Program registration.

(d) The Operator must register and implement its drug and alcohol testing programs in accordance with part 120 of this chapter.

(e) The Operator must comply with the provisions of the Letter of Authorization received.

[Doc. No. FAA–1998–4521, 72 FR 6911, Feb. 13, 2007, as amended by Amdt. 91–307, 74 FR 22652, May 14, 2009; Amdt. 91–320, 76 FR 8893, Feb. 16, 2011]

### §§ 91.148–91.149 [Reserved]

## VISUAL FLIGHT RULES

### § 91.151 Fuel requirements for flight in VFR conditions.

(a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed—

(1) During the day, to fly after that for at least 30 minutes; or

(2) At night, to fly after that for at least 45 minutes.

(b) No person may begin a flight in a rotorcraft under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 20 minutes.

### § 91.153 VFR flight plan: Information required.

(a) *Information required.* Unless otherwise authorized by ATC, each person filing a VFR flight plan shall include in it the following information:

(1) The aircraft identification number and, if necessary, its radio call sign.

(2) The type of the aircraft or, in the case of a formation flight, the type of each aircraft and the number of aircraft in the formation.

(3) The full name and address of the pilot in command or, in the case of a formation flight, the formation commander.

(4) The point and proposed time of departure.

(5) The proposed route, cruising altitude (or flight level), and true airspeed at that altitude.

(6) The point of first intended landing and the estimated elapsed time until over that point.

(7) The amount of fuel on board (in hours).

(8) The number of persons in the aircraft, except where that information is otherwise readily available to the FAA.

(9) Any other information the pilot in command or ATC believes is necessary for ATC purposes.

(b) *Cancellation.* When a flight plan has been activated, the pilot in command, upon canceling or completing the flight under the flight plan, shall notify an FAA Flight Service Station or ATC facility.

### § 91.155 Basic VFR weather minimums.

(a) Except as provided in paragraph (b) of this section and § 91.157, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace in the following table:

| Airspace | Flight visibility | Distance from clouds |
|---|---|---|
| Class A | Not Applicable | Not Applicable. |
| Class B | 3 statute miles | Clear of Clouds. |
| Class C | 3 statute miles | 500 feet below. |
| | | 1,000 feet above. |
| | | 2,000 feet horizontal. |

| Airspace | Flight visibility | Distance from clouds |
|---|---|---|
| Class D | 3 statute miles | 500 feet below. |
| | | 1,000 feet above. |
| | | 2,000 feet horizontal. |
| Class E: | | |
| Less than 10,000 feet MSL. | 3 statute miles | 500 feet below. |
| | | 1,000 feet above. |
| | | 2,000 feet horizontal. |
| At or above 10,000 feet MSL. | 5 statute miles | 1,000 feet below. |
| | | 1,000 feet above. |
| | | 1 statute mile horizontal. |
| Class G: | | |
| 1,200 feet or less above the surface (regardless of MSL altitude) | | |
| For aircraft other than helicopters: | | |
| Day, except as provided in § 91.155(b). | 1 statute mile | Clear of clouds. |
| Night, except as provided in § 91.155(b). | 3 statute miles | 500 feet below. |
| | | 1,000 feet above. |
| | | 2,000 feet horizontal. |
| For helicopters: | | |
| Day | ½ statute mile | Clear of clouds |
| Night, except as provided in § 91.155(b). | 1 statute mile | Clear of clouds. |
| More than 1,200 feet above the surface but less than 10,000 feet MSL | | |
| Day | 1 statute mile | 500 feet below. |
| | | 1,000 feet above. |
| | | 2,000 feet horizontal. |
| Night | 3 statute miles | 500 feet below. |
| | | 1,000 feet above. |
| | | 2,000 feet horizontal. |
| More than 1,200 feet above the surface and at or above 10,000 feet MSL. | 5 statute miles | 1,000 feet below. |
| | | 1,000 feet above. |
| | | 1 statute mile horizontal. |

(b) *Class G Airspace.* Notwithstanding the provisions of paragraph (a) of this section, the following operations may be conducted in Class G airspace below 1,200 feet above the surface:

(1) *Helicopter.* A helicopter may be operated clear of clouds in an airport traffic pattern within ½ mile of the runway or helipad of intended landing if the flight visibility is not less than ½ statute mile.

(2) *Airplane, powered parachute, or weight-shift-control aircraft.* If the visibility is less than 3 statute miles but not less than 1 statute mile during night hours and you are operating in an airport traffic pattern within ½ mile of the runway, you may operate an airplane, powered parachute, or weight-shift-control aircraft clear of clouds.

(c) Except as provided in § 91.157, no person may operate an aircraft beneath the ceiling under VFR within the lateral boundaries of controlled airspace designated to the surface for an airport when the ceiling is less than 1,000 feet.

(d) Except as provided in § 91.157 of this part, no person may take off or land an aircraft, or enter the traffic pattern of an airport, under VFR, within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport—

(1) Unless ground visibility at that airport is at least 3 statute miles; or

(2) If ground visibility is not reported at that airport, unless flight visibility during landing or takeoff, or while operating in the traffic pattern is at least 3 statute miles.

(e) For the purpose of this section, an aircraft operating at the base altitude of a Class E airspace area is considered to be within the airspace directly below that area.

[Doc. No. 24458, 56 FR 65660, Dec. 17, 1991, as amended by Amdt. 91–235, 58 FR 51968, Oct. 5, 1993; Amdt. 91–282, 69 FR 44880, July 27, 2004; Amdt. 91–330, 79 FR 9972, Feb. 21, 2014; Amdt. 91–330A, 79 FR 41125, July 15, 2014]

### § 91.157 Special VFR weather minimums.

(a) Except as provided in appendix D, section 3, of this part, special VFR operations may be conducted under the weather minimums and requirements of this section, instead of those contained in § 91.155, below 10,000 feet MSL within the airspace contained by the upward extension of the lateral boundaries of the controlled airspace designated to the surface for an airport.

(b) Special VFR operations may only be conducted—

(1) With an ATC clearance;

(2) Clear of clouds;

(3) Except for helicopters, when flight visibility is at least 1 statute mile; and

(4) Except for helicopters, between sunrise and sunset (or in Alaska, when the sun is 6 degrees or more below the horizon) unless—

(i) The person being granted the ATC clearance meets the applicable requirements for instrument flight under part 61 of this chapter; and

(ii) The aircraft is equipped as required in § 91.205(d).

(c) No person may take off or land an aircraft (other than a helicopter) under special VFR—

(1) Unless ground visibility is at least 1 statute mile; or

(2) If ground visibility is not reported, unless flight visibility is at least 1 statute mile. For the purposes of this paragraph, the term flight visibility includes the visibility from the cockpit of an aircraft in takeoff position if:

(i) The flight is conducted under this part 91; and

(ii) The airport at which the aircraft is located is a satellite airport that does not have weather reporting capabilities.

(d) The determination of visibility by a pilot in accordance with paragraph (c)(2) of this section is not an official weather report or an official ground visibility report.

[Amdt. 91–235, 58 FR 51968, Oct. 5, 1993, as amended by Amdt. 91–247, 60 FR 66874, Dec. 27, 1995; Amdt. 91–262, 65 FR 16116, Mar. 24, 2000]

### § 91.159 VFR cruising altitude or flight level.

Except while holding in a holding pattern of 2 minutes or less, or while turning, each person operating an aircraft under VFR in level cruising flight more than 3,000 feet above the surface shall maintain the appropriate altitude or flight level prescribed below, unless otherwise authorized by ATC:

(a) When operating below 18,000 feet MSL and—

(1) On a magnetic course of zero degrees through 179 degrees, any odd thousand foot MSL altitude + 500 feet (such as 3,500, 5,500, or 7,500); or

(2) On a magnetic course of 180 degrees through 359 degrees, any even thousand foot MSL altitude + 500 feet (such as 4,500, 6,500, or 8,500).

(b) When operating above 18,000 feet MSL, maintain the altitude or flight level assigned by ATC.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–276, 68 FR 61321, Oct. 27, 2003; 68 FR 70133, Dec. 17, 2003]

### § 91.161 Special awareness training required for pilots flying under visual flight rules within a 60-nautical mile radius of the Washington, DC VOR/DME.

(a) *Operations within a 60-nautical mile radius of the Washington, DC VOR/DME under visual flight rules (VFR).* Except as provided under paragraph (e) of this section, no person may serve as a pilot in command or as second in command of an aircraft while flying within a 60-nautical mile radius of the DCA VOR/DME, under VFR, unless that pilot has completed Special Awareness Training and holds a certificate of training completion.

(b) *Special Awareness Training.* The Special Awareness Training consists of information to educate pilots about the procedures for flying in the Washington, DC area and, more generally, in other types of special use airspace. This free training is available on the FAA's Web site. Upon completion of the training, each person will need to print out a copy of the certificate of training completion.

(c) *Inspection of certificate of training completion.* Each person who holds a certificate for completing the Special Awareness Training must present it for inspection upon request from:

(1) An authorized representative of the FAA;

(2) An authorized representative of the National Transportation Safety Board;

(3) Any Federal, State, or local law enforcement officer; or

(4) An authorized representative of the Transportation Security Administration.

(d) *Emergency declared.* The failure to complete the Special Awareness Training course on flying in and around the Washington, DC Metropolitan Area is not a violation of this section if an

emergency is declared by the pilot, as described under §91.3(b), or there was a failure of two-way radio communications when operating under IFR as described under §91.185.

(e) *Exceptions.* The requirements of this section do not apply if the flight is being performed in an aircraft of an air ambulance operator certificated to conduct part 135 operations under this chapter, the U.S. Armed Forces, or a law enforcement agency.

[Doc. No. FAA–2006–25250, 73 FR 46803, Aug. 12, 2008]

### §§ 91.162–91.165 [Reserved]

INSTRUMENT FLIGHT RULES

### § 91.167 Fuel requirements for flight in IFR conditions.

(a) No person may operate a civil aircraft in IFR conditions unless it carries enough fuel (considering weather reports and forecasts and weather conditions) to—

(1) Complete the flight to the first airport of intended landing;

(2) Except as provided in paragraph (b) of this section, fly from that airport to the alternate airport; and

(3) Fly after that for 45 minutes at normal cruising speed or, for helicopters, fly after that for 30 minutes at normal cruising speed.

(b) Paragraph (a)(2) of this section does not apply if:

(1) Part 97 of this chapter prescribes a standard instrument approach procedure to, or a special instrument approach procedure has been issued by the Administrator to the operator for, the first airport of intended landing; and

(2) Appropriate weather reports or weather forecasts, or a combination of them, indicate the following:

(i) *For aircraft other than helicopters.* For at least 1 hour before and for 1 hour after the estimated time of arrival, the ceiling will be at least 2,000 feet above the airport elevation and the visibility will be at least 3 statute miles.

(ii) *For helicopters.* At the estimated time of arrival and for 1 hour after the estimated time of arrival, the ceiling will be at least 1,000 feet above the airport elevation, or at least 400 feet above the lowest applicable approach minima, whichever is higher, and the visibility will be at least 2 statute miles.

[Doc. No. 98–4390, 65 FR 3546, Jan. 21, 2000]

### § 91.169 IFR flight plan: Information required.

(a) *Information required.* Unless otherwise authorized by ATC, each person filing an IFR flight plan must include in it the following information:

(1) Information required under §91.153 (a) of this part;

(2) Except as provided in paragraph (b) of this section, an alternate airport.

(b) Paragraph (a)(2) of this section does not apply if :

(1) Part 97 of this chapter prescribes a standard instrument approach procedure to, or a special instrument approach procedure has been issued by the Administrator to the operator for, the first airport of intended landing; and

(2) Appropriate weather reports or weather forecasts, or a combination of them, indicate the following:

(i) *For aircraft other than helicopters.* For at least 1 hour before and for 1 hour after the estimated time of arrival, the ceiling will be at least 2,000 feet above the airport elevation and the visibility will be at least 3 statute miles.

(ii) *For helicopters.* At the estimated time of arrival and for 1 hour after the estimated time of arrival, the ceiling will be at least 1,000 feet above the airport elevation, or at least 400 feet above the lowest applicable approach minima, whichever is higher, and the visibility will be at least 2 statute miles.

(c) *IFR alternate airport weather minima.* Unless otherwise authorized by the Administrator, no person may include an alternate airport in an IFR flight plan unless appropriate weather reports or weather forecasts, or a combination of them, indicate that, at the estimated time of arrival at the alternate airport, the ceiling and visibility at that airport will be at or above the following weather minima:

(1) If an instrument approach procedure has been published in part 97 of this chapter, or a special instrument approach procedure has been issued by

the Administrator to the operator, for that airport, the following minima:

(i) *For aircraft other than helicopters:* The alternate airport minima specified in that procedure, or if none are specified the following standard approach minima:

(A) *For a precision approach procedure.* Ceiling 600 feet and visibility 2 statute miles.

(B) *For a nonprecision approach procedure.* Ceiling 800 feet and visibility 2 statute miles.

(ii) *For helicopters:* Ceiling 200 feet above the minimum for the approach to be flown, and visibility at least 1 statute mile but never less than the minimum visibility for the approach to be flown, and

(2) If no instrument approach procedure has been published in part 97 of this chapter and no special instrument approach procedure has been issued by the Administrator to the operator, for the alternate airport, the ceiling and visibility minima are those allowing descent from the MEA, approach, and landing under basic VFR.

(d) *Cancellation.* When a flight plan has been activated, the pilot in command, upon canceling or completing the flight under the flight plan, shall notify an FAA Flight Service Station or ATC facility.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–259, 65 FR 3546, Jan. 21, 2000]

### § 91.171 VOR equipment check for IFR operations.

(a) No person may operate a civil aircraft under IFR using the VOR system of radio navigation unless the VOR equipment of that aircraft—

(1) Is maintained, checked, and inspected under an approved procedure; or

(2) Has been operationally checked within the preceding 30 days, and was found to be within the limits of the permissible indicated bearing error set forth in paragraph (b) or (c) of this section.

(b) Except as provided in paragraph (c) of this section, each person conducting a VOR check under paragraph (a)(2) of this section shall—

(1) Use, at the airport of intended departure, an FAA-operated or approved test signal or a test signal radiated by a certificated and appropriately rated radio repair station or, outside the United States, a test signal operated or approved by an appropriate authority to check the VOR equipment (the maximum permissible indicated bearing error is plus or minus 4 degrees); or

(2) Use, at the airport of intended departure, a point on the airport surface designated as a VOR system checkpoint by the Administrator, or, outside the United States, by an appropriate authority (the maximum permissible bearing error is plus or minus 4 degrees);

(3) If neither a test signal nor a designated checkpoint on the surface is available, use an airborne checkpoint designated by the Administrator or, outside the United States, by an appropriate authority (the maximum permissible bearing error is plus or minus 6 degrees); or

(4) If no check signal or point is available, while in flight—

(i) Select a VOR radial that lies along the centerline of an established VOR airway;

(ii) Select a prominent ground point along the selected radial preferably more than 20 nautical miles from the VOR ground facility and maneuver the aircraft directly over the point at a reasonably low altitude; and

(iii) Note the VOR bearing indicated by the receiver when over the ground point (the maximum permissible variation between the published radial and the indicated bearing is 6 degrees).

(c) If dual system VOR (units independent of each other except for the antenna) is installed in the aircraft, the person checking the equipment may check one system against the other in place of the check procedures specified in paragraph (b) of this section. Both systems shall be tuned to the same VOR ground facility and note the indicated bearings to that station. The maximum permissible variation between the two indicated bearings is 4 degrees.

(d) Each person making the VOR operational check, as specified in paragraph (b) or (c) of this section, shall enter the date, place, bearing error, and sign the aircraft log or other

record. In addition, if a test signal radiated by a repair station, as specified in paragraph (b)(1) of this section, is used, an entry must be made in the aircraft log or other record by the repair station certificate holder or the certificate holder's representative certifying to the bearing transmitted by the repair station for the check and the date of transmission.

(Approved by the Office of Management and Budget under control number 2120–0005)

### § 91.173 ATC clearance and flight plan required.

No person may operate an aircraft in controlled airspace under IFR unless that person has—

(a) Filed an IFR flight plan; and

(b) Received an appropriate ATC clearance.

### § 91.175 Takeoff and landing under IFR.

(a) *Instrument approaches to civil airports.* Unless otherwise authorized by the FAA, when it is necessary to use an instrument approach to a civil airport, each person operating an aircraft must use a standard instrument approach procedure prescribed in part 97 of this chapter for that airport. This paragraph does not apply to United States military aircraft.

(b) *Authorized DA/DH or MDA.* For the purpose of this section, when the approach procedure being used provides for and requires the use of a DA/DH or MDA, the authorized DA/DH or MDA is the highest of the following:

(1) The DA/DH or MDA prescribed by the approach procedure.

(2) The DA/DH or MDA prescribed for the pilot in command.

(3) The DA/DH or MDA appropriate for the aircraft equipment available and used during the approach.

(c) *Operation below DA/ DH or MDA.* Except as provided in paragraph (l) of this section, where a DA/DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, below the authorized MDA or continue an approach below the authorized DA/DH unless—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and for operations conducted under part 121 or part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach being used; and

(3) Except for a Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The runway end identifier lights.

(vi) The visual approach slope indicator.

(vii) The touchdown zone or touchdown zone markings.

(viii) The touchdown zone lights.

(ix) The runway or runway markings.

(x) The runway lights.

(d) *Landing.* No pilot operating an aircraft, except a military aircraft of the United States, may land that aircraft when—

(1) For operations conducted under paragraph (l) of this section, the requirements of (l)(4) of this section are not met; or

(2) For all other part 91 operations and parts 121, 125, 129, and 135 operations, the flight visibility is less than the visibility prescribed in the standard instrument approach procedure being used.

(e) *Missed approach procedures.* Each pilot operating an aircraft, except a military aircraft of the United States, shall immediately execute an appropriate missed approach procedure when either of the following conditions exist:

(1) Whenever operating an aircraft pursuant to paragraph (c) or (l) of this section and the requirements of that paragraph are not met at either of the following times:

(i) When the aircraft is being operated below MDA; or

(ii) Upon arrival at the missed approach point, including a DA/DH where a DA/DH is specified and its use is required, and at any time after that until touchdown.

(2) Whenever an identifiable part of the airport is not distinctly visible to the pilot during a circling maneuver at or above MDA, unless the inability to see an identifiable part of the airport results only from a normal bank of the aircraft during the circling approach.

(f) *Civil airport takeoff minimums.* This paragraph applies to persons operating an aircraft under part 121, 125, 129, or 135 of this chapter.

(1) Unless otherwise authorized by the FAA, no pilot may takeoff from a civil airport under IFR unless the weather conditions at time of takeoff are at or above the weather minimums for IFR takeoff prescribed for that airport under part 97 of this chapter.

(2) If takeoff weather minimums are not prescribed under part 97 of this chapter for a particular airport, the following weather minimums apply to takeoffs under IFR:

(i) For aircraft, other than helicopters, having two engines or less—1 statute mile visibility.

(ii) For aircraft having more than two engines—½ statute mile visibility.

(iii) For helicopters—½ statute mile visibility.

(3) Except as provided in paragraph (f)(4) of this section, no pilot may takeoff under IFR from a civil airport having published obstacle departure procedures (ODPs) under part 97 of this chapter for the takeoff runway to be used, unless the pilot uses such ODPs or an alternative procedure or route assigned by air traffic control.

(4) Notwithstanding the requirements of paragraph (f)(3) of this section, no pilot may takeoff from an airport under IFR unless:

(i) For part 121 and part 135 operators, the pilot uses a takeoff obstacle clearance or avoidance procedure that ensures compliance with the applicable airplane performance operating limitations requirements under part 121, subpart I or part 135, subpart I for takeoff at that airport; or

(ii) For part 129 operators, the pilot uses a takeoff obstacle clearance or avoidance procedure that ensures compliance with the airplane performance operating limitations prescribed by the State of the operator for takeoff at that airport.

(g) *Military airports.* Unless otherwise prescribed by the Administrator, each person operating a civil aircraft under IFR into or out of a military airport shall comply with the instrument approach procedures and the takeoff and landing minimum prescribed by the military authority having jurisdiction of that airport.

(h) *Comparable values of RVR and ground visibility.* (1) Except for Category II or Category III minimums, if RVR minimums for takeoff or landing are prescribed in an instrument approach procedure, but RVR is not reported for the runway of intended operation, the RVR minimum shall be converted to ground visibility in accordance with the table in paragraph (h)(2) of this section and shall be the visibility minimum for takeoff or landing on that runway.

(2)

| RVR (feet) | Visibility (statute miles) |
|---|---|
| 1,600 | 1/4 |
| 2,400 | 1/2 |
| 3,200 | 5/8 |
| 4,000 | 3/4 |
| 4,500 | 7/8 |
| 5,000 | 1 |
| 6,000 | 1 1/4 |

(i) *Operations on unpublished routes and use of radar in instrument approach procedures.* When radar is approved at certain locations for ATC purposes, it may be used not only for surveillance and precision radar approaches, as applicable, but also may be used in conjunction with instrument approach procedures predicated on other types of radio navigational aids. Radar vectors may be authorized to provide course guidance through the segments of an approach to the final course or fix. When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, shall, in addition to complying with § 91.177, maintain the last altitude assigned to that pilot until the

aircraft is established on a segment of a published route or instrument approach procedure unless a different altitude is assigned by ATC. After the aircraft is so established, published altitudes apply to descent within each succeeding route or approach segment unless a different altitude is assigned by ATC. Upon reaching the final approach course or fix, the pilot may either complete the instrument approach in accordance with a procedure approved for the facility or continue a surveillance or precision radar approach to a landing.

(j) *Limitation on procedure turns.* In the case of a radar vector to a final approach course or fix, a timed approach from a holding fix, or an approach for which the procedure specifies ''No PT,'' no pilot may make a procedure turn unless cleared to do so by ATC.

(k) *ILS components.* The basic components of an ILS are the localizer, glide slope, and outer marker, and, when installed for use with Category II or Category III instrument approach procedures, an inner marker. The following means may be used to substitute for the outer marker: Compass locator; precision approach radar (PAR) or airport surveillance radar (ASR); DME, VOR, or nondirectional beacon fixes authorized in the standard instrument approach procedure; or a suitable RNAV system in conjunction with a fix identified in the standard instrument approach procedure. Applicability of, and substitution for, the inner marker for a Category II or III approach is determined by the appropriate 14 CFR part 97 approach procedure, letter of authorization, or operations specifications issued to an operator.

(l) *Approach to straight-in landing operations below DH, or MDA using an enhanced flight vision system (EFVS).* For straight-in instrument approach procedures other than Category II or Category III, no pilot operating under this section or §§ 121.651, 125.381, and 135.225 of this chapter may operate an aircraft at any airport below the authorized MDA or continue an approach below the authorized DH and land unless—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and, for operations conducted under part 121 or part 135 of this chapter, the descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The pilot determines that the enhanced flight visibility observed by use of a certified enhanced flight vision system is not less than the visibility prescribed in the standard instrument approach procedure being used;

(3) The following visual references for the intended runway are distinctly visible and identifiable to the pilot using the enhanced flight vision system:

(i) The approach light system (if installed); or

(ii) The following visual references in both paragraphs (l)(3)(ii)(A) and (B) of this section:

(A) The runway threshold, identified by at least one of the following:

(*1*) The beginning of the runway landing surface;

(*2*) The threshold lights; or

(*3*) The runway end identifier lights.

(B) The touchdown zone, identified by at least one of the following:

(*1*) The runway touchdown zone landing surface;

(*2*) The touchdown zone lights;

(*3*) The touchdown zone markings; or

(*4*) The runway lights.

(4) At 100 feet above the touchdown zone elevation of the runway of intended landing and below that altitude, the flight visibility must be sufficient for the following to be distinctly visible and identifiable to the pilot without reliance on the enhanced flight vision system to continue to a landing:

(i) The lights or markings of the threshold; or

(ii) The lights or markings of the touchdown zone;

(5) The pilot(s) is qualified to use an EFVS as follows—

(i) For parts 119 and 125 certificate holders, the applicable training, testing and qualification provisions of parts 121, 125, and 135 of this chapter;

(ii) For foreign persons, in accordance with the requirements of the civil aviation authority of the State of the operator; or

(iii) For persons conducting any other operation, in accordance with the

applicable currency and proficiency requirements of part 61 of this chapter;

(6) For parts 119 and 125 certificate holders, and part 129 operations specifications holders, their operations specifications authorize use of EFVS; and

(7) The aircraft is equipped with, and the pilot uses, an enhanced flight vision system, the display of which is suitable for maneuvering the aircraft and has either an FAA type design approval or, for a foreign-registered aircraft, the EFVS complies with all of the EFVS requirements of this chapter.

(m) For purposes of this section, ''enhanced flight vision system'' (EFVS) is an installed airborne system comprised of the following features and characteristics:

(1) An electronic means to provide a display of the forward external scene topography (the natural or manmade features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors, such as a forward-looking infrared, millimeter wave radiometry, millimeter wave radar, and low-light level image intensifying;

(2) The EFVS sensor imagery and aircraft flight symbology (*i.e.*, at least airspeed, vertical speed, aircraft attitude, heading, altitude, command guidance as appropriate for the approach to be flown, path deviation indications, and flight path vector, and flight path angle reference cue) are presented on a head-up display, or an equivalent display, so that they are clearly visible to the pilot flying in his or her normal position and line of vision and looking forward along the flight path, to include:

(i) The displayed EFVS imagery, attitude symbology, flight path vector, and flight path angle reference cue, and other cues, which are referenced to this imagery and external scene topography, must be presented so that they are aligned with and scaled to the external view; and

(ii) The flight path angle reference cue must be displayed with the pitch scale, selectable by the pilot to the desired descent angle for the approach, and suitable for monitoring the vertical flight path of the aircraft on approaches without vertical guidance; and

(iii) The displayed imagery and aircraft flight symbology do not adversely obscure the pilot's outside view or field of view through the cockpit window;

(3) The EFVS includes the display element, sensors, computers and power supplies, indications, and controls. It may receive inputs from an airborne navigation system or flight guidance system; and

(4) The display characteristics and dynamics are suitable for manual control of the aircraft.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–281, 69 FR 1640, Jan. 9, 2004; Amdt. 91–296, 72 FR 31678, June 7, 2007; Amdt. 91–306, 74 FR 20205, May 1, 2009]

### § 91.177 Minimum altitudes for IFR operations.

(a) *Operation of aircraft at minimum altitudes.* Except when necessary for takeoff or landing, or unless otherwise authorized by the FAA, no person may operate an aircraft under IFR below—

(1) The applicable minimum altitudes prescribed in parts 95 and 97 of this chapter. However, if both a MEA and a MOCA are prescribed for a particular route or route segment, a person may operate an aircraft below the MEA down to, but not below, the MOCA, provided the applicable navigation signals are available. For aircraft using VOR for navigation, this applies only when the aircraft is within 22 nautical miles of that VOR (based on the reasonable estimate by the pilot operating the aircraft of that distance); or

(2) If no applicable minimum altitude is prescribed in parts 95 and 97 of this chapter, then—

(i) In the case of operations over an area designated as a mountainous area in part 95 of this chapter, an altitude of 2,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown; or

(ii) In any other case, an altitude of 1,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown.

(b) *Climb.* Climb to a higher minimum IFR altitude shall begin immediately after passing the point beyond which

that minimum altitude applies, except that when ground obstructions intervene, the point beyond which that higher minimum altitude applies shall be crossed at or above the applicable MCA.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–296, 72 FR 31678, June 7, 2007; Amdt. 91–315, 75 FR 30690, June 2, 2010]

### § 91.179 IFR cruising altitude or flight level.

Unless otherwise authorized by ATC, the following rules apply—

(a) *In controlled airspace.* Each person operating an aircraft under IFR in level cruising flight in controlled airspace shall maintain the altitude or flight level assigned that aircraft by ATC. However, if the ATC clearance assigns ''VFR conditions on-top,'' that person shall maintain an altitude or flight level as prescribed by § 91.159.

(b) *In uncontrolled airspace.* Except while in a holding pattern of 2 minutes or less or while turning, each person operating an aircraft under IFR in level cruising flight in uncontrolled airspace shall maintain an appropriate altitude as follows:

(1) When operating below 18,000 feet MSL and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd thousand foot MSL altitude (such as 3,000, 5,000, or 7,000); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even thousand foot MSL altitude (such as 2,000, 4,000, or 6,000).

(2) When operating at or above 18,000 feet MSL but below flight level 290, and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd flight level (such as 190, 210, or 230); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even flight level (such as 180, 200, or 220).

(3) When operating at flight level 290 and above in non-RVSM airspace, and—

(i) On a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 290 (such as flight level 290, 330, or 370); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 310 (such as flight level 310, 350, or 390).

(4) When operating at flight level 290 and above in airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd flight level, at 2,000-foot intervals beginning at and including flight level 290 (such as flight level 290, 310, 330, 350, 370, 390, 410); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even flight level, at 2000-foot intervals beginning at and including flight level 300 (such as 300, 320, 340, 360, 380, 400).

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–276, 68 FR 61321, Oct. 27, 2003; 68 FR 70133, Dec. 17, 2003; Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.180 Operations within airspace designated as Reduced Vertical Separation Minimum airspace.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft in airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace unless:

(1) The operator and the operator's aircraft comply with the minimum standards of appendix G of this part; and

(2) The operator is authorized by the Administrator or the country of registry to conduct such operations.

(b) The Administrator may authorize a deviation from the requirements of this section.

[Amdt. 91–276, 68 FR 70133, Dec. 17, 2003]

### § 91.181 Course to be flown.

Unless otherwise authorized by ATC, no person may operate an aircraft within controlled airspace under IFR except as follows:

(a) On an ATS route, along the centerline of that airway.

(b) On any other route, along the direct course between the navigational aids or fixes defining that route. However, this section does not prohibit maneuvering the aircraft to pass well clear of other air traffic or the maneuvering of the aircraft in VFR conditions to clear the intended flight path

both before and during climb or descent.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.183 IFR communications.

Unless otherwise authorized by ATC, the pilot in command of each aircraft operated under IFR in controlled airspace must ensure that a continuous watch is maintained on the appropriate frequency and must report the following as soon as possible—

(a) The time and altitude of passing each designated reporting point, or the reporting points specified by ATC, except that while the aircraft is under radar control, only the passing of those reporting points specifically requested by ATC need be reported;

(b) Any unforecast weather conditions encountered; and

(c) Any other information relating to the safety of flight.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.185 IFR operations: Two-way radio communications failure.

(a) *General.* Unless otherwise authorized by ATC, each pilot who has two-way radio communications failure when operating under IFR shall comply with the rules of this section.

(b) *VFR conditions.* If the failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable.

(c) *IFR conditions.* If the failure occurs in IFR conditions, or if paragraph (b) of this section cannot be complied with, each pilot shall continue the flight according to the following:

(1) *Route.* (i) By the route assigned in the last ATC clearance received;

(ii) If being radar vectored, by the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance;

(iii) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or

(iv) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan.

(2) *Altitude.* At the highest of the following altitudes or flight levels for the route segment being flown:

(i) The altitude or flight level assigned in the last ATC clearance received;

(ii) The minimum altitude (converted, if appropriate, to minimum flight level as prescribed in §91.121(c)) for IFR operations; or

(iii) The altitude or flight level ATC has advised may be expected in a further clearance.

(3) *Leave clearance limit.* (i) When the clearance limit is a fix from which an approach begins, commence descent or descent and approach as close as possible to the expect-further-clearance time if one has been received, or if one has not been received, as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

(ii) If the clearance limit is not a fix from which an approach begins, leave the clearance limit at the expect-further-clearance time if one has been received, or if none has been received, upon arrival over the clearance limit, and proceed to a fix from which an approach begins and commence descent or descent and approach as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989; Amdt. 91–211, 54 FR 41211, Oct. 5, 1989]

### § 91.187 Operation under IFR in controlled airspace: Malfunction reports.

(a) The pilot in command of each aircraft operated in controlled airspace under IFR shall report as soon as practical to ATC any malfunctions of navigational, approach, or communication equipment occurring in flight.

(b) In each report required by paragraph (a) of this section, the pilot in command shall include the—

(1) Aircraft identification;

(2) Equipment affected;

(3) Degree to which the capability of the pilot to operate under IFR in the ATC system is impaired; and

(4) Nature and extent of assistance desired from ATC.

### § 91.189 Category II and III operations: General operating rules.

(a) No person may operate a civil aircraft in a Category II or III operation unless—

(1) The flight crew of the aircraft consists of a pilot in command and a second in command who hold the appropriate authorizations and ratings prescribed in § 61.3 of this chapter;

(2) Each flight crewmember has adequate knowledge of, and familiarity with, the aircraft and the procedures to be used; and

(3) The instrument panel in front of the pilot who is controlling the aircraft has appropriate instrumentation for the type of flight control guidance system that is being used.

(b) Unless otherwise authorized by the Administrator, no person may operate a civil aircraft in a Category II or Category III operation unless each ground component required for that operation and the related airborne equipment is installed and operating.

(c) *Authorized DA/DH.* For the purpose of this section, when the approach procedure being used provides for and requires the use of a DA/DH, the authorized DA/DH is the highest of the following:

(1) The DA/DH prescribed by the approach procedure.

(2) The DA/DH prescribed for the pilot in command.

(3) The DA/DH for which the aircraft is equipped.

(d) Unless otherwise authorized by the Administrator, no pilot operating an aircraft in a Category II or Category III approach that provides and requires use of a DA/DH may continue the approach below the authorized decision height unless the following conditions are met:

(1) The aircraft is in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and where that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing.

(2) At least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The touchdown zone or touchdown zone markings.

(vi) The touchdown zone lights.

(e) Unless otherwise authorized by the Administrator, each pilot operating an aircraft shall immediately execute an appropriate missed approach whenever, prior to touchdown, the requirements of paragraph (d) of this section are not met.

(f) No person operating an aircraft using a Category III approach without decision height may land that aircraft except in accordance with the provisions of the letter of authorization issued by the Administrator.

(g) Paragraphs (a) through (f) of this section do not apply to operations conducted by certificate holders operating under part 121, 125, 129, or 135 of this chapter, or holders of management specifications issued in accordance with subpart K of this part. Holders of operations specifications or management specifications may operate a civil aircraft in a Category II or Category III operation only in accordance with their operations specifications or management specifications, as applicable.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003; Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.191 Category II and Category III manual.

(a) Except as provided in paragraph (c) of this section, after August 4, 1997, no person may operate a U.S.-registered civil aircraft in a Category II or a Category III operation unless—

(1) There is available in the aircraft a current and approved Category II or Category III manual, as appropriate, for that aircraft;

(2) The operation is conducted in accordance with the procedures, instructions, and limitations in the appropriate manual; and

(3) The instruments and equipment listed in the manual that are required for a particular Category II or Category III operation have been inspected and maintained in accordance with the maintenance program contained in the manual.

(b) Each operator must keep a current copy of each approved manual at its principal base of operations and must make each manual available for inspection upon request by the Administrator.

(c) This section does not apply to operations conducted by a certificate holder operating under part 121 or part 135 of this chapter or a holder of management specifications issued in accordance with subpart K of this part.

[Doc. No. 26933, 61 FR 34560, July 2, 1996, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003]

### § 91.193 Certificate of authorization for certain Category II operations.

The Administrator may issue a certificate of authorization authorizing deviations from the requirements of §§ 91.189, 91.191, and 91.205(f) for the operation of small aircraft identified as Category A aircraft in § 97.3 of this chapter in Category II operations if the Administrator finds that the proposed operation can be safely conducted under the terms of the certificate. Such authorization does not permit operation of the aircraft carrying persons or property for compensation or hire.

### §§ 91.195–91.199 [Reserved]

## Subpart C—Equipment, Instrument, and Certificate Requirements

SOURCE: Docket No. 18334, 54 FR 34304, Aug. 18, 1989, unless otherwise noted.

### § 91.201 [Reserved]

### § 91.203 Civil aircraft: Certifications required.

(a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under § 21.197(c) of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under § 21.197(c), or an authorization under § 91.611) must have on it the registration number assigned to the aircraft under part 47 of this chapter. However, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only be obtained upon application to an FAA Flight Standards district office.

(2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in § 47.31(c), a Certificate of Aircraft registration as provided in part 48, or a registration certification issued under the laws of a foreign country.

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

(c) No person may operate an aircraft with a fuel tank installed within the passenger compartment or a baggage compartment unless the installation was accomplished pursuant to part 43 of this chapter, and a copy of FAA Form 337 authorizing that installation is on board the aircraft.

(d) No person may operate a civil airplane (domestic or foreign) into or out of an airport in the United States unless it complies with the fuel venting and exhaust emissions requirements of part 34 of this chapter.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–218, 55 FR 32861, Aug. 10, 1990; Amdt. 91–318, 75 FR 41983, July 20, 2010; Amdt. 91–338, 80 FR 78648, Dec. 16, 2015]

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

(a) *General.* Except as provided in paragraphs (c)(3) and (e) of this section, no person may operate a powered civil aircraft with a standard category U.S. airworthiness certificate in any operation described in paragraphs (b) through (f) of this section unless that aircraft contains the instruments and equipment specified in those paragraphs (or FAA-approved equivalents) for that type of operation, and those instruments and items of equipment are in operable condition.

(b) *Visual-flight rules (day).* For VFR flight during the day, the following instruments and equipment are required:

(1) Airspeed indicator.

(2) Altimeter.

(3) Magnetic direction indicator.

(4) Tachometer for each engine.

(5) Oil pressure gauge for each engine using pressure system.

(6) Temperature gauge for each liquid-cooled engine.

(7) Oil temperature gauge for each air-cooled engine.

(8) Manifold pressure gauge for each altitude engine.

(9) Fuel gauge indicating the quantity of fuel in each tank.

(10) Landing gear position indicator, if the aircraft has a retractable landing gear.

(11) For small civil airplanes certificated after March 11, 1996, in accordance with part 23 of this chapter, an approved aviation red or aviation white anticollision light system. In the event of failure of any light of the anticollision light system, operation of the aircraft may continue to a location where repairs or replacement can be made.

(12) If the aircraft is operated for hire over water and beyond power-off gliding distance from shore, approved flotation gear readily available to each occupant and, unless the aircraft is operating under part 121 of this subchapter, at least one pyrotechnic signaling device. As used in this section, ''shore'' means that area of the land adjacent to the water which is above the high water mark and excludes land areas which are intermittently under water.

(13) An approved safety belt with an approved metal-to-metal latching device for each occupant 2 years of age or older.

(14) For small civil airplanes manufactured after July 18, 1978, an approved shoulder harness for each front seat. The shoulder harness must be designed to protect the occupant from serious head injury when the occupant experiences the ultimate inertia forces specified in § 23.561(b)(2) of this chapter. Each shoulder harness installed at a flight crewmember station must permit the crewmember, when seated and with the safety belt and shoulder harness fastened, to perform all functions necessary for flight operations. For purposes of this paragraph—

(i) The date of manufacture of an airplane is the date the inspection acceptance records reflect that the airplane is complete and meets the FAA-approved type design data; and

(ii) A front seat is a seat located at a flight crewmember station or any seat located alongside such a seat.

(15) An emergency locator transmitter, if required by § 91.207.

(16) For normal, utility, and acrobatic category airplanes with a seating configuration, excluding pilot seats, of 9 or less, manufactured after December 12, 1986, a shoulder harness for—

(i) Each front seat that meets the requirements of § 23.785 (g) and (h) of this chapter in effect on December 12, 1985;

(ii) Each additional seat that meets the requirements of § 23.785(g) of this chapter in effect on December 12, 1985.

(17) For rotorcraft manufactured after September 16, 1992, a shoulder harness for each seat that meets the requirements of § 27.2 or § 29.2 of this chapter in effect on September 16, 1991.

(c) *Visual flight rules (night).* For VFR flight at night, the following instruments and equipment are required:

(1) Instruments and equipment specified in paragraph (b) of this section.

(2) Approved position lights.

(3) An approved aviation red or aviation white anticollision light system on all U.S.-registered civil aircraft. Anticollision light systems initially installed after August 11, 1971, on aircraft for which a type certificate was issued

or applied for before August 11, 1971, must at least meet the anticollision light standards of part 23, 25, 27, or 29 of this chapter, as applicable, that were in effect on August 10, 1971, except that the color may be either aviation red or aviation white. In the event of failure of any light of the anticollision light system, operations with the aircraft may be continued to a stop where repairs or replacement can be made.

(4) If the aircraft is operated for hire, one electric landing light.

(5) An adequate source of electrical energy for all installed electrical and radio equipment.

(6) One spare set of fuses, or three spare fuses of each kind required, that are accessible to the pilot in flight.

(d) *Instrument flight rules.* For IFR flight, the following instruments and equipment are required:

(1) Instruments and equipment specified in paragraph (b) of this section, and, for night flight, instruments and equipment specified in paragraph (c) of this section.

(2) Two-way radio communication and navigation equipment suitable for the route to be flown.

(3) Gyroscopic rate-of-turn indicator, except on the following aircraft:

(i) Airplanes with a third attitude instrument system usable through flight attitudes of 360 degrees of pitch and roll and installed in accordance with the instrument requirements prescribed in §121.305(j) of this chapter; and

(ii) Rotorcraft with a third attitude instrument system usable through flight attitudes of ±80 degrees of pitch and ±120 degrees of roll and installed in accordance with §29.1303(g) of this chapter.

(4) Slip-skid indicator.

(5) Sensitive altimeter adjustable for barometric pressure.

(6) A clock displaying hours, minutes, and seconds with a sweep-second pointer or digital presentation.

(7) Generator or alternator of adequate capacity.

(8) Gyroscopic pitch and bank indicator (artificial horizon).

(9) Gyroscopic direction indicator (directional gyro or equivalent).

(e) *Flight at and above 24,000 feet MSL (FL 240).* If VOR navigation equipment is required under paragraph (d)(2) of this section, no person may operate a U.S.-registered civil aircraft within the 50 states and the District of Columbia at or above FL 240 unless that aircraft is equipped with approved DME or a suitable RNAV system. When the DME or RNAV system required by this paragraph fails at and above FL 240, the pilot in command of the aircraft must notify ATC immediately, and then may continue operations at and above FL 240 to the next airport of intended landing where repairs or replacement of the equipment can be made.

(f) *Category II operations.* The requirements for Category II operations are the instruments and equipment specified in—

(1) Paragraph (d) of this section; and

(2) Appendix A to this part.

(g) *Category III operations.* The instruments and equipment required for Category III operations are specified in paragraph (d) of this section.

(h) *Night vision goggle operations.* For night vision goggle operations, the following instruments and equipment must be installed in the aircraft, functioning in a normal manner, and approved for use by the FAA:

(1) Instruments and equipment specified in paragraph (b) of this section, instruments and equipment specified in paragraph (c) of this section;

(2) Night vision goggles;

(3) Interior and exterior aircraft lighting system required for night vision goggle operations;

(4) Two-way radio communications system;

(5) Gyroscopic pitch and bank indicator (artificial horizon);

(6) Generator or alternator of adequate capacity for the required instruments and equipment; and

(7) Radar altimeter.

(i) *Exclusions.* Paragraphs (f) and (g) of this section do not apply to operations conducted by a holder of a certificate issued under part 121 or part 135 of this chapter.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–220, 55 FR 43310, Oct. 26, 1990; Amdt. 91–223, 56 FR 41052, Aug. 16, 1991; Amdt. 91–231, 57 FR 42672, Sept. 15, 1992; Amdt. 91–248, 61 FR 5171, Feb. 9, 1996; Amdt. 91–251, 61 FR 34560, July 2, 1996; Amdt. 91–285, 69 FR 77599, Dec. 27, 2004; Amdt. 91–296, 72 FR 31679, June 7, 2007; Amdt. 91–309, 74 FR 42563, Aug. 21, 2009]

### § 91.207 Emergency locator transmitters.

(a) Except as provided in paragraphs (e) and (f) of this section, no person may operate a U.S.-registered civil airplane unless—

(1) There is attached to the airplane an approved automatic type emergency locator transmitter that is in operable condition for the following operations, except that after June 21, 1995, an emergency locator transmitter that meets the requirements of TSO-C91 may not be used for new installations:

(i) Those operations governed by the supplemental air carrier and commercial operator rules of parts 121 and 125;

(ii) Charter flights governed by the domestic and flag air carrier rules of part 121 of this chapter; and

(iii) Operations governed by part 135 of this chapter; or

(2) For operations other than those specified in paragraph (a)(1) of this section, there must be attached to the airplane an approved personal type or an approved automatic type emergency locator transmitter that is in operable condition, except that after June 21, 1995, an emergency locator transmitter that meets the requirements of TSO-C91 may not be used for new installations.

(b) Each emergency locator transmitter required by paragraph (a) of this section must be attached to the airplane in such a manner that the probability of damage to the transmitter in the event of crash impact is minimized. Fixed and deployable automatic type transmitters must be attached to the airplane as far aft as practicable.

(c) Batteries used in the emergency locator transmitters required by paragraphs (a) and (b) of this section must be replaced (or recharged, if the batteries are rechargeable)—

(1) When the transmitter has been in use for more than 1 cumulative hour; or

(2) When 50 percent of their useful life (or, for rechargeable batteries, 50 percent of their useful life of charge) has expired, as established by the transmitter manufacturer under its approval.

The new expiration date for replacing (or recharging) the battery must be legibly marked on the outside of the transmitter and entered in the aircraft maintenance record. Paragraph (c)(2) of this section does not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

(d) Each emergency locator transmitter required by paragraph (a) of this section must be inspected within 12 calendar months after the last inspection for—

(1) Proper installation;

(2) Battery corrosion;

(3) Operation of the controls and crash sensor; and

(4) The presence of a sufficient signal radiated from its antenna.

(e) Notwithstanding paragraph (a) of this section, a person may—

(1) Ferry a newly acquired airplane from the place where possession of it was taken to a place where the emergency locator transmitter is to be installed; and

(2) Ferry an airplane with an inoperative emergency locator transmitter from a place where repairs or replacements cannot be made to a place where they can be made.

No person other than required crewmembers may be carried aboard an airplane being ferried under paragraph (e) of this section.

(f) Paragraph (a) of this section does not apply to—

(1) Before January 1, 2004, turbojet-powered aircraft;

(2) Aircraft while engaged in scheduled flights by scheduled air carriers;

(3) Aircraft while engaged in training operations conducted entirely within a 50-nautical mile radius of the airport from which such local flight operations began;

(4) Aircraft while engaged in flight operations incident to design and testing;

(5) New aircraft while engaged in flight operations incident to their manufacture, preparation, and delivery;

(6) Aircraft while engaged in flight operations incident to the aerial application of chemicals and other substances for agricultural purposes;

(7) Aircraft certificated by the Administrator for research and development purposes;

(8) Aircraft while used for showing compliance with regulations, crew training, exhibition, air racing, or market surveys;

(9) Aircraft equipped to carry not more than one person.

(10) An aircraft during any period for which the transmitter has been temporarily removed for inspection, repair, modification, or replacement, subject to the following:

(i) No person may operate the aircraft unless the aircraft records contain an entry which includes the date of initial removal, the make, model, serial number, and reason for removing the transmitter, and a placard located in view of the pilot to show ''ELT not installed.''

(ii) No person may operate the aircraft more than 90 days after the ELT is initially removed from the aircraft; and

(11) On and after January 1, 2004, aircraft with a maximum payload capacity of more than 18,000 pounds when used in air transportation.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–242, 59 FR 32057, June 21, 1994; 59 FR 34578, July 6, 1994; Amdt. 91–265, 65 FR 81319, Dec. 22, 2000; 66 FR 16316, Mar. 23, 2001]

### § 91.209 Aircraft lights.

No person may:

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

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

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

(i) Is clearly illuminated;

(ii) Has lighted position lights; or

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

(3) Anchor an aircraft unless the aircraft—

(i) Has lighted anchor lights; or

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

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

[Doc. No. 27806, 61 FR 5171, Feb. 9, 1996]

### § 91.211 Supplemental oxygen.

(a) *General.* No person may operate a civil aircraft of U.S. registry—

(1) At cabin pressure altitudes above 12,500 feet (MSL) up to and including 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen for that part of the flight at those altitudes that is of more than 30 minutes duration;

(2) At cabin pressure altitudes above 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen during the entire flight time at those altitudes; and

(3) At cabin pressure altitudes above 15,000 feet (MSL) unless each occupant of the aircraft is provided with supplemental oxygen.

(b) *Pressurized cabin aircraft.* (1) No person may operate a civil aircraft of U.S. registry with a pressurized cabin—

(i) At flight altitudes above flight level 250 unless at least a 10-minute supply of supplemental oxygen, in addition to any oxygen required to satisfy paragraph (a) of this section, is available for each occupant of the aircraft for use in the event that a descent is necessitated by loss of cabin pressurization; and

(ii) At flight altitudes above flight level 350 unless one pilot at the controls of the airplane is wearing and using an oxygen mask that is secured

and sealed and that either supplies oxygen at all times or automatically supplies oxygen whenever the cabin pressure altitude of the airplane exceeds 14,000 feet (MSL), except that the one pilot need not wear and use an oxygen mask while at or below flight level 410 if there are two pilots at the controls and each pilot has a quick-donning type of oxygen mask that can be placed on the face with one hand from the ready position within 5 seconds, supplying oxygen and properly secured and sealed.

(2) Notwithstanding paragraph (b)(1)(ii) of this section, if for any reason at any time it is necessary for one pilot to leave the controls of the aircraft when operating at flight altitudes above flight level 350, the remaining pilot at the controls shall put on and use an oxygen mask until the other pilot has returned to that crewmember's station.

### § 91.213 Inoperative instruments and equipment.

(a) Except as provided in paragraph (d) of this section, no person may take off an aircraft with inoperative instruments or equipment installed unless the following conditions are met:

(1) An approved Minimum Equipment List exists for that aircraft.

(2) The aircraft has within it a letter of authorization, issued by the FAA Flight Standards district office having jurisdiction over the area in which the operator is located, authorizing operation of the aircraft under the Minimum Equipment List. The letter of authorization may be obtained by written request of the airworthiness certificate holder. The Minimum Equipment List and the letter of authorization constitute a supplemental type certificate for the aircraft.

(3) The approved Minimum Equipment List must—

(i) Be prepared in accordance with the limitations specified in paragraph (b) of this section; and

(ii) Provide for the operation of the aircraft with the instruments and equipment in an inoperable condition.

(4) The aircraft records available to the pilot must include an entry describing the inoperable instruments and equipment.

(5) The aircraft is operated under all applicable conditions and limitations contained in the Minimum Equipment List and the letter authorizing the use of the list.

(b) The following instruments and equipment may not be included in a Minimum Equipment List:

(1) Instruments and equipment that are either specifically or otherwise required by the airworthiness requirements under which the aircraft is type certificated and which are essential for safe operations under all operating conditions.

(2) Instruments and equipment required by an airworthiness directive to be in operable condition unless the airworthiness directive provides otherwise.

(3) Instruments and equipment required for specific operations by this part.

(c) A person authorized to use an approved Minimum Equipment List issued for a specific aircraft under subpart K of this part, part 121, 125, or 135 of this chapter must use that Minimum Equipment List to comply with the requirements in this section.

(d) Except for operations conducted in accordance with paragraph (a) or (c) of this section, a person may takeoff an aircraft in operations conducted under this part with inoperative instruments and equipment without an approved Minimum Equipment List provided—

(1) The flight operation is conducted in a—

(i) Rotorcraft, non-turbine-powered airplane, glider, lighter-than-air aircraft, powered parachute, or weight-shift-control aircraft, for which a master minimum equipment list has not been developed; or

(ii) Small rotorcraft, nonturbine-powered small airplane, glider, or lighter-than-air aircraft for which a Master Minimum Equipment List has been developed; and

(2) The inoperative instruments and equipment are not—

(i) Part of the VFR-day type certification instruments and equipment prescribed in the applicable airworthiness regulations under which the aircraft was type certificated;

(ii) Indicated as required on the aircraft's equipment list, or on the Kinds

of Operations Equipment List for the kind of flight operation being conducted;

(iii) Required by § 91.205 or any other rule of this part for the specific kind of flight operation being conducted; or

(iv) Required to be operational by an airworthiness directive; and

(3) The inoperative instruments and equipment are—

(i) Removed from the aircraft, the cockpit control placarded, and the maintenance recorded in accordance with § 43.9 of this chapter; or

(ii) Deactivated and placarded ''Inoperative.'' If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with part 43 of this chapter; and

(4) A determination is made by a pilot, who is certificated and appropriately rated under part 61 of this chapter, or by a person, who is certificated and appropriately rated to perform maintenance on the aircraft, that the inoperative instrument or equipment does not constitute a hazard to the aircraft.

An aircraft with inoperative instruments or equipment as provided in paragraph (d) of this section is considered to be in a properly altered condition acceptable to the Administrator.

(e) Notwithstanding any other provision of this section, an aircraft with inoperable instruments or equipment may be operated under a special flight permit issued in accordance with §§ 21.197 and 21.199 of this chapter.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003; Amdt. 91–282, 69 FR 44880, July 27, 2004]

### § 91.215 ATC transponder and altitude reporting equipment and use.

(a) *All airspace: U.S.-registered civil aircraft.* For operations not conducted under part 121 or 135 of this chapter, ATC transponder equipment installed must meet the performance and environmental requirements of any class of TSO-C74b (Mode A) or any class of TSO-C74c (Mode A with altitude reporting capability) as appropriate, or the appropriate class of TSO-C112 (Mode S).

(b) *All airspace.* Unless otherwise authorized or directed by ATC, no person may operate an aircraft in the airspace described in paragraphs (b)(1) through (b)(5) of this section, unless that aircraft is equipped with an operable coded radar beacon transponder having either Mode 3/A 4096 code capability, replying to Mode 3/A interrogations with the code specified by ATC, or a Mode S capability, replying to Mode 3/A interrogations with the code specified by ATC and intermode and Mode S interrogations in accordance with the applicable provisions specified in TSO C–112, and that aircraft is equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments. This requirement applies—

(1) *All aircraft.* In Class A, Class B, and Class C airspace areas;

(2) *All aircraft.* In all airspace within 30 nautical miles of an airport listed in appendix D, section 1 of this part from the surface upward to 10,000 feet MSL;

(3) Notwithstanding paragraph (b)(2) of this section, any aircraft which was not originally certificated with an engine-driven electrical system or which has not subsequently been certified with such a system installed, balloon or glider may conduct operations in the airspace within 30 nautical miles of an airport listed in appendix D, section 1 of this part provided such operations are conducted—

(i) Outside any Class A, Class B, or Class C airspace area; and

(ii) Below the altitude of the ceiling of a Class B or Class C airspace area designated for an airport or 10,000 feet MSL, whichever is lower; and

(4) All aircraft in all airspace above the ceiling and within the lateral boundaries of a Class B or Class C airspace area designated for an airport upward to 10,000 feet MSL; and

(5) All aircraft except any aircraft which was not originally certificated with an engine-driven electrical system or which has not subsequently been certified with such a system installed, balloon, or glider—

(i) In all airspace of the 48 contiguous states and the District of Columbia at and above 10,000 feet MSL, excluding

the airspace at and below 2,500 feet above the surface; and

(ii) In the airspace from the surface to 10,000 feet MSL within a 10-nautical-mile radius of any airport listed in appendix D, section 2 of this part, excluding the airspace below 1,200 feet outside of the lateral boundaries of the surface area of the airspace designated for that airport.

(c) *Transponder-on operation.* While in the airspace as specified in paragraph (b) of this section or in all controlled airspace, each person operating an aircraft equipped with an operable ATC transponder maintained in accordance with §91.413 of this part shall operate the transponder, including Mode C equipment if installed, and shall reply on the appropriate code or as assigned by ATC.

(d) *ATC authorized deviations.* Requests for ATC authorized deviations must be made to the ATC facility having jurisdiction over the concerned airspace within the time periods specified as follows:

(1) For operation of an aircraft with an operating transponder but without operating automatic pressure altitude reporting equipment having a Mode C capability, the request may be made at any time.

(2) For operation of an aircraft with an inoperative transponder to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time.

(3) For operation of an aircraft that is not equipped with a transponder, the request must be made at least one hour before the proposed operation.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–221, 56 FR 469, Jan. 4, 1991; Amdt. 91–227, 56 FR 65660, Dec. 17, 1991; Amdt. 91–227, 7 FR 328, Jan. 3, 1992; Amdt. 91–229, 57 FR 34618, Aug. 5, 1992; Amdt. 91–267, 66 FR 21066, Apr. 27, 2001]

### §91.217 Data correspondence between automatically reported pressure altitude data and the pilot's altitude reference.

(a) No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder—

(1) When deactivation of that equipment is directed by ATC;

(2) Unless, as installed, that equipment was tested and calibrated to transmit altitude data corresponding within 125 feet (on a 95 percent probability basis) of the indicated or calibrated datum of the altimeter normally used to maintain flight altitude, with that altimeter referenced to 29.92 inches of mercury for altitudes from sea level to the maximum operating altitude of the aircraft; or

(3) Unless the altimeters and digitizers in that equipment meet the standards of TSO-C10b and TSO-C88, respectively.

(b) No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder or with ADS–B Out equipment unless the pressure altitude reported for ADS–B Out and Mode C/S is derived from the same source for aircraft equipped with both a transponder and ADS–B Out.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–314, 75 FR 30193, May 28, 2010]

### §91.219 Altitude alerting system or device: Turbojet-powered civil airplanes.

(a) Except as provided in paragraph (d) of this section, no person may operate a turbojet-powered U.S.-registered civil airplane unless that airplane is equipped with an approved altitude alerting system or device that is in operable condition and meets the requirements of paragraph (b) of this section.

(b) Each altitude alerting system or device required by paragraph (a) of this section must be able to—

(1) Alert the pilot—

(i) Upon approaching a preselected altitude in either ascent or descent, by a sequence of both aural and visual signals in sufficient time to establish level flight at that preselected altitude; or

(ii) Upon approaching a preselected altitude in either ascent or descent, by a sequence of visual signals in sufficient time to establish level flight at that preselected altitude, and when deviating above and below that

preselected altitude, by an aural signal;

(2) Provide the required signals from sea level to the highest operating altitude approved for the airplane in which it is installed;

(3) Preselect altitudes in increments that are commensurate with the altitudes at which the aircraft is operated;

(4) Be tested without special equipment to determine proper operation of the alerting signals; and

(5) Accept necessary barometric pressure settings if the system or device operates on barometric pressure. However, for operation below 3,000 feet AGL, the system or device need only provide one signal, either visual or aural, to comply with this paragraph. A radio altimeter may be included to provide the signal if the operator has an approved procedure for its use to determine DA/DH or MDA, as appropriate.

(c) Each operator to which this section applies must establish and assign procedures for the use of the altitude alerting system or device and each flight crewmember must comply with those procedures assigned to him.

(d) Paragraph (a) of this section does not apply to any operation of an airplane that has an experimental certificate or to the operation of any airplane for the following purposes:

(1) Ferrying a newly acquired airplane from the place where possession of it was taken to a place where the altitude alerting system or device is to be installed.

(2) Continuing a flight as originally planned, if the altitude alerting system or device becomes inoperative after the airplane has taken off; however, the flight may not depart from a place where repair or replacement can be made.

(3) Ferrying an airplane with any inoperative altitude alerting system or device from a place where repairs or replacements cannot be made to a place where it can be made.

(4) Conducting an airworthiness flight test of the airplane.

(5) Ferrying an airplane to a place outside the United States for the purpose of registering it in a foreign country.

(6) Conducting a sales demonstration of the operation of the airplane.

(7) Training foreign flight crews in the operation of the airplane before ferrying it to a place outside the United States for the purpose of registering it in a foreign country.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.221 Traffic alert and collision avoidance system equipment and use.

(a) *All airspace: U.S.-registered civil aircraft.* Any traffic alert and collision avoidance system installed in a U.S.-registered civil aircraft must be approved by the Administrator.

(b) *Traffic alert and collision avoidance system, operation required.* Each person operating an aircraft equipped with an operable traffic alert and collision avoidance system shall have that system on and operating.

### § 91.223 Terrain awareness and warning system.

(a) *Airplanes manufactured after March 29, 2002.* Except as provided in paragraph (d) of this section, no person may operate a turbine-powered U.S.-registered airplane configured with six or more passenger seats, excluding any pilot seat, unless that airplane is equipped with an approved terrain awareness and warning system that as a minimum meets the requirements for Class B equipment in Technical Standard Order (TSO)–C151.

(b) *Airplanes manufactured on or before March 29, 2002.* Except as provided in paragraph (d) of this section, no person may operate a turbine-powered U.S.-registered airplane configured with six or more passenger seats, excluding any pilot seat, after March 29, 2005, unless that airplane is equipped with an approved terrain awareness and warning system that as a minimum meets the requirements for Class B equipment in Technical Standard Order (TSO)–C151.

(Approved by the Office of Management and Budget under control number 2120–0631)

(c) *Airplane Flight Manual.* The Airplane Flight Manual shall contain appropriate procedures for—

(1) The use of the terrain awareness and warning system; and

(2) Proper flight crew reaction in response to the terrain awareness and warning system audio and visual warnings.

(d) *Exceptions.* Paragraphs (a) and (b) of this section do not apply to—

(1) Parachuting operations when conducted entirely within a 50 nautical mile radius of the airport from which such local flight operations began.

(2) Firefighting operations.

(3) Flight operations when incident to the aerial application of chemicals and other substances.

[Doc. No. 29312, 65 FR 16755, Mar. 29, 2000]

### § 91.225 Automatic Dependent Surveillance-Broadcast (ADS–B) Out equipment and use.

(a) After January 1, 2020, and unless otherwise authorized by ATC, no person may operate an aircraft in Class A airspace unless the aircraft has equipment installed that—

(1) Meets the performance requirements in TSO–C166b, Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS–B) and Traffic Information Service-Broadcast (TIS–B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz); and

(2) Meets the requirements of § 91.227.

(b) After January 1, 2020, and unless otherwise authorized by ATC, no person may operate an aircraft below 18,000 feet MSL and in airspace described in paragraph (d) of this section unless the aircraft has equipment installed that—

(1) Meets the performance requirements in—

(i) TSO–C166b; or

(ii) TSO–C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS–B) Equipment Operating on the Frequency of 978 MHz;

(2) Meets the requirements of § 91.227.

(c) Operators with equipment installed with an approved deviation under § 21.618 of this chapter also are in compliance with this section.

(d) After January 1, 2020, and unless otherwise authorized by ATC, no person may operate an aircraft in the following airspace unless the aircraft has equipment installed that meets the requirements in paragraph (b) of this section:

(1) Class B and Class C airspace areas;

(2) Except as provided for in paragraph (e) of this section, within 30 nautical miles of an airport listed in appendix D, section 1 to this part from the surface upward to 10,000 feet MSL;

(3) Above the ceiling and within the lateral boundaries of a Class B or Class C airspace area designated for an airport upward to 10,000 feet MSL;

(4) Except as provided in paragraph (e) of this section, Class E airspace within the 48 contiguous states and the District of Columbia at and above 10,000 feet MSL, excluding the airspace at and below 2,500 feet above the surface; and

(5) Class E airspace at and above 3,000 feet MSL over the Gulf of Mexico from the coastline of the United States out to 12 nautical miles.

(e) The requirements of paragraph (b) of this section do not apply to any aircraft that was not originally certificated with an electrical system, or that has not subsequently been certified with such a system installed, including balloons and gliders. These aircraft may conduct operations without ADS–B Out in the airspace specified in paragraphs (d)(2) and (d)(4) of this section. Operations authorized by this section must be conducted—

(1) Outside any Class B or Class C airspace area; and

(2) Below the altitude of the ceiling of a Class B or Class C airspace area designated for an airport, or 10,000 feet MSL, whichever is lower.

(f) Each person operating an aircraft equipped with ADS–B Out must operate this equipment in the transmit mode at all times.

(g) Requests for ATC authorized deviations from the requirements of this section must be made to the ATC facility having jurisdiction over the concerned airspace within the time periods specified as follows:

(1) For operation of an aircraft with an inoperative ADS–B Out, to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time.

(2) For operation of an aircraft that is not equipped with ADS–B Out, the request must be made at least 1 hour before the proposed operation.

(h) The standards required in this section are incorporated by reference with the approval of the Director of the Office of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved materials are available for inspection at the FAA's Office of Rulemaking (ARM–1), 800 Independence Avenue, SW., Washington, DC 20590 (telephone 202–267–9677), or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. This material is also available from the sources indicated in paragraphs (h)(1) and (h)(2) of this section.

(1) Copies of Technical Standard Order (TSO)–C166b, Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS–B) and Traffic Information Service-Broadcast (TIS–B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz) (December 2, 2009) and TSO–C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS–B) Equipment Operating on the Frequency of 978 MHz (December 2, 2009) may be obtained from the U.S. Department of Transportation, Subsequent Distribution Office, DOT Warehouse M30, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785; telephone (301) 322–5377. Copies of TSO –C166B and TSO–C154c are also available on the FAA's Web site, at *http://www.faa.gov/aircraft/air_cert/design_approvals/tso/*. Select the link ''Search Technical Standard Orders.''

(2) Copies of Section 2, Equipment Performance Requirements and Test Procedures, of RTCA DO–260B, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS–B) and Traffic Information Services-Broadcast (TIS–B), December 2, 2009 (referenced in TSO–C166b) and Section 2, Equipment Performance Requirements and Test Procedures, of RTCA DO–282B, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS–B), December 2, 2009 (referenced in TSO C–154c) may be obtained from RTCA, Inc., 1828 L Street, NW., Suite 805, Washington, DC 20036–5133, telephone 202–833–9339. Copies of RTCA DO–260B and RTCA DO–282B are also available on RTCA Inc.'s Web site, at *http://www.rtca.org/onlinecart/allproducts.cfm*.

[Doc. No. FAA–2007–29305, 75 FR 30193, May 28, 2010; Amdt. 91–314–A, 75 FR 37712, June 30, 2010; Amdt. 91–316, 75 FR 37712, June 30, 2010; Amdt. 91–336, 80 FR 6900, Feb. 9, 2015; Amdt. 91–336A, 80 FR 11537, Mar. 4, 2015]

### § 91.227 Automatic Dependent Surveillance-Broadcast (ADS–B) Out equipment performance requirements.

(a) *Definitions.* For the purposes of this section:

*ADS–B Out* is a function of an aircraft's onboard avionics that periodically broadcasts the aircraft's state vector (3-dimensional position and 3-dimensional velocity) and other required information as described in this section.

*Navigation Accuracy Category for Position* ($NAC_P$) specifies the accuracy of a reported aircraft's position, as defined in TSO–C166b and TSO–C154c.

*Navigation Accuracy Category for Velocity* ($NAC_V$) specifies the accuracy of a reported aircraft's velocity, as defined in TSO–C166b and TSO–C154c.

*Navigation Integrity Category (NIC)* specifies an integrity containment radius around an aircraft's reported position, as defined in TSO–C166b and TSO–C154c.

*Position Source* refers to the equipment installed onboard an aircraft used to process and provide aircraft position (for example, latitude, longitude, and velocity) information.

*Source Integrity Level (SIL)* indicates the probability of the reported horizontal position exceeding the containment radius defined by the NIC on a per sample or per hour basis, as defined in TSO–C166b and TSO–C154c.

*System Design Assurance (SDA)* indicates the probability of an aircraft malfunction causing false or misleading information to be transmitted,

as defined in TSO–C166b and TSO–C154c.

*Total latency* is the total time between when the position is measured and when the position is transmitted by the aircraft.

*Uncompensated latency* is the time for which the aircraft does not compensate for latency.

(b) *1090 MHz ES and UAT Broadcast Links and Power Requirements*—

(1) Aircraft operating in Class A airspace must have equipment installed that meets the antenna and power output requirements of Class A1, A1S, A2, A3, B1S, or B1 equipment as defined in TSO–C166b, Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS–B) and Traffic Information Service-Broadcast (TIS–B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz).

(2) Aircraft operating in airspace designated for ADS–B Out, but outside of Class A airspace, must have equipment installed that meets the antenna and output power requirements of either:

(i) Class A1, A1S, A2, A3, B1S, or B1 as defined in TSO–C166b; or

(ii) Class A1H, A1S, A2, A3, B1S, or B1 equipment as defined in TSO–C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance–Broadcast (ADS–B) Equipment Operating on the Frequency of 978 MHz.

(c) *ADS–B Out Performance Requirements for NAC $_P$, NAC$_V$, NIC, SDA, and SIL*—

(1) For aircraft broadcasting ADS–B Out as required under §91.225 (a) and (b)—

(i) The aircraft's $NAC_P$ must be less than 0.05 nautical miles;

(ii) The aircraft's $NAC_V$ must be less than 10 meters per second;

(iii) The aircraft's NIC must be less than 0.2 nautical miles;

(iv) The aircraft's SDA must be 2; and

(v) The aircraft's SIL must be 3.

(2) Changes in $NAC_P$, $NAC_V$, SDA, and SIL must be broadcast within 10 seconds.

(3) Changes in NIC must be broadcast within 12 seconds.

(d) *Minimum Broadcast Message Element Set for ADS–B Out.* Each aircraft must broadcast the following information, as defined in TSO–C166b or TSO–C154c. The pilot must enter information for message elements listed in paragraphs (d)(7) through (d)(10) of this section during the appropriate phase of flight.

(1) The length and width of the aircraft;

(2) An indication of the aircraft's latitude and longitude;

(3) An indication of the aircraft's barometric pressure altitude;

(4) An indication of the aircraft's velocity;

(5) An indication if TCAS II or ACAS is installed and operating in a mode that can generate resolution advisory alerts;

(6) If an operable TCAS II or ACAS is installed, an indication if a resolution advisory is in effect;

(7) An indication of the Mode 3/A transponder code specified by ATC;

(8) An indication of the aircraft's call sign that is submitted on the flight plan, or the aircraft's registration number, except when the pilot has not filed a flight plan, has not requested ATC services, and is using a TSO–C154c self-assigned temporary 24-bit address;

(9) An indication if the flightcrew has identified an emergency, radio communication failure, or unlawful interference;

(10) An indication of the aircraft's ''IDENT'' to ATC;

(11) An indication of the aircraft assigned ICAO 24-bit address, except when the pilot has not filed a flight plan, has not requested ATC services, and is using a TSO–C154c self-assigned temporary 24-bit address;

(12) An indication of the aircraft's emitter category;

(13) An indication of whether an ADS–B In capability is installed;

(14) An indication of the aircraft's geometric altitude;

(15) An indication of the Navigation Accuracy Category for Position ($NAC_P$);

(16) An indication of the Navigation Accuracy Category for Velocity ($NAC_V$);

(17) An indication of the Navigation Integrity Category (NIC);

(18) An indication of the System Design Assurance (SDA); and

(19) An indication of the Source Integrity Level (SIL).

(e) *ADS–B Latency Requirements*—

(1) The aircraft must transmit its geometric position no later than 2.0 seconds from the time of measurement of the position to the time of transmission.

(2) Within the 2.0 total latency allocation, a maximum of 0.6 seconds can be uncompensated latency. The aircraft must compensate for any latency above 0.6 seconds up to the maximum 2.0 seconds total by extrapolating the geometric position to the time of message transmission.

(3) The aircraft must transmit its position and velocity at least once per second while airborne or while moving on the airport surface.

(4) The aircraft must transmit its position at least once every 5 seconds while stationary on the airport surface.

(f) *Equipment with an approved deviation*. Operators with equipment installed with an approved deviation under § 21.618 of this chapter also are in compliance with this section.

(g) *Incorporation by Reference*. The standards required in this section are incorporated by reference with the approval of the Director of the Office of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved materials are available for inspection at the FAA's Office of Rulemaking (ARM–1), 800 Independence Avenue, SW., Washington, DC 20590 (telephone 202–267–9677), or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. This material is also available from the sources indicated in paragraphs (g)(1) and (g)(2) of this section.

(1) Copies of Technical Standard Order (TSO)–C166b, Extended Squitter Automatic Dependent Surveillance–Broadcast (ADS–B) and Traffic Information Service–Broadcast (TIS–B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz) (December 2, 2009) and TSO–C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance–Broadcast (ADS–B) Equipment Operating on the Frequency of 978 MHz (December 2, 2009) may be obtained from the U.S. Department of Transportation, Subsequent Distribution Office, DOT Warehouse M30, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785; telephone (301) 322–5377. Copies of TSO –C166B and TSO–C154c are also available on the FAA's Web site, at *http://www.faa.gov/aircraft/air_cert/design_approvals/tso/*. Select the link ''Search Technical Standard Orders.''

(2) Copies of Section 2, Equipment Performance Requirements and Test Procedures, of RTCA DO–260B, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS–B) and Traffic Information Services-Broadcast (TIS–B), December 2, 2009 (referenced in TSO–C166b) and Section 2, Equipment Performance Requirements and Test Procedures, of RTCA DO–282B, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS–B), December 2, 2009 (referenced in TSO C–154c) may be obtained from RTCA, Inc., 1828 L Street, NW., Suite 805, Washington, DC 20036–5133, telephone 202–833–9339. Copies of RTCA DO–260B and RTCA DO–282B are also available on RTCA Inc.'s Web site, at *http://www.rtca.org/onlinecart/allproducts.cfm*.

[Doc. No. FAA–2007–29305, 75 FR 30194, May 28, 2010; Amdt. 91–314–A, 75 FR 37712, June 30, 2010; Amdt. 91–316, 75 FR 37712, June 30, 2010]

**§§ 91.228–91.299 [Reserved]**

## Subpart D—Special Flight Operations

SOURCE: Docket No. 18334, 54 FR 34308, Aug. 18, 1989, unless otherwise noted.

**§ 91.301 [Reserved]**

**§ 91.303 Aerobatic flight.**

No person may operate an aircraft in aerobatic flight—

(a) Over any congested area of a city, town, or settlement;

(b) Over an open air assembly of persons;

(c) Within the lateral boundaries of the surface areas of Class B, Class C,

Class D, or Class E airspace designated for an airport;

(d) Within 4 nautical miles of the center line of any Federal airway;

(e) Below an altitude of 1,500 feet above the surface; or

(f) When flight visibility is less than 3 statute miles.

For the purposes of this section, aerobatic flight means an intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.

[Doc. No. 18834, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–227, 56 FR 65661, Dec. 17, 1991]

### § 91.305 Flight test areas.

No person may flight test an aircraft except over open water, or sparsely populated areas, having light air traffic.

### § 91.307 Parachutes and parachuting.

(a) No pilot of a civil aircraft may allow a parachute that is available for emergency use to be carried in that aircraft unless it is an approved type and has been packed by a certificated and appropriately rated parachute rigger—

(1) Within the preceding 180 days, if its canopy, shrouds, and harness are composed exclusively of nylon, rayon, or other similar synthetic fiber or materials that are substantially resistant to damage from mold, mildew, or other fungi and other rotting agents propagated in a moist environment; or

(2) Within the preceding 60 days, if any part of the parachute is composed of silk, pongee, or other natural fiber or materials not specified in paragraph (a)(1) of this section.

(b) Except in an emergency, no pilot in command may allow, and no person may conduct, a parachute operation from an aircraft within the United States except in accordance with part 105 of this chapter.

(c) Unless each occupant of the aircraft is wearing an approved parachute, no pilot of a civil aircraft carrying any person (other than a crewmember) may execute any intentional maneuver that exceeds—

(1) A bank of 60 degrees relative to the horizon; or

(2) A nose-up or nose-down attitude of 30 degrees relative to the horizon.

(d) Paragraph (c) of this section does not apply to—

(1) Flight tests for pilot certification or rating; or

(2) Spins and other flight maneuvers required by the regulations for any certificate or rating when given by—

(i) A certificated flight instructor; or

(ii) An airline transport pilot instructing in accordance with § 61.67 of this chapter.

(e) For the purposes of this section, *approved parachute* means—

(1) A parachute manufactured under a type certificate or a technical standard order (C–23 series); or

(2) A personnel-carrying military parachute identified by an NAF, AAF, or AN drawing number, an AAF order number, or any other military designation or specification number.

[Doc. No. 18334, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–255, 62 FR 68137, Dec. 30, 1997; Amdt. 91–268, 66 FR 23553, May 9, 2001; Amdt. 91–305, 73 FR 69530, Nov. 19, 2008]

### § 91.309 Towing: Gliders and unpowered ultralight vehicles.

(a) No person may operate a civil aircraft towing a glider or unpowered ultralight vehicle unless—

(1) The pilot in command of the towing aircraft is qualified under § 61.69 of this chapter;

(2) The towing aircraft is equipped with a tow-hitch of a kind, and installed in a manner, that is approved by the Administrator;

(3) The towline used has breaking strength not less than 80 percent of the maximum certificated operating weight of the glider or unpowered ultralight vehicle and not more than twice this operating weight. However, the towline used may have a breaking strength more than twice the maximum certificated operating weight of the glider or unpowered ultralight vehicle if—

(i) A safety link is installed at the point of attachment of the towline to the glider or unpowered ultralight vehicle with a breaking strength not less than 80 percent of the maximum certificated operating weight of the glider or unpowered ultralight vehicle and

not greater than twice this operating weight;

(ii) A safety link is installed at the point of attachment of the towline to the towing aircraft with a breaking strength greater, but not more than 25 percent greater, than that of the safety link at the towed glider or unpowered ultralight vehicle end of the towline and not greater than twice the maximum certificated operating weight of the glider or unpowered ultralight vehicle;

(4) Before conducting any towing operation within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport, or before making each towing flight within such controlled airspace if required by ATC, the pilot in command notifies the control tower. If a control tower does not exist or is not in operation, the pilot in command must notify the FAA flight service station serving that controlled airspace before conducting any towing operations in that airspace; and

(5) The pilots of the towing aircraft and the glider or unpowered ultralight vehicle have agreed upon a general course of action, including takeoff and release signals, airspeeds, and emergency procedures for each pilot.

(b) No pilot of a civil aircraft may intentionally release a towline, after release of a glider or unpowered ultralight vehicle, in a manner that endangers the life or property of another.

[Doc. No. 18834, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–227, 56 FR 65661, Dec. 17, 1991; Amdt. 91–282, 69 FR 44880, July 27, 2004]

### § 91.311 Towing: Other than under § 91.309.

No pilot of a civil aircraft may tow anything with that aircraft (other than under § 91.309) except in accordance with the terms of a certificate of waiver issued by the Administrator.

### § 91.313 Restricted category civil aircraft: Operating limitations.

(a) No person may operate a restricted category civil aircraft—

(1) For other than the special purpose for which it is certificated; or

(2) In an operation other than one necessary to accomplish the work activity directly associated with that special purpose.

(b) For the purpose of paragraph (a) of this section, operating a restricted category civil aircraft to provide flight crewmember training in a special purpose operation for which the aircraft is certificated is considered to be an operation for that special purpose.

(c) No person may operate a restricted category civil aircraft carrying persons or property for compensation or hire. For the purposes of this paragraph, a special purpose operation involving the carriage of persons or material necessary to accomplish that operation, such as crop dusting, seeding, spraying, and banner towing (including the carrying of required persons or material to the location of that operation), and operation for the purpose of providing flight crewmember training in a special purpose operation, are not considered to be the carriage of persons or property for compensation or hire.

(d) No person may be carried on a restricted category civil aircraft unless that person—

(1) Is a flight crewmember;

(2) Is a flight crewmember trainee;

(3) Performs an essential function in connection with a special purpose operation for which the aircraft is certificated; or

(4) Is necessary to accomplish the work activity directly associated with that special purpose.

(e) Except when operating in accordance with the terms and conditions of a certificate of waiver or special operating limitations issued by the Administrator, no person may operate a restricted category civil aircraft within the United States—

(1) Over a densely populated area;

(2) In a congested airway; or

(3) Near a busy airport where passenger transport operations are conducted.

(f) This section does not apply to nonpassenger-carrying civil rotorcraft external-load operations conducted under part 133 of this chapter.

(g) No person may operate a small restricted-category civil airplane manufactured after July 18, 1978, unless an approved shoulder harness is installed

for each front seat. The shoulder harness must be designed to protect each occupant from serious head injury when the occupant experiences the ultimate inertia forces specified in § 23.561(b)(2) of this chapter. The shoulder harness installation at each flight crewmember station must permit the crewmember, when seated and with the safety belt and shoulder harness fastened, to perform all functions necessary for flight operation. For purposes of this paragraph—

(1) The date of manufacture of an airplane is the date the inspection acceptance records reflect that the airplane is complete and meets the FAA-approved type design data; and

(2) A front seat is a seat located at a flight crewmember station or any seat located alongside such a seat.

### § 91.315 Limited category civil aircraft: Operating limitations.

No person may operate a limited category civil aircraft carrying persons or property for compensation or hire.

### § 91.317 Provisionally certificated civil aircraft: Operating limitations.

(a) No person may operate a provisionally certificated civil aircraft unless that person is eligible for a provisional airworthiness certificate under § 21.213 of this chapter.

(b) No person may operate a provisionally certificated civil aircraft outside the United States unless that person has specific authority to do so from the Administrator and each foreign country involved.

(c) Unless otherwise authorized by the Director, Flight Standards Service, no person may operate a provisionally certificated civil aircraft in air transportation.

(d) Unless otherwise authorized by the Administrator, no person may operate a provisionally certificated civil aircraft except—

(1) In direct conjunction with the type or supplemental type certification of that aircraft;

(2) For training flight crews, including simulated air carrier operations;

(3) Demonstration flight by the manufacturer for prospective purchasers;

(4) Market surveys by the manufacturer;

(5) Flight checking of instruments, accessories, and equipment that do not affect the basic airworthiness of the aircraft; or

(6) Service testing of the aircraft.

(e) Each person operating a provisionally certificated civil aircraft shall operate within the prescribed limitations displayed in the aircraft or set forth in the provisional aircraft flight manual or other appropriate document. However, when operating in direct conjunction with the type or supplemental type certification of the aircraft, that person shall operate under the experimental aircraft limitations of § 21.191 of this chapter and when flight testing, shall operate under the requirements of § 91.305 of this part.

(f) Each person operating a provisionally certificated civil aircraft shall establish approved procedures for—

(1) The use and guidance of flight and ground personnel in operating under this section; and

(2) Operating in and out of airports where takeoffs or approaches over populated areas are necessary. No person may operate that aircraft except in compliance with the approved procedures.

(g) Each person operating a provisionally certificated civil aircraft shall ensure that each flight crewmember is properly certificated and has adequate knowledge of, and familiarity with, the aircraft and procedures to be used by that crewmember.

(h) Each person operating a provisionally certificated civil aircraft shall maintain it as required by applicable regulations and as may be specially prescribed by the Administrator.

(i) Whenever the manufacturer, or the Administrator, determines that a change in design, construction, or operation is necessary to ensure safe operation, no person may operate a provisionally certificated civil aircraft until that change has been made and approved. Section 21.99 of this chapter applies to operations under this section.

(j) Each person operating a provisionally certificated civil aircraft—

(1) May carry in that aircraft only persons who have a proper interest in the operations allowed by this section or who are specifically authorized by

both the manufacturer and the Administrator; and

(2) Shall advise each person carried that the aircraft is provisionally certificated.

(k) The Administrator may prescribe additional limitations or procedures that the Administrator considers necessary, including limitations on the number of persons who may be carried in the aircraft.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–212, 54 FR 39293, Sept. 25, 1989]

### § 91.319 Aircraft having experimental certificates: Operating limitations.

(a) No person may operate an aircraft that has an experimental certificate—

(1) For other than the purpose for which the certificate was issued; or

(2) Carrying persons or property for compensation or hire.

(b) No person may operate an aircraft that has an experimental certificate outside of an area assigned by the Administrator until it is shown that—

(1) The aircraft is controllable throughout its normal range of speeds and throughout all the maneuvers to be executed; and

(2) The aircraft has no hazardous operating characteristics or design features.

(c) Unless otherwise authorized by the Administrator in special operating limitations, no person may operate an aircraft that has an experimental certificate over a densely populated area or in a congested airway. The Administrator may issue special operating limitations for particular aircraft to permit takeoffs and landings to be conducted over a densely populated area or in a congested airway, in accordance with terms and conditions specified in the authorization in the interest of safety in air commerce.

(d) Each person operating an aircraft that has an experimental certificate shall—

(1) Advise each person carried of the experimental nature of the aircraft;

(2) Operate under VFR, day only, unless otherwise specifically authorized by the Administrator; and

(3) Notify the control tower of the experimental nature of the aircraft when operating the aircraft into or out of airports with operating control towers.

(e) No person may operate an aircraft that is issued an experimental certificate under § 21.191(i) of this chapter for compensation or hire, except a person may operate an aircraft issued an experimental certificate under § 21.191(i)(1) for compensation or hire to—

(1) Tow a glider that is a light-sport aircraft or unpowered ultralight vehicle in accordance with § 91.309; or

(2) Conduct flight training in an aircraft which that person provides prior to January 31, 2010.

(f) No person may lease an aircraft that is issued an experimental certificate under § 21.191(i) of this chapter, except in accordance with paragraph (e)(1) of this section.

(g) No person may operate an aircraft issued an experimental certificate under § 21.191(i)(1) of this chapter to tow a glider that is a light-sport aircraft or unpowered ultralight vehicle for compensation or hire or to conduct flight training for compensation or hire in an aircraft which that persons provides unless within the preceding 100 hours of time in service the aircraft has—

(1) Been inspected by a certificated repairman (light-sport aircraft) with a maintenance rating, an appropriately rated mechanic, or an appropriately rated repair station in accordance with inspection procedures developed by the aircraft manufacturer or a person acceptable to the FAA; or

(2) Received an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

(h) The FAA may issue deviation authority providing relief from the provisions of paragraph (a) of this section for the purpose of conducting flight training. The FAA will issue this deviation authority as a letter of deviation authority.

(1) The FAA may cancel or amend a letter of deviation authority at any time.

(2) An applicant must submit a request for deviation authority to the FAA at least 60 days before the date of

intended operations. A request for deviation authority must contain a complete description of the proposed operation and justification that establishes a level of safety equivalent to that provided under the regulations for the deviation requested.

(i) The Administrator may prescribe additional limitations that the Administrator considers necessary, including limitations on the persons that may be carried in the aircraft.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–282, 69 FR 44881, July 27, 2004]

### § 91.321 Carriage of candidates in elections.

(a) As an aircraft operator, you may receive payment for carrying a candidate, agent of a candidate, or person traveling on behalf of a candidate, running for Federal, State, or local election, without having to comply with the rules in parts 121, 125 or 135 of this chapter, under the following conditions:

(1) Your primary business is not as an air carrier or commercial operator;

(2) You carry the candidate, agent, or person traveling on behalf of a candidate, under the rules of part 91; and

(3) By Federal, state or local law, you are required to receive payment for carrying the candidate, agent, or person traveling on behalf of a candidate. For federal elections, the payment may not exceed the amount required by the Federal Election Commission. For a state or local election, the payment may not exceed the amount required under the applicable state or local law.

(b) For the purposes of this section, for Federal elections, the terms *candidate* and *election* have the same meaning as set forth in the regulations of the Federal Election Commission. For State or local elections, the terms *candidate* and *election* have the same meaning as provided by the applicable State or local law and those terms relate to candidates for election to public office in State and local government elections.

[Doc. No. FAA–2005–20168, 70 FR 4982, Jan. 31, 2005]

### § 91.323 Increased maximum certificated weights for certain airplanes operated in Alaska.

(a) Notwithstanding any other provision of the Federal Aviation Regulations, the Administrator will approve, as provided in this section, an increase in the maximum certificated weight of an airplane type certificated under Aeronautics Bulletin No. 7–A of the U.S. Department of Commerce dated January 1, 1931, as amended, or under the normal category of part 4a of the former Civil Air Regulations (14 CFR part 4a, 1964 ed.) if that airplane is operated in the State of Alaska by—

(1) A certificate holder conducting operations under part 121 or part 135 of this chapter; or

(2) The U.S. Department of Interior in conducting its game and fish law enforcement activities or its management, fire detection, and fire suppression activities concerning public lands.

(b) The maximum certificated weight approved under this section may not exceed—

(1) 12,500 pounds;

(2) 115 percent of the maximum weight listed in the FAA aircraft specifications;

(3) The weight at which the airplane meets the positive maneuvering load factor requirement for the normal category specified in § 23.337 of this chapter; or

(4) The weight at which the airplane meets the climb performance requirements under which it was type certificated.

(c) In determining the maximum certificated weight, the Administrator considers the structural soundness of the airplane and the terrain to be traversed.

(d) The maximum certificated weight determined under this section is added to the airplane's operation limitations and is identified as the maximum weight authorized for operations within the State of Alaska.

[Doc. No. 18334, 54 FR 34308, Aug. 18, 1989; Amdt. 91–211, 54 FR 41211, Oct. 5, 1989, as amended by Amdt. 91–253, 62 FR 13253, Mar. 19, 1997]

### § 91.325 Primary category aircraft: Operating limitations.

(a) No person may operate a primary category aircraft carrying persons or property for compensation or hire.

(b) No person may operate a primary category aircraft that is maintained by the pilot-owner under an approved special inspection and maintenance program except—

(1) The pilot-owner; or

(2) A designee of the pilot-owner, provided that the pilot-owner does not receive compensation for the use of the aircraft.

[Doc. No. 23345, 57 FR 41370, Sept. 9, 1992]

### § 91.327 Aircraft having a special airworthiness certificate in the light-sport category: Operating limitations.

(a) No person may operate an aircraft that has a special airworthiness certificate in the light-sport category for compensation or hire except—

(1) To tow a glider or an unpowered ultralight vehicle in accordance with § 91.309 of this chapter; or

(2) To conduct flight training.

(b) No person may operate an aircraft that has a special airworthiness certificate in the light-sport category unless—

(1) The aircraft is maintained by a certificated repairman with a light-sport aircraft maintenance rating, an appropriately rated mechanic, or an appropriately rated repair station in accordance with the applicable provisions of part 43 of this chapter and maintenance and inspection procedures developed by the aircraft manufacturer or a person acceptable to the FAA;

(2) A condition inspection is performed once every 12 calendar months by a certificated repairman (light-sport aircraft) with a maintenance rating, an appropriately rated mechanic, or an appropriately rated repair station in accordance with inspection procedures developed by the aircraft manufacturer or a person acceptable to the FAA;

(3) The owner or operator complies with all applicable airworthiness directives;

(4) The owner or operator complies with each safety directive applicable to the aircraft that corrects an existing unsafe condition. In lieu of complying with a safety directive an owner or operator may—

(i) Correct the unsafe condition in a manner different from that specified in the safety directive provided the person issuing the directive concurs with the action; or

(ii) Obtain an FAA waiver from the provisions of the safety directive based on a conclusion that the safety directive was issued without adhering to the applicable consensus standard;

(5) Each alteration accomplished after the aircraft's date of manufacture meets the applicable and current consensus standard and has been authorized by either the manufacturer or a person acceptable to the FAA;

(6) Each major alteration to an aircraft product produced under a consensus standard is authorized, performed and inspected in accordance with maintenance and inspection procedures developed by the manufacturer or a person acceptable to the FAA; and

(7) The owner or operator complies with the requirements for the recording of major repairs and major alterations performed on type-certificated products in accordance with § 43.9(d) of this chapter, and with the retention requirements in § 91.417.

(c) No person may operate an aircraft issued a special airworthiness certificate in the light-sport category to tow a glider or unpowered ultralight vehicle for compensation or hire or conduct flight training for compensation or hire in an aircraft which that persons provides unless within the preceding 100 hours of time in service the aircraft has—

(1) Been inspected by a certificated repairman with a light-sport aircraft maintenance rating, an appropriately rated mechanic, or an appropriately rated repair station in accordance with inspection procedures developed by the aircraft manufacturer or a person acceptable to the FAA and been approved for return to service in accordance with part 43 of this chapter; or

(2) Received an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

(d) Each person operating an aircraft issued a special airworthiness certificate in the light-sport category must

operate the aircraft in accordance with the aircraft's operating instructions, including any provisions for necessary operating equipment specified in the aircraft's equipment list.

(e) Each person operating an aircraft issued a special airworthiness certificate in the light-sport category must advise each person carried of the special nature of the aircraft and that the aircraft does not meet the airworthiness requirements for an aircraft issued a standard airworthiness certificate.

(f) The FAA may prescribe additional limitations that it considers necessary.

[Doc. No. FAA–2001–11133, 69 FR 44881, July 27, 2004]

**§§ 91.328–91.399 [Reserved]**

## Subpart E—Maintenance, Preventive Maintenance, and Alterations

SOURCE: Docket No. 18334, 54 FR 34311, Aug. 18, 1989, unless otherwise noted.

### § 91.401 Applicability.

(a) This subpart prescribes rules governing the maintenance, preventive maintenance, and alterations of U.S.-registered civil aircraft operating within or outside of the United States.

(b) Sections 91.405, 91.409, 91.411, 91.417, and 91.419 of this subpart do not apply to an aircraft maintained in accordance with a continuous airworthiness maintenance program as provided in part 121, 129, or §§ 91.1411 or 135.411(a)(2) of this chapter.

(c) Sections 91.405 and 91.409 of this part do not apply to an airplane inspected in accordance with part 125 of this chapter.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–280, 68 FR 54560, Sept. 17, 2003]

### § 91.403 General.

(a) The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with part 39 of this chapter.

(b) No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter.

(c) No person may operate an aircraft for which a manufacturer's maintenance manual or instructions for continued airworthiness has been issued that contains an airworthiness limitations section unless the mandatory replacement times, inspection intervals, and related procedures specified in that section or alternative inspection intervals and related procedures set forth in an operations specification approved by the Administrator under part 121 or 135 of this chapter or in accordance with an inspection program approved under § 91.409(e) have been complied with.

(d) A person must not alter an aircraft based on a supplemental type certificate unless the owner or operator of the aircraft is the holder of the supplemental type certificate, or has written permission from the holder.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–293, 71 FR 56005, Sept. 26, 2006]

### § 91.405 Maintenance required.

Each owner or operator of an aircraft—

(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;

(b) Shall ensure that maintenance personnel make appropriate entries in the aircraft maintenance records indicating the aircraft has been approved for return to service;

(c) Shall have any inoperative instrument or item of equipment, permitted to be inoperative by § 91.213(d)(2) of this part, repaired, replaced, removed, or inspected at the next required inspection; and

(d) When listed discrepancies include inoperative instruments or equipment, shall ensure that a placard has been installed as required by § 43.11 of this chapter.

### § 91.407 Operation after maintenance, preventive maintenance, rebuilding, or alteration.

(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—

(1) It has been approved for return to service by a person authorized under § 43.7 of this chapter; and

(2) The maintenance record entry required by § 43.9 or § 43.11, as applicable, of this chapter has been made.

(b) No person may carry any person (other than crewmembers) in an aircraft that has been maintained, rebuilt, or altered in a manner that may have appreciably changed its flight characteristics or substantially affected its operation in flight until an appropriately rated pilot with at least a private pilot certificate flies the aircraft, makes an operational check of the maintenance performed or alteration made, and logs the flight in the aircraft records.

(c) The aircraft does not have to be flown as required by paragraph (b) of this section if, prior to flight, ground tests, inspection, or both show conclusively that the maintenance, preventive maintenance, rebuilding, or alteration has not appreciably changed the flight characteristics or substantially affected the flight operation of the aircraft.

(Approved by the Office of Management and Budget under control number 2120–0005)

### § 91.409 Inspections.

(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by § 43.7 of this chapter; or

(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an ''annual'' inspection in the required maintenance records.

(b) Except as provided in paragraph (c) of this section, no person may operate an aircraft carrying any person (other than a crewmember) for hire, and no person may give flight instruction for hire in an aircraft which that person provides, unless within the preceding 100 hours of time in service the aircraft has received an annual or 100-hour inspection and been approved for return to service in accordance with part 43 of this chapter or has received an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter. The 100-hour limitation may be exceeded by not more than 10 hours while en route to reach a place where the inspection can be done. The excess time used to reach a place where the inspection can be done must be included in computing the next 100 hours of time in service.

(c) Paragraphs (a) and (b) of this section do not apply to—

(1) An aircraft that carries a special flight permit, a current experimental certificate, or a light-sport or provisional airworthiness certificate;

(2) An aircraft inspected in accordance with an approved aircraft inspection program under part 125 or 135 of this chapter and so identified by the registration number in the operations specifications of the certificate holder having the approved inspection program;

(3) An aircraft subject to the requirements of paragraph (d) or (e) of this section; or

(4) Turbine-powered rotorcraft when the operator elects to inspect that rotorcraft in accordance with paragraph (e) of this section.

(d) *Progressive inspection.* Each registered owner or operator of an aircraft desiring to use a progressive inspection program must submit a written request to the FAA Flight Standards district office having jurisdiction over the area in which the applicant is located, and shall provide—

(1) A certificated mechanic holding an inspection authorization, a certificated airframe repair station, or the manufacturer of the aircraft to supervise or conduct the progressive inspection;

(2) A current inspection procedures manual available and readily understandable to pilot and maintenance personnel containing, in detail—

(i) An explanation of the progressive inspection, including the continuity of inspection responsibility, the making of reports, and the keeping of records and technical reference material;

(ii) An inspection schedule, specifying the intervals in hours or days when routine and detailed inspections will be performed and including instructions for exceeding an inspection interval by not more than 10 hours while en route and for changing an inspection interval because of service experience;

(iii) Sample routine and detailed inspection forms and instructions for their use; and

(iv) Sample reports and records and instructions for their use;

(3) Enough housing and equipment for necessary disassembly and proper inspection of the aircraft; and

(4) Appropriate current technical information for the aircraft.

The frequency and detail of the progressive inspection shall provide for the complete inspection of the aircraft within each 12 calendar months and be consistent with the manufacturer's recommendations, field service experience, and the kind of operation in which the aircraft is engaged. The progressive inspection schedule must ensure that the aircraft, at all times, will be airworthy and will conform to all applicable FAA aircraft specifications, type certificate data sheets, airworthiness directives, and other approved data. If the progressive inspection is discontinued, the owner or operator shall immediately notify the local FAA Flight Standards district office, in writing, of the discontinuance. After the discontinuance, the first annual inspection under §91.409(a)(1) is due within 12 calendar months after the last complete inspection of the aircraft under the progressive inspection. The 100-hour inspection under §91.409(b) is due within 100 hours after that complete inspection. A complete inspection of the aircraft, for the purpose of determining when the annual and 100-hour inspections are due, requires a detailed inspection of the aircraft and all its components in accordance with the progressive inspection. A routine inspection of the aircraft and a detailed inspection of several components is not considered to be a complete inspection.

(e) *Large airplanes (to which part 125 is not applicable), turbojet multiengine airplanes, turbopropeller-powered multiengine airplanes, and turbine-powered rotorcraft.* No person may operate a large airplane, turbojet multiengine airplane, turbopropeller-powered multiengine airplane, or turbine-powered rotorcraft unless the replacement times for life-limited parts specified in the aircraft specifications, type data sheets, or other documents approved by the Administrator are complied with and the airplane or turbine-powered rotorcraft, including the airframe, engines, propellers, rotors, appliances, survival equipment, and emergency equipment, is inspected in accordance with an inspection program selected under the provisions of paragraph (f) of this section, except that, the owner or operator of a turbine-powered rotorcraft may elect to use the inspection provisions of §91.409(a), (b), (c), or (d) in lieu of an inspection option of §91.409(f).

(f) *Selection of inspection program under paragraph (e) of this section.* The registered owner or operator of each airplane or turbine-powered rotorcraft described in paragraph (e) of this section must select, identify in the aircraft maintenance records, and use one of the following programs for the inspection of the aircraft:

(1) A continuous airworthiness inspection program that is part of a continuous airworthiness maintenance program currently in use by a person holding an air carrier operating certificate or an operating certificate issued under part 121 or 135 of this chapter and operating that make and model aircraft under part 121 of this chapter or operating that make and model under part 135 of this chapter and maintaining it under §135.411(a)(2) of this chapter.

(2) An approved aircraft inspection program approved under §135.419 of this chapter and currently in use by a person holding an operating certificate issued under part 135 of this chapter.

(3) A current inspection program recommended by the manufacturer.

(4) Any other inspection program established by the registered owner or operator of that airplane or turbine-powered rotorcraft and approved by the Administrator under paragraph (g) of this section. However, the Administrator may require revision of this inspection program in accordance with the provisions of § 91.415.

Each operator shall include in the selected program the name and address of the person responsible for scheduling the inspections required by the program and make a copy of that program available to the person performing inspections on the aircraft and, upon request, to the Administrator.

(g) *Inspection program approved under paragraph (e) of this section.* Each operator of an airplane or turbine-powered rotorcraft desiring to establish or change an approved inspection program under paragraph (f)(4) of this section must submit the program for approval to the local FAA Flight Standards district office having jurisdiction over the area in which the aircraft is based. The program must be in writing and include at least the following information:

(1) Instructions and procedures for the conduct of inspections for the particular make and model airplane or turbine-powered rotorcraft, including necessary tests and checks. The instructions and procedures must set forth in detail the parts and areas of the airframe, engines, propellers, rotors, and appliances, including survival and emergency equipment required to be inspected.

(2) A schedule for performing the inspections that must be performed under the program expressed in terms of the time in service, calendar time, number of system operations, or any combination of these.

(h) *Changes from one inspection program to another.* When an operator changes from one inspection program under paragraph (f) of this section to another, the time in service, calendar times, or cycles of operation accumulated under the previous program must be applied in determining inspection due times under the new program.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989; Amdt. 91–211, 54 FR 41211, Oct. 5, 1989; Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–282, 69 FR 44882, July 27, 2004]

### § 91.410 [Reserved]

### § 91.411 Altimeter system and altitude reporting equipment tests and inspections.

(a) No person may operate an airplane, or helicopter, in controlled airspace under IFR unless—

(1) Within the preceding 24 calendar months, each static pressure system, each altimeter instrument, and each automatic pressure altitude reporting system has been tested and inspected and found to comply with appendices E and F of part 43 of this chapter;

(2) Except for the use of system drain and alternate static pressure valves, following any opening and closing of the static pressure system, that system has been tested and inspected and found to comply with paragraph (a), appendix E, of part 43 of this chapter; and

(3) Following installation or maintenance on the automatic pressure altitude reporting system of the ATC transponder where data correspondence error could be introduced, the integrated system has been tested, inspected, and found to comply with paragraph (c), appendix E, of part 43 of this chapter.

(b) The tests required by paragraph (a) of this section must be conducted by—

(1) The manufacturer of the airplane, or helicopter, on which the tests and inspections are to be performed;

(2) A certificated repair station properly equipped to perform those functions and holding—

(i) An instrument rating, Class I;

(ii) A limited instrument rating appropriate to the make and model of appliance to be tested;

(iii) A limited rating appropriate to the test to be performed;

(iv) An airframe rating appropriate to the airplane, or helicopter, to be tested; or

(3) A certificated mechanic with an airframe rating (static pressure system tests and inspections only).

(c) Altimeter and altitude reporting equipment approved under Technical Standard Orders are considered to be tested and inspected as of the date of their manufacture.

(d) No person may operate an airplane, or helicopter, in controlled airspace under IFR at an altitude above the maximum altitude at which all altimeters and the automatic altitude reporting system of that airplane, or helicopter, have been tested.

[Doc. No. 18334, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–269, 66 FR 41116, Aug. 6, 2001; 72 FR 7739, Feb. 20, 2007]

### § 91.413 ATC transponder tests and inspections.

(a) No persons may use an ATC transponder that is specified in 91.215(a), 121.345(c), or § 135.143(c) of this chapter unless, within the preceding 24 calendar months, the ATC transponder has been tested and inspected and found to comply with appendix F of part 43 of this chapter; and

(b) Following any installation or maintenance on an ATC transponder where data correspondence error could be introduced, the integrated system has been tested, inspected, and found to comply with paragraph (c), appendix E, of part 43 of this chapter.

(c) The tests and inspections specified in this section must be conducted by—

(1) A certificated repair station properly equipped to perform those functions and holding—

(i) A radio rating, Class III;

(ii) A limited radio rating appropriate to the make and model transponder to be tested;

(iii) A limited rating appropriate to the test to be performed;

(2) A holder of a continuous airworthiness maintenance program as provided in part 121 or § 135.411(a)(2) of this chapter; or

(3) The manufacturer of the aircraft on which the transponder to be tested is installed, if the transponder was installed by that manufacturer.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–269, 66 FR 41116, Aug. 6, 2001]

### § 91.415 Changes to aircraft inspection programs.

(a) Whenever the Administrator finds that revisions to an approved aircraft inspection program under § 91.409(f)(4) or § 91.1109 are necessary for the continued adequacy of the program, the owner or operator must, after notification by the Administrator, make any changes in the program found to be necessary by the Administrator.

(b) The owner or operator may petition the Administrator to reconsider the notice to make any changes in a program in accordance with paragraph (a) of this section.

(c) The petition must be filed with the Director, Flight Standards Service within 30 days after the certificate holder or fractional ownership program manager receives the notice.

(d) Except in the case of an emergency requiring immediate action in the interest of safety, the filing of the petition stays the notice pending a decision by the Administrator.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003]

### § 91.417 Maintenance records.

(a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(i) A description (or reference to data acceptable to the Administrator) of the work performed; and

(ii) The date of completion of the work performed; and

(iii) The signature, and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by §43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under §43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

(c) The owner or operator shall make all maintenance records required to be kept by this section available for inspection by the Administrator or any authorized representative of the National Transportation Safety Board (NTSB). In addition, the owner or operator shall present Form 337 described in paragraph (d) of this section for inspection upon request of any law enforcement officer.

(d) When a fuel tank is installed within the passenger compartment or a baggage compartment pursuant to part 43 of this chapter, a copy of FAA Form 337 shall be kept on board the modified aircraft by the owner or operator.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–311, 75 FR 5223, Feb. 1, 2010; Amdt. 91–323, 76 FR 39260, July 6, 2011]

### § 91.419 Transfer of maintenance records.

Any owner or operator who sells a U.S.-registered aircraft shall transfer to the purchaser, at the time of sale, the following records of that aircraft, in plain language form or in coded form at the election of the purchaser, if the coded form provides for the preservation and retrieval of information in a manner acceptable to the Administrator:

(a) The records specified in §91.417(a)(2).

(b) The records specified in §91.417(a)(1) which are not included in the records covered by paragraph (a) of this section, except that the purchaser may permit the seller to keep physical custody of such records. However, custody of records by the seller does not relieve the purchaser of the responsibility under §91.417(c) to make the records available for inspection by the Administrator or any authorized representative of the National Transportation Safety Board (NTSB).

### § 91.421 Rebuilt engine maintenance records.

(a) The owner or operator may use a new maintenance record, without previous operating history, for an aircraft engine rebuilt by the manufacturer or by an agency approved by the manufacturer.

(b) Each manufacturer or agency that grants zero time to an engine rebuilt by it shall enter in the new record—

(1) A signed statement of the date the engine was rebuilt;

(2) Each change made as required by airworthiness directives; and

(3) Each change made in compliance with manufacturer's service bulletins, if the entry is specifically requested in that bulletin.

(c) For the purposes of this section, a rebuilt engine is a used engine that has been completely disassembled, inspected, repaired as necessary, reassembled, tested, and approved in the same manner and to the same tolerances and limits as a new engine with either new or used parts. However, all parts used in it must conform to the production drawing tolerances and limits for new parts or be of approved oversized or undersized dimensions for a new engine.

**§§ 91.423–91.499 [Reserved]**

## Subpart F—Large and Turbine-Powered Multiengine Airplanes and Fractional Ownership Program Aircraft

SOURCE: Docket No. 18334, 54 FR 34314, Aug. 18, 1989, unless otherwise noted.

### § 91.501 Applicability.

(a) This subpart prescribes operating rules, in addition to those prescribed in other subparts of this part, governing the operation of large airplanes of U.S. registry, turbojet-powered multiengine civil airplanes of U.S. registry, and fractional ownership program aircraft of U.S. registry that are operating under subpart K of this part in operations not involving common carriage. The operating rules in this subpart do not apply to those aircraft when they are required to be operated under parts 121, 125, 129, 135, and 137 of this chapter. (Section 91.409 prescribes an inspection program for large and for turbine-powered (turbojet and turboprop) multiengine airplanes and turbine-powered rotorcraft of U.S. registry when they are operated under this part or part 129 or 137.)

(b) Operations that may be conducted under the rules in this subpart instead of those in parts 121, 129, 135, and 137 of this chapter when common carriage is not involved, include—

(1) Ferry or training flights;

(2) Aerial work operations such as aerial photography or survey, or pipeline patrol, but not including fire fighting operations;

(3) Flights for the demonstration of an airplane to prospective customers when no charge is made except for those specified in paragraph (d) of this section;

(4) Flights conducted by the operator of an airplane for his personal transportation, or the transportation of his guests when no charge, assessment, or fee is made for the transportation;

(5) Carriage of officials, employees, guests, and property of a company on an airplane operated by that company, or the parent or a subsidiary of the company or a subsidiary of the parent, when the carriage is within the scope of, and incidental to, the business of the company (other than transportation by air) and no charge, assessment or fee is made for the carriage in excess of the cost of owning, operating, and maintaining the airplane, except that no charge of any kind may be made for the carriage of a guest of a company, when the carriage is not within the scope of, and incidental to, the business of that company;

(6) The carriage of company officials, employees, and guests of the company on an airplane operated under a time sharing, interchange, or joint ownership agreement as defined in paragraph (c) of this section;

(7) The carriage of property (other than mail) on an airplane operated by a person in the furtherance of a business or employment (other than transportation by air) when the carriage is within the scope of, and incidental to, that business or employment and no charge, assessment, or fee is made for the carriage other than those specified in paragraph (d) of this section;

(8) The carriage on an airplane of an athletic team, sports group, choral group, or similar group having a common purpose or objective when there is no charge, assessment, or fee of any kind made by any person for that carriage; and

(9) The carriage of persons on an airplane operated by a person in the furtherance of a business other than transportation by air for the purpose of selling them land, goods, or property,

including franchises or distributorships, when the carriage is within the scope of, and incidental to, that business and no charge, assessment, or fee is made for that carriage.

(10) Any operation identified in paragraphs (b)(1) through (b)(9) of this section when conducted—

(i) By a fractional ownership program manager, or

(ii) By a fractional owner in a fractional ownership program aircraft operated under subpart K of this part, except that a flight under a joint ownership arrangement under paragraph (b)(6) of this section may not be conducted. For a flight under an interchange agreement under paragraph (b)(6) of this section, the exchange of equal time for the operation must be properly accounted for as part of the total hours associated with the fractional owner's share of ownership.

(c) As used in this section—

(1) A *time sharing agreement* means an arrangement whereby a person leases his airplane with flight crew to another person, and no charge is made for the flights conducted under that arrangement other than those specified in paragraph (d) of this section;

(2) An *interchange agreement* means an arrangement whereby a person leases his airplane to another person in exchange for equal time, when needed, on the other person's airplane, and no charge, assessment, or fee is made, except that a charge may be made not to exceed the difference between the cost of owning, operating, and maintaining the two airplanes;

(3) A *joint ownership agreement* means an arrangement whereby one of the registered joint owners of an airplane employs and furnishes the flight crew for that airplane and each of the registered joint owners pays a share of the charge specified in the agreement.

(d) The following may be charged, as expenses of a specific flight, for transportation as authorized by paragraphs (b) (3) and (7) and (c)(1) of this section:

(1) Fuel, oil, lubricants, and other additives.

(2) Travel expenses of the crew, including food, lodging, and ground transportation.

(3) Hangar and tie-down costs away from the aircraft's base of operation.

(4) Insurance obtained for the specific flight.

(5) Landing fees, airport taxes, and similar assessments.

(6) Customs, foreign permit, and similar fees directly related to the flight.

(7) In flight food and beverages.

(8) Passenger ground transportation.

(9) Flight planning and weather contract services.

(10) An additional charge equal to 100 percent of the expenses listed in paragraph (d)(1) of this section.

[Doc. No. 18334, 54 FR 34314, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003]

### § 91.503 Flying equipment and operating information.

(a) The pilot in command of an airplane shall ensure that the following flying equipment and aeronautical charts and data, in current and appropriate form, are accessible for each flight at the pilot station of the airplane:

(1) A flashlight having at least two size ''D'' cells, or the equivalent, that is in good working order.

(2) A cockpit checklist containing the procedures required by paragraph (b) of this section.

(3) Pertinent aeronautical charts.

(4) For IFR, VFR over-the-top, or night operations, each pertinent navigational en route, terminal area, and approach and letdown chart.

(5) In the case of multiengine airplanes, one-engine inoperative climb performance data.

(b) Each cockpit checklist must contain the following procedures and shall be used by the flight crewmembers when operating the airplane:

(1) Before starting engines.

(2) Before takeoff.

(3) Cruise.

(4) Before landing.

(5) After landing.

(6) Stopping engines.

(7) Emergencies.

(c) Each emergency cockpit checklist procedure required by paragraph (b)(7) of this section must contain the following procedures, as appropriate:

(1) Emergency operation of fuel, hydraulic, electrical, and mechanical systems.

(2) Emergency operation of instruments and controls.

(3) Engine inoperative procedures.

(4) Any other procedures necessary for safety.

(d) The equipment, charts, and data prescribed in this section shall be used by the pilot in command and other members of the flight crew, when pertinent.

### § 91.505 Familiarity with operating limitations and emergency equipment.

(a) Each pilot in command of an airplane shall, before beginning a flight, become familiar with the Airplane Flight Manual for that airplane, if one is required, and with any placards, listings, instrument markings, or any combination thereof, containing each operating limitation prescribed for that airplane by the Administrator, including those specified in § 91.9(b).

(b) Each required member of the crew shall, before beginning a flight, become familiar with the emergency equipment installed on the airplane to which that crewmember is assigned and with the procedures to be followed for the use of that equipment in an emergency situation.

### § 91.507 Equipment requirements: Over-the-top or night VFR operations.

No person may operate an airplane over-the-top or at night under VFR unless that airplane is equipped with the instruments and equipment required for IFR operations under § 91.205(d) and one electric landing light for night operations. Each required instrument and item of equipment must be in operable condition.

### § 91.509 Survival equipment for overwater operations.

(a) No person may take off an airplane for a flight over water more than 50 nautical miles from the nearest shore unless that airplane is equipped with a life preserver or an approved flotation means for each occupant of the airplane.

(b) Except as provided in paragraph (c) of this section, no person may take off an airplane for flight over water more than 30 minutes flying time or 100 nautical miles from the nearest shore, whichever is less, unless it has on board the following survival equipment:

(1) A life preserver, equipped with an approved survivor locator light, for each occupant of the airplane.

(2) Enough liferafts (each equipped with an approved survival locator light) of a rated capacity and buoyancy to accommodate the occupants of the airplane.

(3) At least one pyrotechnic signaling device for each liferaft.

(4) One self-buoyant, water-resistant, portable emergency radio signaling device that is capable of transmission on the appropriate emergency frequency or frequencies and not dependent upon the airplane power supply.

(5) A lifeline stored in accordance with § 25.1411(g) of this chapter.

(c) A fractional ownership program manager under subpart K of this part may apply for a deviation from paragraphs (b)(2) through (5) of this section for a particular over water operation or the Administrator may amend the management specifications to require the carriage of all or any specific items of the equipment listed in paragraphs (b)(2) through (5) of this section.

(d) The required life rafts, life preservers, and signaling devices must be installed in conspicuously marked locations and easily accessible in the event of a ditching without appreciable time for preparatory procedures.

(e) A survival kit, appropriately equipped for the route to be flown, must be attached to each required life raft.

(f) As used in this section, the term shore means that area of the land adjacent to the water that is above the high water mark and excludes land areas that are intermittently under water.

[Doc. No. 18334, 54 FR 34314, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54561, Sept. 17, 2003]

### § 91.511 Communication and navigation equipment for overwater operations.

(a) Except as provided in paragraphs (c), (d), and (f) of this section, no person may take off an airplane for a flight over water more than 30 minutes

flying time or 100 nautical miles from the nearest shore unless it has at least the following operable equipment:

(1) Radio communication equipment appropriate to the facilities to be used and able to transmit to, and receive from, at least one communication facility from any place along the route:

(i) Two transmitters.

(ii) Two microphones.

(iii) Two headsets or one headset and one speaker.

(iv) Two independent receivers.

(2) Appropriate electronic navigational equipment consisting of at least two independent electronic navigation units capable of providing the pilot with the information necessary to navigate the airplane within the airspace assigned by air traffic control. However, a receiver that can receive both communications and required navigational signals may be used in place of a separate communications receiver and a separate navigational signal receiver or unit.

(b) For the purposes of paragraphs (a)(1)(iv) and (a)(2) of this section, a receiver or electronic navigation unit is independent if the function of any part of it does not depend on the functioning of any part of another receiver or electronic navigation unit.

(c) Notwithstanding the provisions of paragraph (a) of this section, a person may operate an airplane on which no passengers are carried from a place where repairs or replacement cannot be made to a place where they can be made, if not more than one of each of the dual items of radio communication and navigational equipment specified in paragraphs (a)(1) (i) through (iv) and (a)(2) of this section malfunctions or becomes inoperative.

(d) Notwithstanding the provisions of paragraph (a) of this section, when both VHF and HF communications equipment are required for the route and the airplane has two VHF transmitters and two VHF receivers for communications, only one HF transmitter and one HF receiver is required for communications.

(e) As used in this section, the term *shore* means that area of the land adjacent to the water which is above the high-water mark and excludes land areas which are intermittently under water.

(f) Notwithstanding the requirements in paragraph (a)(2) of this section, a person may operate in the Gulf of Mexico, the Caribbean Sea, and the Atlantic Ocean west of a line which extends from 44°47′00″ N / 67°00′00″ W to 39°00′00″ N / 67°00′00″ W to 38°30′00″ N / 60°00′00″ W south along the 60°00′00″ W longitude line to the point where the line intersects with the northern coast of South America, when:

(1) A single long-range navigation system is installed, operational, and appropriate for the route; and

(2) Flight conditions and the aircraft's capabilities are such that no more than a 30-minute gap in two-way radio very high frequency communications is expected to exist.

[Doc. No. 18334, 54 FR 34314, Aug. 18, 1989, as amended by Amdt. 91–249, 61 FR 7190, Feb. 26, 1996; Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.513 Emergency equipment.

(a) No person may operate an airplane unless it is equipped with the emergency equipment listed in this section.

(b) Each item of equipment—

(1) Must be inspected in accordance with § 91.409 to ensure its continued serviceability and immediate readiness for its intended purposes;

(2) Must be readily accessible to the crew;

(3) Must clearly indicate its method of operation; and

(4) When carried in a compartment or container, must have that compartment or container marked as to contents and date of last inspection.

(c) Hand fire extinguishers must be provided for use in crew, passenger, and cargo compartments in accordance with the following:

(1) The type and quantity of extinguishing agent must be suitable for the kinds of fires likely to occur in the compartment where the extinguisher is intended to be used.

(2) At least one hand fire extinguisher must be provided and located on or near the flight deck in a place that is readily accessible to the flight crew.

(3) At least one hand fire extinguisher must be conveniently located

in the passenger compartment of each airplane accommodating more than six but less than 31 passengers, and at least two hand fire extinguishers must be conveniently located in the passenger compartment of each airplane accommodating more than 30 passengers.

(4) Hand fire extinguishers must be installed and secured in such a manner that they will not interfere with the safe operation of the airplane or adversely affect the safety of the crew and passengers. They must be readily accessible and, unless the locations of the fire extinguishers are obvious, their stowage provisions must be properly identified.

(d) First aid kits for treatment of injuries likely to occur in flight or in minor accidents must be provided.

(e) Each airplane accommodating more than 19 passengers must be equipped with a crash axe.

(f) Each passenger-carrying airplane must have a portable battery-powered megaphone or megaphones readily accessible to the crewmembers assigned to direct emergency evacuation, installed as follows:

(1) One megaphone on each airplane with a seating capacity of more than 60 but less than 100 passengers, at the most rearward location in the passenger cabin where it would be readily accessible to a normal flight attendant seat. However, the Administrator may grant a deviation from the requirements of this subparagraph if the Administrator finds that a different location would be more useful for evacuation of persons during an emergency.

(2) On each airplane with a seating capacity of 100 or more passengers, one megaphone installed at the forward end and one installed at the most rearward location where it would be readily accessible to a normal flight attendant seat.

### § 91.515 Flight altitude rules.

(a) Notwithstanding § 91.119, and except as provided in paragraph (b) of this section, no person may operate an airplane under VFR at less than—

(1) One thousand feet above the surface, or 1,000 feet from any mountain, hill, or other obstruction to flight, for day operations; and

(2) The altitudes prescribed in § 91.177, for night operations.

(b) This section does not apply—

(1) During takeoff or landing;

(2) When a different altitude is authorized by a waiver to this section under subpart J of this part; or

(3) When a flight is conducted under the special VFR weather minimums of § 91.157 with an appropriate clearance from ATC.

### § 91.517 Passenger information.

(a) Except as provided in paragraph (b) of this section, no person may operate an airplane carrying passengers unless it is equipped with signs that are visible to passengers and flight attendants to notify them when smoking is prohibited and when safety belts must be fastened. The signs must be so constructed that the crew can turn them on and off. They must be turned on during airplane movement on the surface, for each takeoff, for each landing, and when otherwise considered to be necessary by the pilot in command.

(b) The pilot in command of an airplane that is not required, in accordance with applicable aircraft and equipment requirements of this chapter, to be equipped as provided in paragraph (a) of this section shall ensure that the passengers are notified orally each time that it is necessary to fasten their safety belts and when smoking is prohibited.

(c) If passenger information signs are installed, no passenger or crewmember may smoke while any ''no smoking'' sign is lighted nor may any passenger or crewmember smoke in any lavatory.

(d) Each passenger required by § 91.107(a)(3) to occupy a seat or berth shall fasten his or her safety belt about him or her and keep it fastened while any ''fasten seat belt'' sign is lighted.

(e) Each passenger shall comply with instructions given him or her by crewmembers regarding compliance with paragraphs (b), (c), and (d) of this section.

[Doc. No. 26142, 57 FR 42672, Sept. 15, 1992]

### § 91.519 Passenger briefing.

(a) Before each takeoff the pilot in command of an airplane carrying passengers shall ensure that all passengers have been orally briefed on—

(1) *Smoking.* Each passenger shall be briefed on when, where, and under what conditions smoking is prohibited. This briefing shall include a statement, as appropriate, that the Federal Aviation Regulations require passenger compliance with lighted passenger information signs and no smoking placards, prohibit smoking in lavatories, and require compliance with crewmember instructions with regard to these items;

(2) *Use of safety belts and shoulder harnesses.* Each passenger shall be briefed on when, where, and under what conditions it is necessary to have his or her safety belt and, if installed, his or her shoulder harness fastened about him or her. This briefing shall include a statement, as appropriate, that Federal Aviation Regulations require passenger compliance with the lighted passenger sign and/or crewmember instructions with regard to these items;

(3) Location and means for opening the passenger entry door and emergency exits;

(4) Location of survival equipment;

(5) Ditching procedures and the use of flotation equipment required under § 91.509 for a flight over water; and

(6) The normal and emergency use of oxygen equipment installed on the airplane.

(b) The oral briefing required by paragraph (a) of this section shall be given by the pilot in command or a member of the crew, but need not be given when the pilot in command determines that the passengers are familiar with the contents of the briefing. It may be supplemented by printed cards for the use of each passenger containing—

(1) A diagram of, and methods of operating, the emergency exits; and

(2) Other instructions necessary for use of emergency equipment.

(c) Each card used under paragraph (b) must be carried in convenient locations on the airplane for the use of each passenger and must contain information that is pertinent only to the type and model airplane on which it is used.

(d) For operations under subpart K of this part, the passenger briefing requirements of § 91.1035 apply, instead of the requirements of paragraphs (a) through (c) of this section.

[Doc. No. 18334, 54 FR 34314, Aug. 18, 1989, as amended by Amdt. 91–231, 57 FR 42672, Sept. 15, 1992; Amdt. 91–280, 68 FR 54561, Sept. 17, 2003]

### § 91.521 Shoulder harness.

(a) No person may operate a transport category airplane that was type certificated after January 1, 1958, unless it is equipped at each seat at a flight deck station with a combined safety belt and shoulder harness that meets the applicable requirements specified in § 25.785 of this chapter, except that—

(1) Shoulder harnesses and combined safety belt and shoulder harnesses that were approved and installed before March 6, 1980, may continue to be used; and

(2) Safety belt and shoulder harness restraint systems may be designed to the inertia load factors established under the certification basis of the airplane.

(b) No person may operate a transport category airplane unless it is equipped at each required flight attendant seat in the passenger compartment with a combined safety belt and shoulder harness that meets the applicable requirements specified in § 25.785 of this chapter, except that—

(1) Shoulder harnesses and combined safety belt and shoulder harnesses that were approved and installed before March 6, 1980, may continue to be used; and

(2) Safety belt and shoulder harness restraint systems may be designed to the inertia load factors established under the certification basis of the airplane.

### § 91.523 Carry-on baggage.

No pilot in command of an airplane having a seating capacity of more than 19 passengers may permit a passenger to stow baggage aboard that airplane except—

(a) In a suitable baggage or cargo storage compartment, or as provided in § 91.525; or

(b) Under a passenger seat in such a way that it will not slide forward under crash impacts severe enough to induce the ultimate inertia forces specified in

§ 25.561(b)(3) of this chapter, or the requirements of the regulations under which the airplane was type certificated. Restraining devices must also limit sideward motion of under-seat baggage and be designed to withstand crash impacts severe enough to induce sideward forces specified in § 25.561(b)(3) of this chapter.

### § 91.525 Carriage of cargo.

(a) No pilot in command may permit cargo to be carried in any airplane unless—

(1) It is carried in an approved cargo rack, bin, or compartment installed in the airplane;

(2) It is secured by means approved by the Administrator; or

(3) It is carried in accordance with each of the following:

(i) It is properly secured by a safety belt or other tiedown having enough strength to eliminate the possibility of shifting under all normally anticipated flight and ground conditions.

(ii) It is packaged or covered to avoid possible injury to passengers.

(iii) It does not impose any load on seats or on the floor structure that exceeds the load limitation for those components.

(iv) It is not located in a position that restricts the access to or use of any required emergency or regular exit, or the use of the aisle between the crew and the passenger compartment.

(v) It is not carried directly above seated passengers.

(b) When cargo is carried in cargo compartments that are designed to require the physical entry of a crewmember to extinguish any fire that may occur during flight, the cargo must be loaded so as to allow a crewmember to effectively reach all parts of the compartment with the contents of a hand fire extinguisher.

### § 91.527 Operating in icing conditions.

(a) No pilot may take off an airplane that has frost, ice, or snow adhering to any propeller, windshield, stabilizing or control surface; to a powerplant installation; or to an airspeed, altimeter, rate of climb, or flight attitude instrument system or wing, except that takeoffs may be made with frost under the wing in the area of the fuel tanks if authorized by the FAA.

(b) No pilot may fly under IFR into known or forecast light or moderate icing conditions, or under VFR into known light or moderate icing conditions, unless—

(1) The aircraft has functioning deicing or anti-icing equipment protecting each rotor blade, propeller, windshield, wing, stabilizing or control surface, and each airspeed, altimeter, rate of climb, or flight attitude instrument system;

(2) The airplane has ice protection provisions that meet section 34 of Special Federal Aviation Regulation No. 23; or

(3) The airplane meets transport category airplane type certification provisions, including the requirements for certification for flight in icing conditions.

(c) Except for an airplane that has ice protection provisions that meet the requirements in section 34 of Special Federal Aviation Regulation No. 23, or those for transport category airplane type certification, no pilot may fly an airplane into known or forecast severe icing conditions.

(d) If current weather reports and briefing information relied upon by the pilot in command indicate that the forecast icing conditions that would otherwise prohibit the flight will not be encountered during the flight because of changed weather conditions since the forecast, the restrictions in paragraphs (b) and (c) of this section based on forecast conditions do not apply.

[Doc. No. 18334, 54 FR 34314, Aug. 18, 1989, as amended by Amdt. 91–310, 74 FR 62696, Dec. 1, 2009]

### § 91.529 Flight engineer requirements.

(a) No person may operate the following airplanes without a flight crewmember holding a current flight engineer certificate:

(1) An airplane for which a type certificate was issued before January 2, 1964, having a maximum certificated takeoff weight of more than 80,000 pounds.

(2) An airplane type certificated after January 1, 1964, for which a flight engineer is required by the type certification requirements.

(b) No person may serve as a required flight engineer on an airplane unless, within the preceding 6 calendar months, that person has had at least 50 hours of flight time as a flight engineer on that type airplane or has been checked by the Administrator on that type airplane and is found to be familiar and competent with all essential current information and operating procedures.

### § 91.531 Second in command requirements.

(a) Except as provided in paragraph (b) and (d) of this section, no person may operate the following airplanes without a pilot who is designated as second in command of that airplane:

(1) A large airplane, except that a person may operate an airplane certificated under SFAR 41 without a pilot who is designated as second in command if that airplane is certificated for operation with one pilot.

(2) A turbojet-powered multiengine airplane for which two pilots are required under the type certification requirements for that airplane.

(3) A commuter category airplane, except that a person may operate a commuter category airplane notwithstanding paragraph (a)(1) of this section, that has a passenger seating configuration, excluding pilot seats, of nine or less without a pilot who is designated as second in command if that airplane is type certificated for operations with one pilot.

(b) The Administrator may issue a letter of authorization for the operation of an airplane without compliance with the requirements of paragraph (a) of this section if that airplane is designed for and type certificated with only one pilot station. The authorization contains any conditions that the Administrator finds necessary for safe operation.

(c) No person may designate a pilot to serve as second in command, nor may any pilot serve as second in command, of an airplane required under this section to have two pilots unless that pilot meets the qualifications for second in command prescribed in § 61.55 of this chapter.

(d) No person may operate an aircraft under subpart K of this part without a pilot who is designated as second in command of that aircraft in accordance with § 91.1049(d). The second in command must meet the experience requirements of § 91.1053.

[Doc. No. 18334, 54 FR 34314, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54561, Sept. 17, 2003]

### § 91.533 Flight attendant requirements.

(a) No person may operate an airplane unless at least the following number of flight attendants are on board the airplane:

(1) For airplanes having more than 19 but less than 51 passengers on board, one flight attendant.

(2) For airplanes having more than 50 but less than 101 passengers on board, two flight attendants.

(3) For airplanes having more than 100 passengers on board, two flight attendants plus one additional flight attendant for each unit (or part of a unit) of 50 passengers above 100.

(b) No person may serve as a flight attendant on an airplane when required by paragraph (a) of this section unless that person has demonstrated to the pilot in command familiarity with the necessary functions to be performed in an emergency or a situation requiring emergency evacuation and is capable of using the emergency equipment installed on that airplane.

### § 91.535 Stowage of food, beverage, and passenger service equipment during aircraft movement on the surface, takeoff, and landing.

(a) No operator may move an aircraft on the surface, take off, or land when any food, beverage, or tableware furnished by the operator is located at any passenger seat.

(b) No operator may move an aircraft on the surface, take off, or land unless each food and beverage tray and seat back tray table is secured in its stowed position.

(c) No operator may permit an aircraft to move on the surface, take off, or land unless each passenger serving cart is secured in its stowed position.

(d) No operator may permit an aircraft to move on the surface, take off, or land unless each movie screen that extends into the aisle is stowed.

(e) Each passenger shall comply with instructions given by a crewmember with regard to compliance with this section.

[Doc. No. 26142, 57 FR 42672, Sept. 15, 1992]

**§§ 91.536–91.599 [Reserved]**

## Subpart G—Additional Equipment and Operating Requirements for Large and Transport Category Aircraft

SOURCE: Docket No. 18334, 54 FR 34318, Aug. 18, 1989, unless otherwise noted.

### § 91.601 Applicability.

This subpart applies to operation of large and transport category U.S.-registered civil aircraft.

### § 91.603 Aural speed warning device.

No person may operate a transport category airplane in air commerce unless that airplane is equipped with an aural speed warning device that complies with §25.1303(c)(1).

### § 91.605 Transport category civil airplane weight limitations.

(a) No person may take off any transport category airplane (other than a turbine-engine-powered airplane certificated after September 30, 1958) unless—

(1) The takeoff weight does not exceed the authorized maximum takeoff weight for the elevation of the airport of takeoff;

(2) The elevation of the airport of takeoff is within the altitude range for which maximum takeoff weights have been determined;

(3) Normal consumption of fuel and oil in flight to the airport of intended landing will leave a weight on arrival not in excess of the authorized maximum landing weight for the elevation of that airport; and

(4) The elevations of the airport of intended landing and of all specified alternate airports are within the altitude range for which the maximum landing weights have been determined.

(b) No person may operate a turbine-engine-powered transport category airplane certificated after September 30, 1958, contrary to the Airplane Flight Manual, or take off that airplane unless—

(1) The takeoff weight does not exceed the takeoff weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of takeoff;

(2) Normal consumption of fuel and oil in flight to the airport of intended landing and to the alternate airports will leave a weight on arrival not in excess of the landing weight specified in the Airplane Flight Manual for the elevation of each of the airports involved and for the ambient temperatures expected at the time of landing;

(3) The takeoff weight does not exceed the weight shown in the Airplane Flight Manual to correspond with the minimum distances required for takeoff, considering the elevation of the airport, the runway to be used, the effective runway gradient, the ambient temperature and wind component at the time of takeoff, and, if operating limitations exist for the minimum distances required for takeoff from wet runways, the runway surface condition (dry or wet). Wet runway distances associated with grooved or porous friction course runways, if provided in the Airplane Flight Manual, may be used only for runways that are grooved or treated with a porous friction course (PFC) overlay, and that the operator determines are designed, constructed, and maintained in a manner acceptable to the Administrator.

(4) Where the takeoff distance includes a clearway, the clearway distance is not greater than one-half of—

(i) The takeoff run, in the case of airplanes certificated after September 30, 1958, and before August 30, 1959; or

(ii) The runway length, in the case of airplanes certificated after August 29, 1959.

(c) No person may take off a turbine-engine-powered transport category airplane certificated after August 29, 1959, unless, in addition to the requirements of paragraph (b) of this section—

(1) The accelerate-stop distance is no greater than the length of the runway

plus the length of the stopway (if present); and

(2) The takeoff distance is no greater than the length of the runway plus the length of the clearway (if present); and

(3) The takeoff run is no greater than the length of the runway.

[Doc. No. 18334, 54 FR 34318, Aug. 18, 1989, as amended by Amdt. 91–256, 63 FR 8321, Feb. 18, 1998]

### § 91.607 Emergency exits for airplanes carrying passengers for hire.

(a) Notwithstanding any other provision of this chapter, no person may operate a large airplane (type certificated under the Civil Air Regulations effective before April 9, 1957) in passenger-carrying operations for hire, with more than the number of occupants—

(1) Allowed under Civil Air Regulations § 4b.362 (a), (b), and (c) as in effect on December 20, 1951; or

(2) Approved under Special Civil Air Regulations SR–387, SR–389, SR–389A, or SR–389B, or under this section as in effect.

However, an airplane type listed in the following table may be operated with up to the listed number of occupants (including crewmembers) and the corresponding number of exits (including emergency exits and doors) approved for the emergency exit of passengers or with an occupant-exit configuration approved under paragraph (b) or (c) of this section.

| Airplane type | Maximum number of occupants including all crewmembers | Corresponding number of exits authorized for passenger use |
|---|---|---|
| B–307 | 61 | 4 |
| B–377 | 96 | 9 |
| C–46 | 67 | 4 |
| CV–240 | 53 | 6 |
| CV–340 and CV–440 | 53 | 6 |
| DC–3 | 35 | 4 |
| DC–3 (Super) | 39 | 5 |
| DC–4 | 86 | 5 |
| DC–6 | 87 | 7 |
| DC–6B | 112 | 11 |
| L–18 | 17 | 3 |
| L–049, L–649, L–749 | 87 | 7 |
| L–1049 series | 96 | 9 |
| M–202 | 53 | 6 |
| M–404 | 53 | 7 |
| Viscount 700 series | 53 | 7 |

(b) Occupants in addition to those authorized under paragraph (a) of this section may be carried as follows:

(1) For each additional floor-level exit at least 24 inches wide by 48 inches high, with an unobstructed 20-inch-wide access aisleway between the exit and the main passenger aisle, 12 additional occupants.

(2) For each additional window exit located over a wing that meets the requirements of the airworthiness standards under which the airplane was type certificated or that is large enough to inscribe an ellipse $19 \times 26$ inches, eight additional occupants.

(3) For each additional window exit that is not located over a wing but that otherwise complies with paragraph (b)(2) of this section, five additional occupants.

(4) For each airplane having a ratio (as computed from the table in paragraph (a) of this section) of maximum number of occupants to number of exits greater than 14:1, and for each airplane that does not have at least one full-size, door-type exit in the side of the fuselage in the rear part of the cabin, the first additional exit must be a floor-level exit that complies with paragraph (b)(1) of this section and must be located in the rear part of the cabin on the opposite side of the fuselage from the main entrance door. However, no person may operate an airplane under this section carrying more than 115 occupants unless there is such an exit on each side of the fuselage in the rear part of the cabin.

(c) No person may eliminate any approved exit except in accordance with the following:

(1) The previously authorized maximum number of occupants must be reduced by the same number of additional occupants authorized for that exit under this section.

(2) Exits must be eliminated in accordance with the following priority schedule: First, non-over-wing window exits; second, over-wing window exits; third, floor-level exits located in the forward part of the cabin; and fourth, floor-level exits located in the rear of the cabin.

(3) At least one exit must be retained on each side of the fuselage regardless of the number of occupants.

(4) No person may remove any exit that would result in a ratio of maximum number of occupants to approved exits greater than 14:1.

(d) This section does not relieve any person operating under part 121 of this chapter from complying with § 121.291.

### § 91.609 Flight data recorders and cockpit voice recorders.

(a) No holder of an air carrier operating certificate or an operating certificate may conduct any operation under this part with an aircraft listed in the holder's operations specifications or current list of aircraft used in air transportation unless that aircraft complies with any applicable flight recorder and cockpit voice recorder requirements of the part under which its certificate is issued except that the operator may—

(1) Ferry an aircraft with an inoperative flight recorder or cockpit voice recorder from a place where repair or replacement cannot be made to a place where they can be made;

(2) Continue a flight as originally planned, if the flight recorder or cockpit voice recorder becomes inoperative after the aircraft has taken off;

(3) Conduct an airworthiness flight test during which the flight recorder or cockpit voice recorder is turned off to test it or to test any communications or electrical equipment installed in the aircraft; or

(4) Ferry a newly acquired aircraft from the place where possession of it is taken to a place where the flight recorder or cockpit voice recorder is to be installed.

(b) Notwithstanding paragraphs (c) and (e) of this section, an operator other than the holder of an air carrier or a commercial operator certificate may—

(1) Ferry an aircraft with an inoperative flight recorder or cockpit voice recorder from a place where repair or replacement cannot be made to a place where they can be made;

(2) Continue a flight as originally planned if the flight recorder or cockpit voice recorder becomes inoperative after the aircraft has taken off;

(3) Conduct an airworthiness flight test during which the flight recorder or cockpit voice recorder is turned off to test it or to test any communications or electrical equipment installed in the aircraft;

(4) Ferry a newly acquired aircraft from a place where possession of it was taken to a place where the flight recorder or cockpit voice recorder is to be installed; or

(5) Operate an aircraft:

(i) For not more than 15 days while the flight recorder and/or cockpit voice recorder is inoperative and/or removed for repair provided that the aircraft maintenance records contain an entry that indicates the date of failure, and a placard is located in view of the pilot to show that the flight recorder or cockpit voice recorder is inoperative.

(ii) For not more than an additional 15 days, provided that the requirements in paragraph (b)(5)(i) are met and that a certificated pilot, or a certificated person authorized to return an aircraft to service under § 43.7 of this chapter, certifies in the aircraft maintenance records that additional time is required to complete repairs or obtain a replacement unit.

(c)(1) No person may operate a U.S. civil registered, multiengine, turbine-powered airplane or rotorcraft having a passenger seating configuration, excluding any pilot seats of 10 or more that has been manufactured after October 11, 1991, unless it is equipped with one or more approved flight recorders that utilize a digital method of recording and storing data and a method of readily retrieving that data from the storage medium, that are capable of recording the data specified in appendix E to this part, for an airplane, or appendix F to this part, for a rotorcraft, of this part within the range, accuracy, and recording interval specified, and that are capable of retaining no less than 8 hours of aircraft operation.

(2) All airplanes subject to paragraph (c)(1) of this section that are manufactured before April 7, 2010, by April 7, 2012, must meet the requirements of § 23.1459(a)(7) or § 25.1459(a)(8) of this chapter, as applicable.

(3) All airplanes and rotorcraft subject to paragraph (c)(1) of this section that are manufactured on or after April 7, 2010, must meet the flight data recorder requirements of § 23.1459, § 25.1459, § 27.1459, or § 29.1459 of this

chapter, as applicable, and retain at least the last 25 hours of recorded information using a recorder that meets the standards of TSO–C124a, or later revision.

(d) Whenever a flight recorder, required by this section, is installed, it must be operated continuously from the instant the airplane begins the takeoff roll or the rotorcraft begins lift-off until the airplane has completed the landing roll or the rotorcraft has landed at its destination.

(e) Unless otherwise authorized by the Administrator, after October 11, 1991, no person may operate a U.S. civil registered multiengine, turbine-powered airplane or rotorcraft having a passenger seating configuration of six passengers or more and for which two pilots are required by type certification or operating rule unless it is equipped with an approved cockpit voice recorder that:

(1) Is installed in compliance with §23.1457(a)(1) and (2), (b), (c), (d)(1)(i), (2) and (3), (e), (f), and (g); §25.1457(a)(1) and (2), (b), (c), (d)(1)(i), (2) and (3), (e), (f), and (g); §27.1457(a)(1) and (2), (b), (c), (d)(1)(i), (2) and (3), (e), (f), and (g); or §29.1457(a)(1) and (2), (b), (c), (d)(1)(i), (2) and (3), (e), (f), and (g) of this chapter, as applicable; and

(2) Is operated continuously from the use of the checklist before the flight to completion of the final checklist at the end of the flight.

(f) In complying with this section, an approved cockpit voice recorder having an erasure feature may be used, so that at any time during the operation of the recorder, information recorded more than 15 minutes earlier may be erased or otherwise obliterated.

(g) In the event of an accident or occurrence requiring immediate notification to the National Transportation Safety Board under part 830 of its regulations that results in the termination of the flight, any operator who has installed approved flight recorders and approved cockpit voice recorders shall keep the recorded information for at least 60 days or, if requested by the Administrator or the Board, for a longer period. Information obtained from the record is used to assist in determining the cause of accidents or occurrences in connection with the investigation under part 830. The Administrator does not use the cockpit voice recorder record in any civil penalty or certificate action.

(h) All airplanes required by this section to have a cockpit voice recorder and a flight data recorder, that are manufactured before April 7, 2010, must by April 7, 2012, have a cockpit voice recorder that also—

(1) Meets the requirements of §23.1457(d)(6) or §25.1457(d)(6) of this chapter, as applicable; and

(2) If transport category, meets the requirements of §25.1457(a)(3), (a)(4), and (a)(5) of this chapter.

(i) All airplanes or rotorcraft required by this section to have a cockpit voice recorder and flight data recorder, that are manufactured on or after April 7, 2010, must have a cockpit voice recorder installed that also—

(1) Is installed in accordance with the requirements of §23.1457 (except for paragraphs (a)(6) and (d)(5)); §25.1457 (except for paragraphs (a)(6) and (d)(5)); §27.1457 (except for paragraphs (a)(6) and (d)(5)); or §29.1457 (except for paragraphs (a)(6) and (d)(5)) of this chapter, as applicable; and

(2) Retains at least the last 2 hours of recorded information using a recorder that meets the standards of TSO–C123a, or later revision.

(3) For all airplanes or rotorcraft manufactured on or after April 6, 2012, also meets the requirements of §23.1457(a)(6) and (d)(5); §25.1457(a)(6) and (d)(5); §27.1457(a)(6) and (d)(5); or §29.1457(a)(6) and (d)(5) of this chapter, as applicable.

(j) All airplanes or rotorcraft required by this section to have a cockpit voice recorder and a flight data recorder, that install datalink communication equipment on or after April 6, 2012, must record all datalink messages as required by the certification rule applicable to the aircraft.

(k) An aircraft operated under this part under deviation authority from part 125 of this chapter must comply with all of the applicable flight data

recorder requirements of part 125 applicable to the aircraft, notwithstanding such deviation authority.

[Doc. No. 18334, 54 FR 34318, Aug. 18, 1989, as amended by Amdt. 91–226, 56 FR 51621, Oct. 11, 1991; Amdt. 91–228, 57 FR 19353, May 5, 1992; Amdt. 91–300, 73 FR 12564, Mar. 7, 2008; Amdt. 91–304, 73 FR 73178, Dec. 2, 2008; Amdt. 91–300, 74 FR 32800, July 9, 2009; Amdt. 91–313, 75 FR 17045, Apr. 5, 2010]

### § 91.611 Authorization for ferry flight with one engine inoperative.

(a) *General.* The holder of an air carrier operating certificate or an operating certificate issued under part 125 may conduct a ferry flight of a four-engine airplane or a turbine-engine-powered airplane equipped with three engines, with one engine inoperative, to a base for the purpose of repairing that engine subject to the following:

(1) The airplane model has been test flown and found satisfactory for safe flight in accordance with paragraph (b) or (c) of this section, as appropriate. However, each operator who before November 19, 1966, has shown that a model of airplane with an engine inoperative is satisfactory for safe flight by a test flight conducted in accordance with performance data contained in the applicable Airplane Flight Manual under paragraph (a)(2) of this section need not repeat the test flight for that model.

(2) The approved Airplane Flight Manual contains the following performance data and the flight is conducted in accordance with that data:

(i) Maximum weight.

(ii) Center of gravity limits.

(iii) Configuration of the inoperative propeller (if applicable).

(iv) Runway length for takeoff (including temperature accountability).

(v) Altitude range.

(vi) Certificate limitations.

(vii) Ranges of operational limits.

(viii) Performance information.

(ix) Operating procedures.

(3) The operator has FAA approved procedures for the safe operation of the airplane, including specific requirements for—

(i) Limiting the operating weight on any ferry flight to the minimum necessary for the flight plus the necessary reserve fuel load;

(ii) A limitation that takeoffs must be made from dry runways unless, based on a showing of actual operating takeoff techniques on wet runways with one engine inoperative, takeoffs with full controllability from wet runways have been approved for the specific model aircraft and included in the Airplane Flight Manual:

(iii) Operations from airports where the runways may require a takeoff or approach over populated areas; and

(iv) Inspection procedures for determining the operating condition of the operative engines.

(4) No person may take off an airplane under this section if—

(i) The initial climb is over thickly populated areas; or

(ii) Weather conditions at the takeoff or destination airport are less than those required for VFR flight.

(5) Persons other than required flight crewmembers shall not be carried during the flight.

(6) No person may use a flight crewmember for flight under this section unless that crewmember is thoroughly familiar with the operating procedures for one-engine inoperative ferry flight contained in the certificate holder's manual and the limitations and performance information in the Airplane Flight Manual.

(b) *Flight tests: reciprocating-engine-powered airplanes.* The airplane performance of a reciprocating-engine-powered airplane with one engine inoperative must be determined by flight test as follows:

(1) A speed not less than 1.3 $V_{S1}$ must be chosen at which the airplane may be controlled satisfactorily in a climb with the critical engine inoperative (with its propeller removed or in a configuration desired by the operator and with all other engines operating at the maximum power determined in paragraph (b)(3) of this section.

(2) The distance required to accelerate to the speed listed in paragraph (b)(1) of this section and to climb to 50 feet must be determined with—

(i) The landing gear extended;

(ii) The critical engine inoperative and its propeller removed or in a configuration desired by the operator; and

(iii) The other engines operating at not more than maximum power established under paragraph (b)(3) of this section.

(3) The takeoff, flight and landing procedures, such as the approximate trim settings, method of power application, maximum power, and speed must be established.

(4) The performance must be determined at a maximum weight not greater than the weight that allows a rate of climb of at least 400 feet per minute in the en route configuration set forth in §25.67(d) of this chapter in effect on January 31, 1977, at an altitude of 5,000 feet.

(5) The performance must be determined using temperature accountability for the takeoff field length, computed in accordance with §25.61 of this chapter in effect on January 31, 1977.

(c) *Flight tests: Turbine-engine-powered airplanes.* The airplane performance of a turbine-engine-powered airplane with one engine inoperative must be determined by flight tests, including at least three takeoff tests, in accordance with the following:

(1) Takeoff speeds $V_R$ and $V_2$, not less than the corresponding speeds under which the airplane was type certificated under §25.107 of this chapter, must be chosen at which the airplane may be controlled satisfactorily with the critical engine inoperative (with its propeller removed or in a configuration desired by the operator, if applicable) and with all other engines operating at not more than the power selected for type certification as set forth in §25.101 of this chapter.

(2) The minimum takeoff field length must be the horizontal distance required to accelerate and climb to the 35-foot height at $V_2$ speed (including any additional speed increment obtained in the tests) multiplied by 115 percent and determined with—

(i) The landing gear extended;

(ii) The critical engine inoperative and its propeller removed or in a configuration desired by the operator (if applicable); and

(iii) The other engine operating at not more than the power selected for type certification as set forth in §25.101 of this chapter.

(3) The takeoff, flight, and landing procedures such as the approximate trim setting, method of power application, maximum power, and speed must be established. The airplane must be satisfactorily controllable during the entire takeoff run when operated according to these procedures.

(4) The performance must be determined at a maximum weight not greater than the weight determined under §25.121(c) of this chapter but with—

(i) The actual steady gradient of the final takeoff climb requirement not less than 1.2 percent at the end of the takeoff path with two critical engines inoperative; and

(ii) The climb speed not less than the two-engine inoperative trim speed for the actual steady gradient of the final takeoff climb prescribed by paragraph (c)(4)(i) of this section.

(5) The airplane must be satisfactorily controllable in a climb with two critical engines inoperative. Climb performance may be shown by calculations based on, and equal in accuracy to, the results of testing.

(6) The performance must be determined using temperature accountability for takeoff distance and final takeoff climb computed in accordance with §25.101 of this chapter.

For the purpose of paragraphs (c)(4) and (5) of this section, *two critical engines* means two adjacent engines on one side of an airplane with four engines, and the center engine and one outboard engine on an airplane with three engines.

### § 91.613 Materials for compartment interiors.

(a) No person may operate an airplane that conforms to an amended or supplemental type certificate issued in accordance with SFAR No. 41 for a maximum certificated takeoff weight in excess of 12,500 pounds unless within 1 year after issuance of the initial airworthiness certificate under that SFAR the airplane meets the compartment interior requirements set forth in §25.853 (a), (b), (b–1), (b–2), and (b–3) of this chapter in effect on September 26, 1978.

(b) Thermal/acoustic insulation materials. For transport category airplanes type certificated after January 1, 1958:

(1) For airplanes manufactured before September 2, 2005, when thermal/acoustic insulation is installed in the fuselage as replacements after September 2, 2005, the insulation must meet the flame propagation requirements of §25.856 of this chapter, effective September 2, 2003, if it is:

(i) Of a blanket construction or

(ii) Installed around air ducting.

(2) For airplanes manufactured after September 2, 2005, thermal/acoustic insulation materials installed in the fuselage must meet the flame propagation requirements of §25.856 of this chapter, effective September 2, 2003.

[Doc. No. 18334, 54 FR 34318, Aug. 18, 1989, as amended by Amdt. 91–279, 68 FR 45083, July 31, 2003; Amdt. 91–290, 70 FR 77752, Dec. 30, 2005]

### §§ 91.615–91.699 [Reserved]

## Subpart H—Foreign Aircraft Operations and Operations of U.S.-Registered Civil Aircraft Outside of the United States; and Rules Governing Persons on Board Such Aircraft

SOURCE: Docket No. 18334, 54 FR 34320, Aug. 18, 1989, unless otherwise noted.

### §91.701 Applicability.

(a) This subpart applies to the operations of civil aircraft of U.S. registry outside of the United States and the operations of foreign civil aircraft within the United States.

(b) Section 91.702 of this subpart also applies to each person on board an aircraft operated as follows:

(1) A U.S. registered civil aircraft operated outside the United States;

(2) Any aircraft operated outside the United States—

(i) That has its next scheduled destination or last place of departure in the United States if the aircraft next lands in the United States; or

(ii) If the aircraft lands in the United States with the individual still on the aircraft regardless of whether it was a scheduled or otherwise planned landing site.

[Doc. No. FAA–1998–4954, 64 FR 1079, Jan. 7, 1999]

### §91.702 Persons on board.

Section 91.11 of this part (Prohibitions on interference with crewmembers) applies to each person on board an aircraft.

[Doc. No. FAA–1998–4954, 64 FR 1079, Jan. 7, 1999]

### §91.703 Operations of civil aircraft of U.S. registry outside of the United States.

(a) Each person operating a civil aircraft of U.S. registry outside of the United States shall—

(1) When over the high seas, comply with annex 2 (Rules of the Air) to the Convention on International Civil Aviation and with §§91.117(c), 91.127, 91.129, and 91.131;

(2) When within a foreign country, comply with the regulations relating to the flight and maneuver of aircraft there in force;

(3) Except for §§91.117(a), 91.307(b), 91.309, 91.323, and 91.711, comply with this part so far as it is not inconsistent with applicable regulations of the foreign country where the aircraft is operated or annex 2 of the Convention on International Civil Aviation; and

(4) When operating within airspace designated as Minimum Navigation Performance Specifications (MNPS) airspace, comply with §91.705. When operating within airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace, comply with §91.706.

(5) For aircraft subject to ICAO Annex 16, carry on board the aircraft documents that summarize the noise operating characteristics and certifications of the aircraft that demonstrate compliance with this part and part 36 of this chapter.

(b) Annex 2 to the Convention on International Civil Aviation, Ninth Edition—July 1990, with Amendments through Amendment 32 effective February 19, 1996, to which reference is made in this part, is incorporated into this part and made a part hereof as provided in 5 U.S.C. §552 and pursuant to 1 CFR part 51. Annex 2 (including a

complete historic file of changes thereto) is available for public inspection at the Rules Docket, AGC–200, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. In addition, Annex 2 may be purchased from the International Civil Aviation Organization (Attention: Distribution Officer), P.O. Box 400, Succursale, Place de L'Aviation Internationale, 1000 Sherbrooke Street West, Montreal, Quebec, Canada H3A 2R2.

[Doc. No. 18834, 54 FR 34320, Aug. 18, 1989, as amended by Amdt. 91–227, 56 FR 65661, Dec. 17, 1991; Amdt. 91–254, 62 FR 17487, Apr. 9, 1997; 69 FR 18803, Apr. 9, 2004; Amdt. 91–299, 73 FR 10143, Feb. 26, 2008; Amdt. 91–312, 75 FR 9333, Mar. 2, 2010]

### § 91.705 Operations within airspace designated as Minimum Navigation Performance Specification Airspace.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft of U.S. registry in airspace designated as Minimum Navigation Performance Specifications airspace unless—

(1) The aircraft has approved navigation performance capability that complies with the requirements of appendix C of this part; and

(2) The operator is authorized by the Administrator to perform such operations.

(b) The Administrator may authorize a deviation from the requirements of this section in accordance with Section 3 of appendix C to this part.

[Doc. No. 28870, 62 FR 17487, Apr. 9, 1997]

### § 91.706 Operations within airspace designed as Reduced Vertical Separation Minimum Airspace.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft of U.S. registry in airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace unless:

(1) The operator and the operator's aircraft comply with the requirements of appendix G of this part; and

(2) The operator is authorized by the Administrator to conduct such operations.

(b) The Administrator may authorize a deviation from the requirements of this section in accordance with Section 5 of appendix G to this part.

[Doc. No. 28870, 62 FR 17487, Apr. 9, 1997]

### § 91.707 Flights between Mexico or Canada and the United States.

Unless otherwise authorized by ATC, no person may operate a civil aircraft between Mexico or Canada and the United States without filing an IFR or VFR flight plan, as appropriate.

### § 91.709 Operations to Cuba.

No person may operate a civil aircraft from the United States to Cuba unless—

(a) Departure is from an international airport of entry designated in § 6.13 of the Air Commerce Regulations of the Bureau of Customs (19 CFR 6.13); and

(b) In the case of departure from any of the 48 contiguous States or the District of Columbia, the pilot in command of the aircraft has filed—

(1) A DVFR or IFR flight plan as prescribed in § 99.11 or § 99.13 of this chapter; and

(2) A written statement, within 1 hour before departure, with the Office of Immigration and Naturalization Service at the airport of departure, containing—

(i) All information in the flight plan;

(ii) The name of each occupant of the aircraft;

(iii) The number of occupants of the aircraft; and

(iv) A description of the cargo, if any.

This section does not apply to the operation of aircraft by a scheduled air carrier over routes authorized in operations specifications issued by the Administrator.

(Approved by the Office of Management and Budget under control number 2120–0005)

### § 91.711 Special rules for foreign civil aircraft.

(a) *General.* In addition to the other applicable regulations of this part, each person operating a foreign civil aircraft within the United States shall comply with this section.

(b) *VFR.* No person may conduct VFR operations which require two-way radio communications under this part unless at least one crewmember of that aircraft is able to conduct two-way radio communications in the English language and is on duty during that operation.

(c) *IFR.* No person may operate a foreign civil aircraft under IFR unless—

(1) That aircraft is equipped with—

(i) Radio equipment allowing two-way radio communication with ATC when it is operated in controlled airspace; and

(ii) Navigation equipment suitable for the route to be flown.

(2) Each person piloting the aircraft—

(i) Holds a current United States instrument rating or is authorized by his foreign airman certificate to pilot under IFR; and

(ii) Is thoroughly familiar with the United States en route, holding, and letdown procedures; and

(3) At least one crewmember of that aircraft is able to conduct two-way radiotelephone communications in the English language and that crewmember is on duty while the aircraft is approaching, operating within, or leaving the United States.

(d) *Over water.* Each person operating a foreign civil aircraft over water off the shores of the United States shall give flight notification or file a flight plan in accordance with the Supplementary Procedures for the ICAO region concerned.

(e) *Flight at and above FL 240.* If VOR navigation equipment is required under paragraph (c)(1)(ii) of this section, no person may operate a foreign civil aircraft within the 50 States and the District of Columbia at or above FL 240, unless the aircraft is equipped with approved DME or a suitable RNAV system. When the DME or RNAV system required by this paragraph fails at and above FL 240, the pilot in command of the aircraft must notify ATC immediately and may then continue operations at and above FL 240 to the next airport of intended landing where repairs or replacement of the equipment can be made. A foreign civil aircraft may be operated within the 50 States and the District of Columbia at or above FL 240 without DME or an RNAV system when operated for the following purposes, and ATC is notified before each takeoff:

(1) Ferry flights to and from a place in the United States where repairs or alterations are to be made.

(2) Ferry flights to a new country of registry.

(3) Flight of a new aircraft of U.S. manufacture for the purpose of—

(i) Flight testing the aircraft;

(ii) Training foreign flight crews in the operation of the aircraft; or

(iii) Ferrying the aircraft for export delivery outside the United States.

(4) Ferry, demonstration, and test flight of an aircraft brought to the United States for the purpose of demonstration or testing the whole or any part thereof.

[Doc. No. 18834, 54 FR 34320, Aug. 18, 1989, as amended by Amdt. 91–227, 56 FR 65661, Dec. 17, 1991; Amdt. 91–296, 72 FR 31679, June 7, 2007]

### § 91.713 Operation of civil aircraft of Cuban registry.

No person may operate a civil aircraft of Cuban registry except in controlled airspace and in accordance with air traffic clearance or air traffic control instructions that may require use of specific airways or routes and landings at specific airports.

### § 91.715 Special flight authorizations for foreign civil aircraft.

(a) Foreign civil aircraft may be operated without airworthiness certificates required under § 91.203 if a special flight authorization for that operation is issued under this section. Application for a special flight authorization must be made to the Flight Standards Division Manager or Aircraft Certification Directorate Manager of the FAA region in which the applicant is located or to the region within which the U.S. point of entry is located. However, in the case of an aircraft to be operated in

the U.S. for the purpose of demonstration at an airshow, the application may be made to the Flight Standards Division Manager or Aircraft Certification Directorate Manager of the FAA region in which the airshow is located.

(b) The Administrator may issue a special flight authorization for a foreign civil aircraft subject to any conditions and limitations that the Administrator considers necessary for safe operation in the U.S. airspace.

(c) No person may operate a foreign civil aircraft under a special flight authorization unless that operation also complies with part 375 of the Special Regulations of the Department of Transportation (14 CFR part 375).

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34320, Aug. 18, 1989, as amended by Amdt. 91–212, 54 FR 39293, Sept. 25, 1989]

**§§ 91.717–91.799 [Reserved]**

## Subpart I—Operating Noise Limits

SOURCE: Docket No. 18334, 54 FR 34321, Aug. 18, 1989, unless otherwise noted.

### § 91.801 Applicability: Relation to part 36.

(a) This subpart prescribes operating noise limits and related requirements that apply, as follows, to the operation of civil aircraft in the United States.

(1) Sections 91.803, 91.805, 91.807, 91.809, and 91.811 apply to civil subsonic jet (turbojet) airplanes with maximum weights of more than 75,000 pounds and—

(i) If U.S. registered, that have standard airworthiness certificates; or

(ii) If foreign registered, that would be required by this chapter to have a U.S. standard airworthiness certificate in order to conduct the operations intended for the airplane were it registered in the United States. Those sections apply to operations to or from airports in the United States under this part and parts 121, 125, 129, and 135 of this chapter.

(2) Section 91.813 applies to U.S. operators of civil subsonic jet (turbojet) airplanes covered by this subpart. This section applies to operators operating to or from airports in the United States under this part and parts 121, 125, and 135, but not to those operating under part 129 of this chapter.

(3) Sections 91.803, 91.819, and 91.821 apply to U.S.-registered civil supersonic airplanes having standard airworthiness certificates and to foreign-registered civil supersonic airplanes that, if registered in the United States, would be required by this chapter to have U.S. standard airworthiness certificates in order to conduct the operations intended for the airplane. Those sections apply to operations under this part and under parts 121, 125, 129, and 135 of this chapter.

(b) Unless otherwise specified, as used in this subpart ''part 36'' refers to 14 CFR part 36, including the noise levels under appendix C of that part, notwithstanding the provisions of that part excepting certain airplanes from the specified noise requirements. For purposes of this subpart, the various stages of noise levels, the terms used to describe airplanes with respect to those levels, and the terms ''subsonic airplane'' and ''supersonic airplane'' have the meanings specified under part 36 of this chapter. For purposes of this subpart, for subsonic airplanes operated in foreign air commerce in the United States, the Administrator may accept compliance with the noise requirements under annex 16 of the International Civil Aviation Organization when those requirements have been shown to be substantially compatible with, and achieve results equivalent to those achievable under, part 36 for that airplane. Determinations made under these provisions are subject to the limitations of § 36.5 of this chapter as if those noise levels were part 36 noise levels.

(c) Sections 91.851 through 91.877 of this subpart prescribe operating noise limits and related requirements that apply to any civil subsonic jet (turbojet) airplane (for which an airworthiness certificate other than an experimental certificate has been issued by the Administrator) with a maximum certificated takeoff weight of more than 75,000 pounds operating to or from an airport in the 48 contiguous United States and the District of Columbia under this part, parts 121, 125, 129, or

135 of this chapter on and after September 25, 1991.

(d) Section 91.877 prescribes reporting requirements that apply to any civil subsonic jet (turbojet) airplane with a maximum weight of more than 75,000 pounds operated by an air carrier or foreign air carrier between the contiguous United States and the State of Hawaii, between the State of Hawaii and any point outside of the 48 contiguous United States, or between the islands of Hawaii in turnaround service, under part 121 or 129 of this chapter on or after November 5, 1990.

(e) Sections 91.881 through 91.883 of this subpart prescribe operating noise limits and related requirements that apply to any civil subsonic jet airplane with a maximum takeoff weight of 75,000 pounds or less and for which an airworthiness certificate (other than an experimental certificate) has been issued, operating to or from an airport in the contiguous United States under this part, part 121, 125, 129, or 135 of this chapter on and after December 31, 2015.

[Doc. No. 18334, 54 FR 34321, Aug. 18, 1989; Amdt. 91–211, 54 FR 41211, Oct. 5, 1989, as amended by Amdt. 91–225, 56 FR 48658, Sept. 25, 1991; Amdt. 91–252, 61 FR 66185, Dec. 16, 1996; Amdt. 91–275, 67 FR 45237, July 8, 2002; Amdt. 91–276, 67 FR 46571, July 15, 2002; Amdt. 91–328, 78 FR 39583, July 2, 2013]

### § 91.803 Part 125 operators: Designation of applicable regulations.

For airplanes covered by this subpart and operated under part 125 of this chapter, the following regulations apply as specified:

(a) For each airplane operation to which requirements prescribed under this subpart applied before November 29, 1980, those requirements of this subpart continue to apply.

(b) For each subsonic airplane operation to which requirements prescribed under this subpart did not apply before November 29, 1980, because the airplane was not operated in the United States under this part or part 121, 129, or 135 of this chapter, the requirements prescribed under §91.805 of this subpart apply.

(c) For each supersonic airplane operation to which requirements prescribed under this subpart did not apply before November 29, 1980, because the airplane was not operated in the United States under this part or part 121, 129, or 135 of this chapter, the requirements of §§91.819 and 91.821 of this subpart apply.

(d) For each airplane required to operate under part 125 for which a deviation under that part is approved to operate, in whole or in part, under this part or part 121, 129, or 135 of this chapter, notwithstanding the approval, the requirements prescribed under paragraphs (a), (b), and (c) of this section continue to apply.

[Doc. No. 18334, 54 FR 34321, Aug. 18, 1989, as amended by Amdt. 91–276, 67 FR 46571, July 15, 2002]

### § 91.805 Final compliance: Subsonic airplanes.

Except as provided in §§91.809 and 91.811, on and after January 1, 1985, no person may operate to or from an airport in the United States any subsonic airplane covered by this subpart unless that airplane has been shown to comply with Stage 2 or Stage 3 noise levels under part 36 of this chapter.

### §§ 91.807–91.813 [Reserved]

### § 91.815 Agricultural and fire fighting airplanes: Noise operating limitations.

(a) This section applies to propeller-driven, small airplanes having standard airworthiness certificates that are designed for ''agricultural aircraft operations'' (as defined in §137.3 of this chapter, as effective on January 1, 1966) or for dispensing fire fighting materials.

(b) If the Airplane Flight Manual, or other approved manual material information, markings, or placards for the airplane indicate that the airplane has not been shown to comply with the noise limits under part 36 of this chapter, no person may operate that airplane, except—

(1) To the extent necessary to accomplish the work activity directly associated with the purpose for which it is designed;

(2) To provide flight crewmember training in the special purpose operation for which the airplane is designed; and

(3) To conduct ''nondispensing aerial work operations'' in accordance with the requirements under §137.29(c) of this chapter.

### §91.817 Civil aircraft sonic boom.

(a) No person may operate a civil aircraft in the United States at a true flight Mach number greater than 1 except in compliance with conditions and limitations in an authorization to exceed Mach 1 issued to the operator under appendix B of this part.

(b) In addition, no person may operate a civil aircraft for which the maximum operating limit speed $M_{MO}$ exceeds a Mach number of 1, to or from an airport in the United States, unless—

(1) Information available to the flight crew includes flight limitations that ensure that flights entering or leaving the United States will not cause a sonic boom to reach the surface within the United States; and

(2) The operator complies with the flight limitations prescribed in paragraph (b)(1) of this section or complies with conditions and limitations in an authorization to exceed Mach 1 issued under appendix B of this part.

(Approved by the Office of Management and Budget under control number 2120–0005)

### §91.819 Civil supersonic airplanes that do not comply with part 36.

(a) *Applicability*. This section applies to civil supersonic airplanes that have not been shown to comply with the Stage 2 noise limits of part 36 in effect on October 13, 1977, using applicable trade-off provisions, and that are operated in the United States, after July 31, 1978.

(b) *Airport use*. Except in an emergency, the following apply to each person who operates a civil supersonic airplane to or from an airport in the United States:

(1) Regardless of whether a type design change approval is applied for under part 21 of this chapter, no person may land or take off an airplane covered by this section for which the type design is changed, after July 31, 1978, in a manner constituting an ''acoustical change'' under §21.93 unless the acoustical change requirements of part 36 are complied with.

(2) No flight may be scheduled, or otherwise planned, for takeoff or landing after 10 p.m. and before 7 a.m. local time.

### §91.821 Civil supersonic airplanes: Noise limits.

Except for Concorde airplanes having flight time before January 1, 1980, no person may operate in the United States, a civil supersonic airplane that does not comply with Stage 2 noise limits of part 36 in effect on October 13, 1977, using applicable trade-off provisions.

### §§91.823–91.849 [Reserved]

### §91.851 Definitions.

For the purposes of §§91.851 through 91.877 of this subpart:

*Chapter 4 noise level* means a noise level at or below the maximum noise level prescribed in Chapter 4, Paragraph 4.4, Maximum Noise Levels, of the International Civil Aviation Organization (ICAO) Annex 16, Volume I, Amendment 7, effective March 21, 2002. The Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 approved the incorporation by reference of this document, which can be obtained from the International Civil Aviation Organization (ICAO), Document Sales Unit, 999 University Street, Montreal, Quebec H3C 5H7, Canada. Also, you may obtain documents on the Internet at *http://www.ICAO.int/eshop/index.cfm*. Copies may be reviewed at the U.S. Department of Transportation, Docket Operations, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html*.

*Contiguous United States* means the area encompassed by the 48 contiguous United States and the District of Columbia.

*Fleet* means those civil subsonic jet (turbojet) airplanes with a maximum certificated weight of more than 75,000 pounds that are listed on an operator's

operations specifications as eligible for operation in the contiguous United States.

*Import* means a change in ownership of an airplane from a non-U.S. person to a U.S. person when the airplane is brought into the United States for operation.

*Operations specifications* means an enumeration of airplanes by type, model, series, and serial number operated by the operator or foreign air carrier on a given day, regardless of how or whether such airplanes are formally listed or designated by the operator.

*Owner* means any person that has indicia of ownership sufficient to register the airplane in the United States pursuant to part 47 of this chapter.

*New entrant* means an air carrier or foreign air carrier that, on or before November 5, 1990, did not conduct operations under part 121 or 129 of this chapter using an airplane covered by this subpart to or from any airport in the contiguous United States, but that initiates such operation after that date.

*Stage 2 noise levels* mean the requirements for Stage 2 noise levels as defined in part 36 of this chapter in effect on November 5, 1990.

*Stage 3 noise levels* mean the requirements for Stage 3 noise levels as defined in part 36 of this chapter in effect on November 5, 1990.

*Stage 4 noise level* means a noise level at or below the Stage 4 noise limit prescribed in part 36 of this chapter.

*Stage 2 airplane* means a civil subsonic jet (turbojet) airplane with a maximum certificated weight of 75,000 pounds or more that complies with Stage 2 noise levels as defined in part 36 of this chapter.

*Stage 3 airplane* means a civil subsonic jet (turbojet) airplane with a maximum certificated weight of 75,000 pounds or more that complies with Stage 3 noise levels as defined in part 36 of this chapter.

*Stage 4 airplane* means an airplane that has been shown not to exceed the Stage 4 noise limit prescribed in part 36 of this chapter. A Stage 4 airplane complies with all of the noise operating rules of this part.

[Doc. No. 26433, 56 FR 48658, Sept. 25, 1991, as amended by Amdt. 91–252, 61 FR 66185, Dec. 16, 1996; Amdt. 91–275, 67 FR 45237, July 8, 2002; Amdt. 91–288, 70 FR 38749, July 5, 2005; 72 FR 68475, Dec. 5, 2007]

### § 91.853 Final compliance: Civil subsonic airplanes.

Except as provided in § 91.873, after December 31, 1999, no person shall operate to or from any airport in the contiguous United States any airplane subject to § 91.801(c) of this subpart, unless that airplane has been shown to comply with Stage 3 or Stage 4 noise levels.

[Doc. No. FAA–2003–16526, 70 FR 38749, July 5, 2005]

### § 91.855 Entry and nonaddition rule.

No person may operate any airplane subject to § 91.801(c) of this subpart to or from an airport in the contiguous United States unless one or more of the following apply:

(a) The airplane complies with Stage 3 or Stage 4 noise levels.

(b) The airplane complies with Stage 2 noise levels and was owned by a U.S. person on and since November 5, 1990. Stage 2 airplanes that meet these criteria and are leased to foreign airlines are also subject to the return provisions of paragraph (e) of this section.

(c) The airplane complies with Stage 2 noise levels, is owned by a non-U.S. person, and is the subject of a binding lease to a U.S. person effective before and on September 25, 1991. Any such airplane may be operated for the term of the lease in effect on that date, and any extensions thereof provided for in that lease.

(d) The airplane complies with Stage 2 noise levels and is operated by a foreign air carrier.

(e) The airplane complies with Stage 2 noise levels and is operated by a foreign operator other than for the purpose of foreign air commerce.

(f) The airplane complies with Stage 2 noise levels and—

(1) On November 5, 1990, was owned by:

(i) A corporation, trust, or partnership organized under the laws of the United States or any State (including

individual States, territories, possessions, and the District of Columbia);

(ii) An individual who is a citizen of the United States; or

(iii) An entity owned or controlled by a corporation, trust, partnership, or individual described in paragraph (f)(1) (i) or (ii) of this section; and

(2) Enters into the United States not later than 6 months after the expiration of a lease agreement (including any extensions thereof) between an owner described in paragraph (f)(1) of this section and a foreign airline.

(g) The airplane complies with Stage 2 noise levels and was purchased by the importer under a written contract executed before November 5, 1990.

(h) Any Stage 2 airplane described in this section is eligible for operation in the contiguous United States only as provided under § 91.865 or 91.867.

[Doc. No. 26433, 56 FR 48658, Sept. 25, 1991; 56 FR 51167, Oct. 10, 1991, as amended by Amdt. 91–288, 70 FR 38750, July 5, 2005]

### § 91.857 Stage 2 operations outside of the 48 contiguous United States.

An operator of a Stage 2 airplane that is operating only between points outside the contiguous United States on or after November 5, 1990, must include in its operations specifications a statement that such airplane may not be used to provide air transportation to or from any airport in the contiguous United States.

[Doc. No. FAA–2002–12771, 67 FR 46571, July 15, 2002]

### § 91.858 Special flight authorizations for non-revenue Stage 2 operations.

(a) After December 31, 1999, any operator of a Stage 2 airplane over 75,000 pounds may operate that airplane in nonrevenue service in the contiguous United States only for the following purposes:

(1) Sell, lease, or scrap the airplane;

(2) Obtain modifications to meet Stage 3 noise levels;

(3) Obtain scheduled heavy maintenance or significant modifications;

(4) Deliver the airplane to a lessee or return it to a lessor;

(5) Park or store the airplane; and

(6) Prepare the airplane for any of the purposes listed in paragraph (a)(1) thru (a)(5) of this section.

(b) An operator of a Stage 2 airplane that needs to operate in the contiguous United States for any of the purposes listed above may apply to FAA's Office of Environment and Energy for a special flight authorization. The applicant must file in advance. Applications are due 30 days in advance of the planned flight and must provide the information necessary for the FAA to determine that the planned flight is within the limits prescribed in the law.

[Doc. No. FAA–2002–12771, 67 FR 46571, July 15, 2002]

### § 91.859 Modification to meet Stage 3 or Stage 4 noise levels.

For an airplane subject to § 91.801(c) of this subpart and otherwise prohibited from operation to or from an airport in the contiguous United States by § 91.855, any person may apply for a special flight authorization for that airplane to operate in the contiguous United States for the purpose of obtaining modifications to meet Stage 3 or Stage 4 noise levels.

[Doc. No. FAA–2003–16526, 70 FR 38750, July 5, 2005]

### § 91.861 Base level.

(a) *U.S. Operators.* The base level of a U.S. operator is equal to the number of owned or leased Stage 2 airplanes subject to § 91.801(c) of this subpart that were listed on that operator's operations specifications for operations to or from airports in the contiguous United States on any one day selected by the operator during the period January 1, 1990, through July 1, 1991, plus or minus adjustments made pursuant to paragraphs (a) (1) and (2).

(1) The base level of a U.S. operator shall be increased by a number equal to the total of the following—

(i) The number of Stage 2 airplanes returned to service in the United States pursuant to § 91.855(f);

(ii) The number of Stage 2 airplanes purchased pursuant to § 91.855(g); and

(iii) Any U.S. operator base level acquired with a Stage 2 airplane transferred from another person under § 91.863.

(2) The base level of a U.S. operator shall be decreased by the amount of U.S. operator base level transferred

with the corresponding number of Stage 2 airplanes to another person under § 91.863.

(b) Foreign air carriers. The base level of a foreign air carrier is equal to the number of owned or leased Stage 2 airplanes that were listed on that carrier's U.S. operations specifications on any one day during the period January 1, 1990, through July 1, 1991, plus or minus any adjustments to the base levels made pursuant to paragraphs (b) (1) and (2).

(1) The base level of a foreign air carrier shall be increased by the amount of foreign air carrier base level acquired with a Stage 2 airplane from another person under § 91.863.

(2) The base level of a foreign air carrier shall be decreased by the amount of foreign air carrier base level transferred with a Stage 2 airplane to another person under § 91.863.

(c) New entrants do not have a base level.

[Doc. No. 26433, 56 FR 48659, Sept. 25, 1991; 56 FR 51167, Oct. 10, 1991]

### § 91.863 Transfers of Stage 2 airplanes with base level.

(a) Stage 2 airplanes may be transferred with or without the corresponding amount of base level. Base level may not be transferred without the corresponding number of Stage 2 airplanes.

(b) No portion of a U.S. operator's base level established under § 91.861(a) may be used for operations by a foreign air carrier. No portion of a foreign air carrier's base level established under § 91.861(b) may be used for operations by a U.S. operator.

(c) Whenever a transfer of Stage 2 airplanes with base level occurs, the transferring and acquiring parties shall, within 10 days, jointly submit written notification of the transfer to the FAA, Office of Environment and Energy. Such notification shall state:

(1) The names of the transferring and acquiring parties;

(2) The name, address, and telephone number of the individual responsible for submitting the notification on behalf of the transferring and acquiring parties;

(3) The total number of Stage 2 airplanes transferred, listed by airplane type, model, series, and serial number;

(4) The corresponding amount of base level transferred and whether it is U.S. operator or foreign air carrier base level; and

(5) The effective date of the transaction.

(d) If, taken as a whole, a transaction or series of transactions made pursuant to this section does not produce an increase or decrease in the number of Stage 2 airplanes for either the acquiring or transferring operator, such transaction or series of transactions may not be used to establish compliance with the requirements of § 91.865.

[Doc. No. 26433, 56 FR 48659, Sept. 25, 1991]

### § 91.865 Phased compliance for operators with base level.

Except as provided in paragraph (a) of this section, each operator that operates an airplane under part 91, 121, 125, 129, or 135 of this chapter, regardless of the national registry of the airplane, shall comply with paragraph (b) or (d) of this section at each interim compliance date with regard to its subsonic airplane fleet covered by § 91.801(c) of this subpart.

(a) This section does not apply to new entrants covered by § 91.867 or to foreign operators not engaged in foreign air commerce.

(b) Each operator that chooses to comply with this paragraph pursuant to any interim compliance requirement shall reduce the number of Stage 2 airplanes it operates that are eligible for operation in the contiguous United States to a maximum of:

(1) After December 31, 1994, 75 percent of the base level held by the operator;

(2) After December 31, 1996, 50 percent of the base level held by the operator;

(3) After December 31, 1998, 25 percent of the base level held by the operator.

(c) Except as provided under § 91.871, the number of Stage 2 airplanes that must be reduced at each compliance date contained in paragraph (b) of this section shall be determined by reference to the amount of base level held by the operator on that compliance date, as calculated under § 91.861.

(d) Each operator that chooses to comply with this paragraph pursuant

to any interim compliance requirement shall operate a fleet that consists of:

(1) After December 31, 1994, not less than 55 percent Stage 3 airplanes;

(2) After December 31, 1996, not less than 65 percent Stage 3 airplanes;

(3) After December 31, 1998, not less than 75 percent Stage 3 airplanes.

(e) Calculations resulting in fractions may be rounded to permit the continued operation of the next whole number of Stage 2 airplanes.

[Doc. No. 26433, 56 FR 48659, Sept. 25, 1991]

### § 91.867 Phased compliance for new entrants.

(a) New entrant U.S. air carriers.

(1) A new entrant initiating operations under part 121 of this chapter on or before December 31, 1994, may initiate service without regard to the percentage of its fleet composed of Stage 3 airplanes.

(2) After December 31, 1994, at least 25 percent of the fleet of a new entrant must comply with Stage 3 noise levels.

(3) After December 31, 1996, at least 50 percent of the fleet of a new entrant must comply with Stage 3 noise levels.

(4) After December 31, 1998, at least 75 percent of the fleet of a new entrant must comply with Stage 3 noise levels.

(b) New entrant foreign air carriers.

(1) A new entrant foreign air carrier initiating part 129 operations on or before December 31, 1994, may initiate service without regard to the percentage of its fleet composed of Stage 3 airplanes.

(2) After December 31, 1994, at least 25 percent of the fleet on U.S. operations specifications of a new entrant foreign air carrier must comply with Stage 3 noise levels.

(3) After December 31, 1996, at least 50 percent of the fleet on U.S. operations specifications of a new entrant foreign air carrier must comply with Stage 3 noise levels.

(4) After December 31, 1998, at least 75 percent of the fleet on U.S. operations specifications of a new entrant foreign air carrier must comply with Stage 3 noise levels.

(c) Calculations resulting in fractions may be rounded to permit the continued operation of the next whole number of Stage 2 airplanes.

[Doc. No. 26433, 56 FR 48659, Sept. 25, 1991, as amended by Amdt. 91–252, 61 FR 66185, Dec. 16, 1996]

### § 91.869 Carry-forward compliance.

(a) Any operator that exceeds the requirements of paragraph (b) of § 91.865 of this part on or before December 31, 1994, or on or before December 31, 1996, may claim a credit that may be applied at a subsequent interim compliance date.

(b) Any operator that eliminates or modifies more Stage 2 airplanes pursuant to § 91.865(b) than required as of December 31, 1994, or December 31, 1996, may count the number of additional Stage 2 airplanes reduced as a credit toward—

(1) The number of Stage 2 airplanes it would otherwise be required to reduce following a subsequent interim compliance date specified in § 91.865(b); or

(2) The number of Stage 3 airplanes it would otherwise be required to operate in its fleet following a subsequent interim compliance date to meet the percentage requirements specified in § 91.865(d).

[Doc. No. 26433, 56 FR 48659, Sept. 25, 1991; 56 FR 65783, Dec. 18, 1991]

### § 91.871 Waivers from interim compliance requirements.

(a) Any U.S. operator or foreign air carrier subject to the requirements of § 91.865 or 91.867 of this subpart may request a waiver from any individual compliance requirement.

(b) Applications must be filed with the Secretary of Transportation at least 120 days prior to the compliance date from which the waiver is requested.

(c) Applicants must show that a grant of waiver would be in the public interest, and must include in its application its plans and activities for modifying its fleet, including evidence of good faith efforts to comply with the requirements of § 91.865 or § 91.867. The application should contain all information the applicant considers relevant, including, as appropriate, the following:

(1) The applicant's balance sheet and cash flow positions;

(2) The composition of the applicant's current fleet; and

(3) The applicant's delivery position with respect to new airplanes or noise-abatement equipment.

(d) Waivers will be granted only upon a showing by the applicant that compliance with the requirements of §91.865 or 91.867 at a particular interim compliance date is financially onerous, physically impossible, or technologically infeasible, or that it would have an adverse effect on competition or on service to small communities.

(e) The conditions of any waiver granted under this section shall be determined by the circumstances presented in the application, but in no case may the term extend beyond the next interim compliance date.

(f) A summary of any request for a waiver under this section will be published in the FEDERAL REGISTER, and public comment will be invited. Unless the Secretary finds that circumstances require otherwise, the public comment period will be at least 14 days.

[Doc. No. 26433, 56 FR 48660, Sept. 25, 1991]

### §91.873 Waivers from final compliance.

(a) A U.S. air carrier or a foreign air carrier may apply for a waiver from the prohibition contained in §91.853 of this part for its remaining Stage 2 airplanes, provided that, by July 1, 1999, at least 85 percent of the airplanes used by the carrier to provide service to or from an airport in the contiguous United States will comply with the Stage 3 noise levels.

(b) An application for the waiver described in paragraph (a) of this section must be filed with the Secretary of Transportation no later than January 1, 1999, or, in the case of a foreign air carrier, no later than April 20, 2000. Such application must include a plan with firm orders for replacing or modifying all airplanes to comply with Stage 3 noise levels at the earliest practicable time.

(c) To be eligible to apply for the waiver under this section, a new entrant U.S. air carrier must initiate service no later than January 1, 1999, and must comply fully with all provisions of this section.

(d) The Secretary may grant a waiver under this section if the Secretary finds that granting such waiver is in the public interest. In making such a finding, the Secretary shall include consideration of the effect of granting such waiver on competition in the air carrier industry and the effect on small community air service, and any other information submitted by the applicant that the Secretary considers relevant.

(e) The term of any waiver granted under this section shall be determined by the circumstances presented in the application, but in no case will the waiver permit the operation of any Stage 2 airplane covered by this subchapter in the contiguous United States after December 31, 2003.

(f) A summary of any request for a waiver under this section will be published in the FEDERAL REGISTER, and public comment will be invited. Unless the secretary finds that circumstances require otherwise, the public comment period will be at least 14 days.

[Doc. No. 26433, 56 FR 48660, Sept. 25, 1991; 56 FR 51167 Oct. 10, 1991; Amdt. 91–276, 67 FR 46571, July 15, 2002]

### §91.875 Annual progress reports.

(a) Each operator subject to §91.865 or §91.867 of this chapter shall submit an annual report to the FAA, Office of Environment and Energy, on the progress it has made toward complying with the requirements of that section. Such reports shall be submitted no later than 45 days after the end of a calendar year. All progress reports must provide the information through the end of the calendar year, be certified by the operator as true and complete (under penalty of 18 U.S.C. 1001), and include the following information:

(1) The name and address of the operator;

(2) The name, title, and telephone number of the person designated by the operator to be responsible for ensuring the accuracy of the information in the report;

(3) The operator's progress during the reporting period toward compliance with the requirements of §91.853, §91.865 or §91.867. For airplanes on U.S.

operations specifications, each operator shall identify the airplanes by type, model, series, and serial number.

(i) Each Stage 2 airplane added or removed from operation or U.S. operations specifications (grouped separately by those airplanes acquired with and without base level);

(ii) Each Stage 2 airplane modified to Stage 3 noise levels (identifying the manufacturer and model of noise abatement retrofit equipment;

(iii) Each Stage 3 airplane on U.S. operations specifications as of the last day of the reporting period; and

(iv) For each Stage 2 airplane transferred or acquired, the name and address of the recipient or transferor; and, if base level was transferred, the person to or from whom base level was transferred or acquired pursuant to Section 91.863 along with the effective date of each base level transaction, and the type of base level transferred or acquired.

(b) Each operator subject to § 91.865 or § 91.867 of this chapter shall submit an initial progress report covering the period from January 1, 1990, through December 31, 1991, and provide:

(1) For each operator subject to § 91.865:

(i) The date used to establish its base level pursuant to § 91.861(a); and

(ii) A list of those Stage 2 airplanes (by type, model, series and serial number) in its base level, including adjustments made pursuant to § 91.861 after the date its base level was established.

(2) For each U.S. operator:

(i) A plan to meet the compliance schedules in § 91.865 or § 91.867 and the final compliance date of § 91.853, including the schedule for delivery of replacement Stage 3 airplanes or the installation of noise abatement retrofit equipment; and

(ii) A separate list (by type, model, series, and serial number) of those airplanes included in the operator's base level, pursuant to § 91.861(a)(1) (i) and (ii), under the categories ''returned'' or ''purchased,'' along with the date each was added to its operations specifications.

(c) Each operator subject to § 91.865 or § 91.867 of this chapter shall submit subsequent annual progress reports covering the calendar year preceding the report and including any changes in the information provided in paragraphs (a) and (b) of this section; including the use of any carry-forward credits pursuant to § 91.869.

(d) An operator may request, in any report, that specific planning data be considered proprietary.

(e) If an operator's actions during any reporting period cause it to achieve compliance with § 91.853, the report should include a statement to that effect. Further progress reports are not required unless there is any change in the information reported pursuant to paragraph (a) of this section.

(f) For each U.S. operator subject to § 91.865, progress reports submitted for calendar years 1994, 1996, and 1998, shall also state how the operator achieved compliance with the requirements of that section, i.e.—

(1) By reducing the number of Stage 2 airplanes in its fleet to no more than the maximum permitted percentage of its base level under § 91.865(b), or

(2) By operating a fleet that consists of at least the minimum required percentage of Stage 3 airplanes under § 91.865(d).

(Approved by the Office of Management and Budget under control number 2120–0553)

[Doc. No. 26433, 56 FR 48660, Sept. 25, 1991; 56 FR 51168, Oct. 10, 1991, as amended by 57 FR 5977, Feb. 19, 1992]

### § 91.877 Annual reporting of Hawaiian operations.

(a) Each air carrier or foreign air carrier subject to § 91.865 or § 91.867 of this part that conducts operations between the contiguous United States and the State of Hawaii, between the State of Hawaii and any point outside of the contiguous United States, or between the islands of Hawaii in turnaround service, on or since November 5, 1990, shall include in its annual report the information described in paragraph (c) of this section.

(b) Each air carrier or foreign air carrier not subject to § 91.865 or § 91.867 of this part that conducts operations between the contiguous U.S. and the State of Hawaii, between the State of Hawaii and any point outside of the contiguous United States, or between the islands of Hawaii in turnaround service, on or since November 5, 1990,

shall submit an annual report to the FAA, Office of Environment and Energy, on its compliance with the Hawaiian operations provisions of 49 U.S.C. 47528. Such reports shall be submitted no later than 45 days after the end of a calendar year. All progress reports must provide the information through the end of the calendar year, be certified by the operator as true and complete (under penalty of 18 U.S.C. 1001), and include the following information—

(1) The name and address of the air carrier or foreign air carrier;

(2) The name, title, and telephone number of the person designated by the air carrier or foreign air carrier to be responsible for ensuring the accuracy of the information in the report; and

(3) The information specified in paragraph (c) of this section.

(c) The following information must be included in reports filed pursuant to this section—

(1) For operations conducted between the contiguous United States and the State of Hawaii—

(i) The number of Stage 2 airplanes used to conduct such operations as of November 5, 1990;

(ii) Any change to that number during the calendar year being reported, including the date of such change;

(2) For air carriers that conduct inter-island turnaround service in the State of Hawaii—

(i) The number of Stage 2 airplanes used to conduct such operations as of November 5, 1990;

(ii) Any change to that number during the calendar year being reported, including the date of such change;

(iii) For an air carrier that provided inter-island trunaround service within the state of Hawaii on November 5, 1990, the number reported under paragraph (c)(2)(i) of this section may include all Stage 2 airplanes with a maximum certificated takeoff weight of more than 75,000 pounds that were owned or leased by the air carrier on November 5, 1990, regardless of whether such airplanes were operated by that air carrier or foreign air carrier on that date.

(3) For operations conducted between the State of Hawaii and a point outside the contiguous United States—

(i) The number of Stage 2 airplanes used to conduct such operations as of November 5, 1990; and

(ii) Any change to that number during the calendar year being reported, including the date of such change.

(d) Reports or amended reports for years predating this regulation are required to be filed concurrently with the next annual report.

[Doc. No. 28213, 61 FR 66185, Dec. 16, 1996]

### §§ 91.879–91.880 [Reserved]

### § 91.881 Final compliance: Civil subsonic jet airplanes weighing 75,000 pounds or less.

Except as provided in §91.883, after December 31, 2015, a person may not operate to or from an airport in the contiguous United States a civil subsonic jet airplane subject to §91.801(e) of this subpart unless that airplane has been shown to comply with Stage 3 noise levels.

[Doc. No. FAA–2013–0503, 78 FR 39583, July 2, 2013]

### § 91.883 Special flight authorizations for jet airplanes weighing 75,000 pounds or less.

(a) After December 31, 2015, an operator of a jet airplane weighing 75,000 pounds or less that does not comply with Stage 3 noise levels may, when granted a special flight authorization by the FAA, operate that airplane in the contiguous United States only for one of the following purposes:

(1) To sell, lease, or use the airplane outside the 48 contiguous States;

(2) To scrap the airplane;

(3) To obtain modifications to the airplane to meet Stage 3 noise levels;

(4) To perform scheduled heavy maintenance or significant modifications on the airplane at a maintenance facility located in the contiguous 48 States;

(5) To deliver the airplane to an operator leasing the airplane from the owner or return the airplane to the lessor;

(6) To prepare, park, or store the airplane in anticipation of any of the activities described in paragraphs (a)(1) through (a)(5) of this section;

(7) To provide transport of persons and goods in the relief of an emergency situation; or

(8) To divert the airplane to an alternative airport in the 48 contiguous States on account of weather, mechanical, fuel, air traffic control, or other safety reasons while conducting a flight in order to perform any of the activities described in paragraphs (a)(1) through (a)(7) of this section.

(b) An operator of an affected airplane may apply for a special flight authorization for one of the purposes listed in paragraph (a) of this section by filing an application with the FAA's Office of Environment and Energy. Except for emergency relief authorizations sought under paragraph (a)(7) of this section, applications must be filed at least 30 days in advance of the planned flight. All applications must provide the information necessary for the FAA to determine that the planned flight is within the limits prescribed in the law.

[Doc. No. FAA–2013–0503, 78 FR 39583, July 2, 2013]

**§§ 91.884–91.899 [Reserved]**

## Subpart J—Waivers

**§ 91.901 [Reserved]**

**§ 91.903 Policy and procedures.**

(a) The Administrator may issue a certificate of waiver authorizing the operation of aircraft in deviation from any rule listed in this subpart if the Administrator finds that the proposed operation can be safely conducted under the terms of that certificate of waiver.

(b) An application for a certificate of waiver under this part is made on a form and in a manner prescribed by the Administrator and may be submitted to any FAA office.

(c) A certificate of waiver is effective as specified in that certificate of waiver.

[Doc. No. 18334, 54 FR 34325, Aug. 18, 1989]

**§ 91.905 List of rules subject to waivers.**

Sec.

91.107 Use of safety belts.
91.111 Operating near other aircraft.
91.113 Right-of-way rules: Except water operations.
91.115 Right-of-way rules: Water operations.
91.117 Aircraft speed.
91.119 Minimum safe altitudes: General.
91.121 Altimeter settings.
91.123 Compliance with ATC clearances and instructions.
91.125 ATC light signals.
91.126 Operating on or in the vicinity of an airport in Class G airspace.
91.127 Operating on or in the vicinity of an airport in Class E airspace.
91.129 Operations in Class D airspace.
91.130 Operations in Class C airspace.
91.131 Operations in Class B airspace.
91.133 Restricted and prohibited areas.
91.135 Operations in Class A airspace.
91.137 Temporary flight restrictions.
91.141 Flight restrictions in the proximity of the Presidential and other parties.
91.143 Flight limitation in the proximity of space flight operations.
91.153 VFR flight plan: Information required.
91.155 Basic VFR weather minimums
91.157 Special VFR weather minimums.
91.159 VFR cruising altitude or flight level.
91.169 IFR flight plan: Information required.
91.173 ATC clearance and flight plan required.
91.175 Takeoff and landing under IFR.
91.177 Minimum altitudes for IFR operations.
91.179 IFR cruising altitude or flight level.
91.181 Course to be flown.
91.183 IFR radio communications.
91.185 IFR operations: Two-way radio communications failure.
91.187 Operation under IFR in controlled airspace: Malfunction reports.
91.209 Aircraft lights.
91.303 Aerobatic flights.
91.305 Flight test areas.
91.311 Towing: Other than under § 91.309.
91.313(e) Restricted category civil aircraft: Operating limitations.
91.515 Flight altitude rules.
91.705 Operations within the North Atlantic Minimum Navigation Performance Specifications Airspace.
91.707 Flights between Mexico or Canada and the United States.
91.713 Operation of civil aircraft of Cuban registry.

[Doc. No. 18334, 54 FR 34325, Aug. 18, 1989, as amended by Amdt. 91–227, 56 FR 65661, Dec. 17, 1991]

**§§ 91.907–91.999 [Reserved]**

## Subpart K—Fractional Ownership Operations

SOURCE: Docket No. FAA–2001–10047, 68 FR 54561, Sept. 17, 2003, unless otherwise noted.

**§ 91.1001 Applicability.**

(a) This subpart prescribes rules, in addition to those prescribed in other subparts of this part, that apply to fractional owners and fractional ownership program managers governing—

(1) The provision of program management services in a fractional ownership program;

(2) The operation of a fractional ownership program aircraft in a fractional ownership program; and

(3) The operation of a program aircraft included in a fractional ownership program managed by an affiliate of the manager of the program to which the owner belongs.

(b) As used in this part—

(1) *Affiliate of a program manager* means a manager that, directly, or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with, another program manager. The holding of at least forty percent (40 percent) of the equity and forty percent (40 percent) of the voting power of an entity will be presumed to constitute control for purposes of determining an affiliation under this subpart.

(2) A *dry-lease aircraft exchange* means an arrangement, documented by the written program agreements, under which the program aircraft are available, on an as needed basis without crew, to each fractional owner.

(3) A *fractional owner or owner* means an individual or entity that possesses a minimum fractional ownership interest in a program aircraft and that has entered into the applicable program agreements; provided, however, that in the case of the flight operations described in paragraph (b)(6)(ii) of this section, and solely for purposes of requirements pertaining to those flight operations, the fractional owner operating the aircraft will be deemed to be a fractional owner in the program managed by the affiliate.

(4) A *fractional ownership interest* means the ownership of an interest or holding of a multi-year leasehold interest and/or a multi-year leasehold interest that is convertible into an ownership interest in a program aircraft.

(5) A *fractional ownership program or program* means any system of aircraft ownership and exchange that consists of all of the following elements:

(i) The provision for fractional ownership program management services by a single fractional ownership program manager on behalf of the fractional owners.

(ii) Two or more airworthy aircraft.

(iii) One or more fractional owners per program aircraft, with at least one program aircraft having more than one owner.

(iv) Possession of at least a minimum fractional ownership interest in one or more program aircraft by each fractional owner.

(v) A dry-lease aircraft exchange arrangement among all of the fractional owners.

(vi) Multi-year program agreements covering the fractional ownership, fractional ownership program management services, and dry-lease aircraft exchange aspects of the program.

(6) A *fractional ownership program aircraft or program aircraft* means:

(i) An aircraft in which a fractional owner has a minimal fractional ownership interest and that has been included in the dry-lease aircraft exchange pursuant to the program agreements, or

(ii) In the case of a fractional owner from one program operating an aircraft in a different fractional ownership program managed by an affiliate of the operating owner's program manager, the aircraft being operated by the fractional owner, so long as the aircraft is:

(A) Included in the fractional ownership program managed by the affiliate of the operating owner's program manager, and

(B) Included in the operating owner's program's dry-lease aircraft exchange pursuant to the program agreements of the operating owner's program.

(iii) An aircraft owned in whole or in part by the program manager that has been included in the dry-lease aircraft exchange and is used to supplement program operations.

(7) A *Fractional Ownership Program Flight or Program Flight* means a flight under this subpart when one or more passengers or property designated by a fractional owner are on board the aircraft.

(8) *Fractional ownership program management services or program management services* mean administrative and aviation support services furnished in accordance with the applicable requirements of this subpart or provided by the program manager on behalf of the fractional owners, including, but not limited to, the—

(i) Establishment and implementation of program safety guidelines;

(ii) Employment, furnishing, or contracting of pilots and other crewmembers;

(iii) Training and qualification of pilots and other crewmembers and personnel;

(iv) Scheduling and coordination of the program aircraft and crews;

(v) Maintenance of program aircraft;

(vi) Satisfaction of recordkeeping requirements;

(vii) Development and use of a program operations manual and procedures; and

(viii) Application for and maintenance of management specifications and other authorizations and approvals.

(9) A *fractional ownership program manager or program manager* means the entity that offers fractional ownership program management services to fractional owners, and is designated in the multi-year program agreements referenced in paragraph (b)(1)(v) of this section to fulfill the requirements of this chapter applicable to the manager of the program containing the aircraft being flown. When a fractional owner is operating an aircraft in a fractional ownership program managed by an affiliate of the owner's program manager, the references in this subpart to the flight-related responsibilities of the program manager apply, with respect to that particular flight, to the affiliate of the owner's program manager rather than to the owner's program manager.

(10) A *minimum fractional ownership interest* means—

(i) A fractional ownership interest equal to, or greater than, one-sixteenth (1/16) of at least one subsonic, fixed-wing or powered-lift program aircraft; or

(ii) A fractional ownership interest equal to, or greater than, one-thirty-second (1/32) of at least one rotorcraft program aircraft.

(c) The rules in this subpart that refer to a fractional owner or a fractional ownership program manager also apply to any person who engages in an operation governed by this subpart without the management specifications required by this subpart.

### § 91.1002 Compliance date.

No person that conducted flights before November 17, 2003 under a program that meets the definition of fractional ownership program in § 91.1001 may conduct such flights after February 17, 2005 unless it has obtained management specifications under this subpart.

[Doc. No. FAA–2001–10047, 68 FR 54561, Sept. 17, 2003; 69 FR 74413, Dec. 14, 2004]

### § 91.1003 Management contract between owner and program manager.

Each owner must have a contract with the program manager that—

(a) Requires the program manager to ensure that the program conforms to all applicable requirements of this chapter.

(b) Provides the owner the right to inspect and to audit, or have a designee of the owner inspect and audit, the records of the program manager pertaining to the operational safety of the program and those records required to show compliance with the management specifications and all applicable regulations. These records include, but are not limited to, the management specifications, authorizations, approvals, manuals, log books, and maintenance records maintained by the program manager.

(c) Designates the program manager as the owner's agent to receive service of notices pertaining to the program that the FAA seeks to provide to owners and authorizes the FAA to send such notices to the program manager in its capacity as the agent of the owner for such service.

(d) Acknowledges the FAA's right to contact the owner directly if the Administrator determines that direct contact is necessary.

### § 91.1005 Prohibitions and limitations.

(a) Except as provided in § 91.321 or § 91.501, no owner may carry persons or property for compensation or hire on a program flight.

(b) During the term of the multi-year program agreements under which a fractional owner has obtained a minimum fractional ownership interest in a program aircraft, the flight hours used during that term by the owner on program aircraft must not exceed the total hours associated with the fractional owner's share of ownership.

(c) No person may sell or lease an aircraft interest in a fractional ownership program that is smaller than that prescribed in the definition of ''minimum fractional ownership interest'' in § 91.1001(b)(10) unless flights associated with that interest are operated under part 121 or 135 of this chapter and are conducted by an air carrier or commercial operator certificated under part 119 of this chapter.

### § 91.1007 Flights conducted under part 121 or part 135 of this chapter.

(a) Except as provided in § 91.501(b), when a nonprogram aircraft is used to substitute for a program flight, the flight must be operated in compliance with part 121 or part 135 of this chapter, as applicable.

(b) A program manager who holds a certificate under part 119 of this chapter may conduct a flight for the use of a fractional owner under part 121 or part 135 of this chapter if the aircraft is listed on that certificate holder's operations specifications for part 121 or part 135, as applicable.

(c) The fractional owner must be informed when a flight is being conducted as a program flight or is being conducted under part 121 or part 135 of this chapter.

## OPERATIONAL CONTROL

### § 91.1009 Clarification of operational control.

(a) An owner is in operational control of a program flight when the owner—

(1) Has the rights and is subject to the limitations set forth in §§ 91.1003 through 91.1013;

(2) Has directed that a program aircraft carry passengers or property designated by that owner; and

(3) The aircraft is carrying those passengers or property.

(b) An owner is not in operational control of a flight in the following circumstances:

(1) A program aircraft is used for a flight for administrative purposes such as demonstration, positioning, ferrying, maintenance, or crew training, and no passengers or property designated by such owner are being carried; or

(2) The aircraft being used for the flight is being operated under part 121 or 135 of this chapter.

### § 91.1011 Operational control responsibilities and delegation.

(a) Each owner in operational control of a program flight is ultimately responsible for safe operations and for complying with all applicable requirements of this chapter, including those related to airworthiness and operations in connection with the flight. Each owner may delegate some or all of the performance of the tasks associated with carrying out this responsibility to the program manager, and may rely on the program manager for aviation expertise and program management services. When the owner delegates performance of tasks to the program manager or relies on the program manager's expertise, the owner and the program manager are jointly and individually responsible for compliance.

(b) The management specifications, authorizations, and approvals required by this subpart are issued to, and in the sole name of, the program manager on behalf of the fractional owners collectively. The management specifications, authorizations, and approvals will not be affected by any change in ownership of a program aircraft, as long as the aircraft remains a program aircraft in the identified program.

### § 91.1013 Operational control briefing and acknowledgment.

(a) Upon the signing of an initial program management services contract, or a renewal or extension of a program management services contract, the

program manager must brief the fractional owner on the owner's operational control responsibilities, and the owner must review and sign an acknowledgment of these operational control responsibilities. The acknowledgment must be included with the program management services contract. The acknowledgment must define when a fractional owner is in operational control and the owner's responsibilities and liabilities under the program. These include:

(1) Responsibility for compliance with the management specifications and all applicable regulations.

(2) Enforcement actions for any noncompliance.

(3) Liability risk in the event of a flight-related occurrence that causes personal injury or property damage.

(b) The fractional owner's signature on the acknowledgment will serve as the owner's affirmation that the owner has read, understands, and accepts the operational control responsibilities described in the acknowledgment.

(c) Each program manager must ensure that the fractional owner or owner's representatives have access to the acknowledgments for such owner's program aircraft. Each program manager must ensure that the FAA has access to the acknowledgments for all program aircraft.

PROGRAM MANAGEMENT

### §91.1014 Issuing or denying management specifications.

(a) A person applying to the Administrator for management specifications under this subpart must submit an application—

(1) In a form and manner prescribed by the Administrator; and

(2) Containing any information the Administrator requires the applicant to submit.

(b) Management specifications will be issued to the program manager on behalf of the fractional owners if, after investigation, the Administrator finds that the applicant:

(1) Meets the applicable requirements of this subpart; and

(2) Is properly and adequately equipped in accordance with the requirements of this chapter and is able to conduct safe operations under appropriate provisions of part 91 of this chapter and management specifications issued under this subpart.

(c) An application for management specifications will be denied if the Administrator finds that the applicant is not properly or adequately equipped or is not able to conduct safe operations under this part.

### §91.1015 Management specifications.

(a) Each person conducting operations under this subpart or furnishing fractional ownership program management services to fractional owners must do so in accordance with management specifications issued by the Administrator to the fractional ownership program manager under this subpart. Management specifications must include:

(1) The current list of all fractional owners and types of aircraft, registration markings and serial numbers;

(2) The authorizations, limitations, and certain procedures under which these operations are to be conducted,

(3) Certain other procedures under which each class and size of aircraft is to be operated;

(4) Authorization for an inspection program approved under §91.1109, including the type of aircraft, the registration markings and serial numbers of each aircraft to be operated under the program. No person may conduct any program flight using any aircraft not listed.

(5) Time limitations, or standards for determining time limitations, for overhauls, inspections, and checks for airframes, engines, propellers, rotors, appliances, and emergency equipment of aircraft.

(6) The specific location of the program manager's principal base of operations and, if different, the address that will serve as the primary point of contact for correspondence between the FAA and the program manager and the name and mailing address of the program manager's agent for service;

(7) Other business names the program manager may use;

(8) Authorization for the method of controlling weight and balance of aircraft;

(9) Any authorized deviation and exemption granted from any requirement of this chapter; and

(10) Any other information the Administrator determines is necessary.

(b) The program manager may keep the current list of all fractional owners required by paragraph (a)(1) of this section at its principal base of operation or other location approved by the Administrator and referenced in its management specifications. Each program manager shall make this list of owners available for inspection by the Administrator.

(c) Management specifications issued under this subpart are effective unless—

(1) The management specifications are amended as provided in §91.1017; or

(2) The Administrator suspends or revokes the management specifications.

(d) At least 30 days before it proposes to establish or change the location of its principal base of operations, its main operations base, or its main maintenance base, a program manager must provide written notification to the Flight Standards District Office that issued the program manager's management specifications.

(e) Each program manager must maintain a complete and separate set of its management specifications at its principal base of operations, or at a place approved by the Administrator, and must make its management specifications available for inspection by the Administrator and the fractional owner(s) to whom the program manager furnishes its services for review and audit.

(f) Each program manager must insert pertinent excerpts of its management specifications, or references thereto, in its program manual and must—

(1) Clearly identify each such excerpt as a part of its management specifications; and

(2) State that compliance with each management specifications requirement is mandatory.

(g) Each program manager must keep each of its employees and other persons who perform duties material to its operations informed of the provisions of its management specifications that apply to that employee's or person's duties and responsibilities.

### §91.1017 Amending program manager's management specifications.

(a) The Administrator may amend any management specifications issued under this subpart if—

(1) The Administrator determines that safety and the public interest require the amendment of any management specifications; or

(2) The program manager applies for the amendment of any management specifications, and the Administrator determines that safety and the public interest allows the amendment.

(b) Except as provided in paragraph (e) of this section, when the Administrator initiates an amendment of a program manager's management specifications, the following procedure applies:

(1) The Flight Standards District Office that issued the program manager's management specifications will notify the program manager in writing of the proposed amendment.

(2) The Flight Standards District Office that issued the program manager's management specifications will set a reasonable period (but not less than 7 days) within which the program manager may submit written information, views, and arguments on the amendment.

(3) After considering all material presented, the Flight Standards District Office that issued the program manager's management specifications will notify the program manager of—

(i) The adoption of the proposed amendment,

(ii) The partial adoption of the proposed amendment, or

(iii) The withdrawal of the proposed amendment.

(4) If the Flight Standards District Office that issued the program manager's management specifications issues an amendment of the management specifications, it becomes effective not less than 30 days after the program manager receives notice of it unless—

(i) The Flight Standards District Office that issued the program manager's management specifications finds under paragraph (e) of this section that there

is an emergency requiring immediate action with respect to safety; or

(ii) The program manager petitions for reconsideration of the amendment under paragraph (d) of this section.

(c) When the program manager applies for an amendment to its management specifications, the following procedure applies:

(1) The program manager must file an application to amend its management specifications—

(i) At least 90 days before the date proposed by the applicant for the amendment to become effective, unless a shorter time is approved, in cases such as mergers, acquisitions of operational assets that require an additional showing of safety (for example, proving tests or validation tests), and resumption of operations following a suspension of operations as a result of bankruptcy actions.

(ii) At least 15 days before the date proposed by the applicant for the amendment to become effective in all other cases.

(2) The application must be submitted to the Flight Standards District Office that issued the program manager's management specifications in a form and manner prescribed by the Administrator.

(3) After considering all material presented, the Flight Standards District Office that issued the program manager's management specifications will notify the program manager of—

(i) The adoption of the applied for amendment;

(ii) The partial adoption of the applied for amendment; or

(iii) The denial of the applied for amendment. The program manager may petition for reconsideration of a denial under paragraph (d) of this section.

(4) If the Flight Standards District Office that issued the program manager's management specifications approves the amendment, following coordination with the program manager regarding its implementation, the amendment is effective on the date the Administrator approves it.

(d) When a program manager seeks reconsideration of a decision of the Flight Standards District Office that issued the program manager's management specifications concerning the amendment of management specifications, the following procedure applies:

(1) The program manager must petition for reconsideration of that decision within 30 days of the date that the program manager receives a notice of denial of the amendment of its management specifications, or of the date it receives notice of an FAA-initiated amendment of its management specifications, whichever circumstance applies.

(2) The program manager must address its petition to the Director, Flight Standards Service.

(3) A petition for reconsideration, if filed within the 30-day period, suspends the effectiveness of any amendment issued by the Flight Standards District Office that issued the program manager's management specifications unless that District Office has found, under paragraph (e) of this section, that an emergency exists requiring immediate action with respect to safety.

(4) If a petition for reconsideration is not filed within 30 days, the procedures of paragraph (c) of this section apply.

(e) If the Flight Standards District Office that issued the program manager's management specifications finds that an emergency exists requiring immediate action with respect to safety that makes the procedures set out in this section impracticable or contrary to the public interest—

(1) The Flight Standards District Office amends the management specifications and makes the amendment effective on the day the program manager receives notice of it; and

(2) In the notice to the program manager, the Flight Standards District Office will articulate the reasons for its finding that an emergency exists requiring immediate action with respect to safety or that makes it impracticable or contrary to the public interest to stay the effectiveness of the amendment.

### §91.1019 Conducting tests and inspections.

(a) At any time or place, the Administrator may conduct an inspection or test, other than an en route inspection, to determine whether a program manager under this subpart is complying

with title 49 of the United States Code, applicable regulations, and the program manager's management specifications.

(b) The program manager must—

(1) Make available to the Administrator at the program manager's principal base of operations, or at a place approved by the Administrator, the program manager's management specifications; and

(2) Allow the Administrator to make any test or inspection, other than an en route inspection, to determine compliance respecting any matter stated in paragraph (a) of this section.

(c) Each employee of, or person used by, the program manager who is responsible for maintaining the program manager's records required by or necessary to demonstrate compliance with this subpart must make those records available to the Administrator.

(d) The Administrator may determine a program manager's continued eligibility to hold its management specifications on any grounds listed in paragraph (a) of this section, or any other appropriate grounds.

(e) Failure by any program manager to make available to the Administrator upon request, the management specifications, or any required record, document, or report is grounds for suspension of all or any part of the program manager's management specifications.

### § 91.1021 Internal safety reporting and incident/accident response.

(a) Each program manager must establish an internal anonymous safety reporting procedure that fosters an environment of safety without any potential for retribution for filing the report.

(b) Each program manager must establish procedures to respond to an aviation incident/accident.

### § 91.1023 Program operating manual requirements.

(a) Each program manager must prepare and keep current a program operating manual setting forth procedures and policies acceptable to the Administrator. The program manager's management, flight, ground, and maintenance personnel must use this manual to conduct operations under this subpart. However, the Administrator may authorize a deviation from this paragraph if the Administrator finds that, because of the limited size of the operation, part of the manual is not necessary for guidance of management, flight, ground, or maintenance personnel.

(b) Each program manager must maintain at least one copy of the manual at its principal base of operations.

(c) No manual may be contrary to any applicable U.S. regulations, foreign regulations applicable to the program flights in foreign countries, or the program manager's management specifications.

(d) The program manager must make a copy of the manual, or appropriate portions of the manual (and changes and additions), available to its maintenance and ground operations personnel and must furnish the manual to—

(1) Its crewmembers; and

(2) Representatives of the Administrator assigned to the program manager.

(e) Each employee of the program manager to whom a manual or appropriate portions of it are furnished under paragraph (d)(1) of this section must keep it up-to-date with the changes and additions furnished to them.

(f) Except as provided in paragraph (h) of this section, the appropriate parts of the manual must be carried on each aircraft when away from the principal operations base. The appropriate parts must be available for use by ground or flight personnel.

(g) For the purpose of complying with paragraph (d) of this section, a program manager may furnish the persons listed therein with all or part of its manual in printed form or other form, acceptable to the Administrator, that is retrievable in the English language. If the program manager furnishes all or part of the manual in other than printed form, it must ensure there is a compatible reading device available to those persons that provides a legible image of the maintenance information and instructions, or a system that is able to retrieve the maintenance information and instructions in the English language.

(h) If a program manager conducts aircraft inspections or maintenance at specified facilities where the approved aircraft inspection program is available, the program manager is not required to ensure that the approved aircraft inspection program is carried aboard the aircraft en route to those facilities.

(i) Program managers that are also certificated to operate under part 121 or 135 of this chapter may be authorized to use the operating manual required by those parts to meet the manual requirements of subpart K, provided:

(1) The policies and procedures are consistent for both operations, or

(2) When policies and procedures are different, the applicable policies and procedures are identified and used.

### §91.1025 Program operating manual contents.

Each program operating manual must have the date of the last revision on each revised page. Unless otherwise authorized by the Administrator, the manual must include the following:

(a) Procedures for ensuring compliance with aircraft weight and balance limitations;

(b) Copies of the program manager's management specifications or appropriate extracted information, including area of operations authorized, category and class of aircraft authorized, crew complements, and types of operations authorized;

(c) Procedures for complying with accident notification requirements;

(d) Procedures for ensuring that the pilot in command knows that required airworthiness inspections have been made and that the aircraft has been approved for return to service in compliance with applicable maintenance requirements;

(e) Procedures for reporting and recording mechanical irregularities that come to the attention of the pilot in command before, during, and after completion of a flight;

(f) Procedures to be followed by the pilot in command for determining that mechanical irregularities or defects reported for previous flights have been corrected or that correction of certain mechanical irregularities or defects have been deferred;

(g) Procedures to be followed by the pilot in command to obtain maintenance, preventive maintenance, and servicing of the aircraft at a place where previous arrangements have not been made by the program manager or owner, when the pilot is authorized to so act for the operator;

(h) Procedures under §91.213 for the release of, and continuation of flight if any item of equipment required for the particular type of operation becomes inoperative or unserviceable en route;

(i) Procedures for refueling aircraft, eliminating fuel contamination, protecting from fire (including electrostatic protection), and supervising and protecting passengers during refueling;

(j) Procedures to be followed by the pilot in command in the briefing under §91.1035.

(k) Procedures for ensuring compliance with emergency procedures, including a list of the functions assigned each category of required crewmembers in connection with an emergency and emergency evacuation duties;

(l) The approved aircraft inspection program, when applicable;

(m) Procedures for the evacuation of persons who may need the assistance of another person to move expeditiously to an exit if an emergency occurs;

(n) Procedures for performance planning that take into account take off, landing and en route conditions;

(o) An approved Destination Airport Analysis, when required by §91.1037(c), that includes the following elements, supported by aircraft performance data supplied by the aircraft manufacturer for the appropriate runway conditions—

(1) Pilot qualifications and experience;

(2) Aircraft performance data to include normal, abnormal and emergency procedures as supplied by the aircraft manufacturer;

(3) Airport facilities and topography;

(4) Runway conditions (including contamination);

(5) Airport or area weather reporting;

(6) Appropriate additional runway safety margins, if required;

(7) Airplane inoperative equipment;

(8) Environmental conditions; and

(9) Other criteria that affect aircraft performance.

(p) A suitable system (which may include a coded or electronic system) that provides for preservation and retrieval of maintenance recordkeeping information required by § 91.1113 in a manner acceptable to the Administrator that provides—

(1) A description (or reference to date acceptable to the Administrator) of the work performed:

(2) The name of the person performing the work if the work is performed by a person outside the organization of the program manager; and

(3) The name or other positive identification of the individual approving the work.

(q) Flight locating and scheduling procedures; and

(r) Other procedures and policy instructions regarding program operations that are issued by the program manager or required by the Administrator.

### § 91.1027 Recordkeeping.

(a) Each program manager must keep at its principal base of operations or at other places approved by the Administrator, and must make available for inspection by the Administrator all of the following:

(1) The program manager's management specifications.

(2) A current list of the aircraft used or available for use in operations under this subpart, the operations for which each is equipped (for example, MNPS, RNP5/10, RVSM.).

(3) An individual record of each pilot used in operations under this subpart, including the following information:

(i) The full name of the pilot.

(ii) The pilot certificate (by type and number) and ratings that the pilot holds.

(iii) The pilot's aeronautical experience in sufficient detail to determine the pilot's qualifications to pilot aircraft in operations under this subpart.

(iv) The pilot's current duties and the date of the pilot's assignment to those duties.

(v) The effective date and class of the medical certificate that the pilot holds.

(vi) The date and result of each of the initial and recurrent competency tests and proficiency checks required by this subpart and the type of aircraft flown during that test or check.

(vii) The pilot's flight time in sufficient detail to determine compliance with the flight time limitations of this subpart.

(viii) The pilot's check pilot authorization, if any.

(ix) Any action taken concerning the pilot's release from employment for physical or professional disqualification; and

(x) The date of the satisfactory completion of initial, transition, upgrade, and differences training and each recurrent training phase required by this subpart.

(4) An individual record for each flight attendant used in operations under this subpart, including the following information:

(i) The full name of the flight attendant, and

(ii) The date and result of training required by § 91.1063, as applicable.

(5) A current list of all fractional owners and associated aircraft. This list or a reference to its location must be included in the management specifications and should be of sufficient detail to determine the minimum fractional ownership interest of each aircraft.

(b) Each program manager must keep each record required by paragraph (a)(2) of this section for at least 6 months, and must keep each record required by paragraphs (a)(3) and (a)(4) of this section for at least 12 months. When an employee is no longer employed or affiliated with the program manager or fractional owner, each record required by paragraphs (a)(3) and (a)(4) of this section must be retained for at least 12 months.

(c) Each program manager is responsible for the preparation and accuracy of a load manifest in duplicate containing information concerning the loading of the aircraft. The manifest must be prepared before each takeoff and must include—

(1) The number of passengers;

(2) The total weight of the loaded aircraft;

(3) The maximum allowable takeoff weight for that flight;

(4) The center of gravity limits;

(5) The center of gravity of the loaded aircraft, except that the actual center of gravity need not be computed if the aircraft is loaded according to a loading schedule or other approved method that ensures that the center of gravity of the loaded aircraft is within approved limits. In those cases, an entry must be made on the manifest indicating that the center of gravity is within limits according to a loading schedule or other approved method;

(6) The registration number of the aircraft or flight number;

(7) The origin and destination; and

(8) Identification of crewmembers and their crew position assignments.

(d) The pilot in command of the aircraft for which a load manifest must be prepared must carry a copy of the completed load manifest in the aircraft to its destination. The program manager must keep copies of completed load manifest for at least 30 days at its principal operations base, or at another location used by it and approved by the Administrator.

(e) Each program manager is responsible for providing a written document that states the name of the entity having operational control on that flight and the part of this chapter under which the flight is operated. The pilot in command of the aircraft must carry a copy of the document in the aircraft to its destination. The program manager must keep a copy of the document for at least 30 days at its principal operations base, or at another location used by it and approved by the Administrator.

(f) Records may be kept either in paper or other form acceptable to the Administrator.

(g) Program managers that are also certificated to operate under part 121 or 135 of this chapter may satisfy the recordkeeping requirements of this section and of § 91.1113 with records maintained to fulfill equivalent obligations under part 121 or 135 of this chapter.

### § 91.1029 Flight scheduling and locating requirements.

(a) Each program manager must establish and use an adequate system to schedule and release program aircraft.

(b) Except as provided in paragraph (d) of this section, each program manager must have adequate procedures established for locating each flight, for which a flight plan is not filed, that—

(1) Provide the program manager with at least the information required to be included in a VFR flight plan;

(2) Provide for timely notification of an FAA facility or search and rescue facility, if an aircraft is overdue or missing; and

(3) Provide the program manager with the location, date, and estimated time for reestablishing radio or telephone communications, if the flight will operate in an area where communications cannot be maintained.

(c) Flight locating information must be retained at the program manager's principal base of operations, or at other places designated by the program manager in the flight locating procedures, until the completion of the flight.

(d) The flight locating requirements of paragraph (b) of this section do not apply to a flight for which an FAA flight plan has been filed and the flight plan is canceled within 25 nautical miles of the destination airport.

### § 91.1031 Pilot in command or second in command: Designation required.

(a) Each program manager must designate a—

(1) Pilot in command for each program flight; and

(2) Second in command for each program flight requiring two pilots.

(b) The pilot in command, as designated by the program manager, must remain the pilot in command at all times during that flight.

### § 91.1033 Operating information required.

(a) Each program manager must, for all program operations, provide the following materials, in current and appropriate form, accessible to the pilot at the pilot station, and the pilot must use them—

(1) A cockpit checklist;

(2) For multiengine aircraft or for aircraft with retractable landing gear, an emergency cockpit checklist containing the procedures required by paragraph (c) of this section, as appropriate;

(3) At least one set of pertinent aeronautical charts; and

(4) For IFR operations, at least one set of pertinent navigational en route, terminal area, and instrument approach procedure charts.

(b) Each cockpit checklist required by paragraph (a)(1) of this section must contain the following procedures:

(1) Before starting engines;

(2) Before takeoff;

(3) Cruise;

(4) Before landing;

(5) After landing; and

(6) Stopping engines.

(c) Each emergency cockpit checklist required by paragraph (a)(2) of this section must contain the following procedures, as appropriate:

(1) Emergency operation of fuel, hydraulic, electrical, and mechanical systems.

(2) Emergency operation of instruments and controls.

(3) Engine inoperative procedures.

(4) Any other emergency procedures necessary for safety.

### § 91.1035 Passenger awareness.

(a) Prior to each takeoff, the pilot in command of an aircraft carrying passengers on a program flight must ensure that all passengers have been orally briefed on—

(1) *Smoking:* Each passenger must be briefed on when, where, and under what conditions smoking is prohibited. This briefing must include a statement, as appropriate, that the regulations require passenger compliance with lighted passenger information signs and no smoking placards, prohibit smoking in lavatories, and require compliance with crewmember instructions with regard to these items;

(2) *Use of safety belts, shoulder harnesses, and child restraint systems:* Each passenger must be briefed on when, where and under what conditions it is necessary to have his or her safety belt and, if installed, his or her shoulder harness fastened about him or her, and if a child is being transported, the appropriate use of child restraint systems, if available. This briefing must include a statement, as appropriate, that the regulations require passenger compliance with the lighted passenger information sign and/or crewmember instructions with regard to these items;

(3) The placement of seat backs in an upright position before takeoff and landing;

(4) Location and means for opening the passenger entry door and emergency exits;

(5) Location of survival equipment;

(6) Ditching procedures and the use of flotation equipment required under § 91.509 for a flight over water;

(7) The normal and emergency use of oxygen installed in the aircraft; and

(8) Location and operation of fire extinguishers.

(b) Prior to each takeoff, the pilot in command of an aircraft carrying passengers on a program flight must ensure that each person who may need the assistance of another person to move expeditiously to an exit if an emergency occurs and that person's attendant, if any, has received a briefing as to the procedures to be followed if an evacuation occurs. This paragraph does not apply to a person who has been given a briefing before a previous leg of that flight in the same aircraft.

(c) Prior to each takeoff, the pilot in command must advise the passengers of the name of the entity in operational control of the flight.

(d) The oral briefings required by paragraphs (a), (b), and (c) of this section must be given by the pilot in command or another crewmember.

(e) The oral briefing required by paragraph (a) of this section may be delivered by means of an approved recording playback device that is audible to each passenger under normal noise levels.

(f) The oral briefing required by paragraph (a) of this section must be supplemented by printed cards that must be carried in the aircraft in locations convenient for the use of each passenger. The cards must—

(1) Be appropriate for the aircraft on which they are to be used;

(2) Contain a diagram of, and method of operating, the emergency exits; and

(3) Contain other instructions necessary for the use of emergency equipment on board the aircraft.

### §91.1037 Large transport category airplanes: Turbine engine powered; Limitations; Destination and alternate airports.

(a) No program manager or any other person may permit a turbine engine powered large transport category airplane on a program flight to take off that airplane at a weight that (allowing for normal consumption of fuel and oil in flight to the destination or alternate airport) the weight of the airplane on arrival would exceed the landing weight in the Airplane Flight Manual for the elevation of the destination or alternate airport and the ambient temperature expected at the time of landing.

(b) Except as provided in paragraph (c) of this section, no program manager or any other person may permit a turbine engine powered large transport category airplane on a program flight to take off that airplane unless its weight on arrival, allowing for normal consumption of fuel and oil in flight (in accordance with the landing distance in the Airplane Flight Manual for the elevation of the destination airport and the wind conditions expected there at the time of landing), would allow a full stop landing at the intended destination airport within 60 percent of the effective length of each runway described below from a point 50 feet above the intersection of the obstruction clearance plane and the runway. For the purpose of determining the allowable landing weight at the destination airport, the following is assumed:

(1) The airplane is landed on the most favorable runway and in the most favorable direction, in still air.

(2) The airplane is landed on the most suitable runway considering the probable wind velocity and direction and the ground handling characteristics of that airplane, and considering other conditions such as landing aids and terrain.

(c) A program manager or other person flying a turbine engine powered large transport category airplane on a program flight may permit that airplane to take off at a weight in excess of that allowed by paragraph (b) of this section if all of the following conditions exist:

(1) The operation is conducted in accordance with an approved Destination Airport Analysis in that person's program operating manual that contains the elements listed in §91.1025(o).

(2) The airplane's weight on arrival, allowing for normal consumption of fuel and oil in flight (in accordance with the landing distance in the Airplane Flight Manual for the elevation of the destination airport and the wind conditions expected there at the time of landing), would allow a full stop landing at the intended destination airport within 80 percent of the effective length of each runway described below from a point 50 feet above the intersection of the obstruction clearance plane and the runway. For the purpose of determining the allowable landing weight at the destination airport, the following is assumed:

(i) The airplane is landed on the most favorable runway and in the most favorable direction, in still air.

(ii) The airplane is landed on the most suitable runway considering the probable wind velocity and direction and the ground handling characteristics of that airplane, and considering other conditions such as landing aids and terrain.

(3) The operation is authorized by management specifications.

(d) No program manager or other person may select an airport as an alternate airport for a turbine engine powered large transport category airplane unless (based on the assumptions in paragraph (b) of this section) that airplane, at the weight expected at the time of arrival, can be brought to a full stop landing within 80 percent of the effective length of the runway from a point 50 feet above the intersection of the obstruction clearance plane and the runway.

(e) Unless, based on a showing of actual operating landing techniques on wet runways, a shorter landing distance (but never less than that required by paragraph (b) or (c) of this section) has been approved for a specific type and model airplane and included in the Airplane Flight Manual,

no person may take off a turbojet airplane when the appropriate weather reports or forecasts, or any combination of them, indicate that the runways at the destination or alternate airport may be wet or slippery at the estimated time of arrival unless the effective runway length at the destination airport is at least 115 percent of the runway length required under paragraph (b) or (c) of this section.

### § 91.1039 IFR takeoff, approach and landing minimums.

(a) No pilot on a program aircraft operating a program flight may begin an instrument approach procedure to an airport unless—

(1) Either that airport or the alternate airport has a weather reporting facility operated by the U.S. National Weather Service, a source approved by the U.S. National Weather Service, or a source approved by the Administrator; and

(2) The latest weather report issued by the weather reporting facility includes a current local altimeter setting for the destination airport. If no local altimeter setting is available at the destination airport, the pilot must obtain the current local altimeter setting from a source provided by the facility designated on the approach chart for the destination airport.

(b) For flight planning purposes, if the destination airport does not have a weather reporting facility described in paragraph (a)(1) of this section, the pilot must designate as an alternate an airport that has a weather reporting facility meeting that criteria.

(c) The MDA or Decision Altitude and visibility landing minimums prescribed in part 97 of this chapter or in the program manager's management specifications are increased by 100 feet and ½ mile respectively, but not to exceed the ceiling and visibility minimums for that airport when used as an alternate airport, for each pilot in command of a turbine-powered aircraft who has not served at least 100 hours as pilot in command in that type of aircraft.

(d) No person may take off an aircraft under IFR from an airport where weather conditions are at or above takeoff minimums but are below authorized IFR landing minimums unless there is an alternate airport within one hour's flying time (at normal cruising speed, in still air) of the airport of departure.

(e) Each pilot making an IFR takeoff or approach and landing at an airport must comply with applicable instrument approach procedures and take off and landing weather minimums prescribed by the authority having jurisdiction over the airport. In addition, no pilot may, at that airport take off when the visibility is less than 600 feet.

### § 91.1041 Aircraft proving and validation tests.

(a) No program manager may permit the operation of an aircraft, other than a turbojet aircraft, for which two pilots are required by the type certification requirements of this chapter for operations under VFR, if it has not previously proved such an aircraft in operations under this part in at least 25 hours of proving tests acceptable to the Administrator including—

(1) Five hours of night time, if night flights are to be authorized;

(2) Five instrument approach procedures under simulated or actual conditions, if IFR flights are to be authorized; and

(3) Entry into a representative number of en route airports as determined by the Administrator.

(b) No program manager may permit the operation of a turbojet airplane if it has not previously proved a turbojet airplane in operations under this part in at least 25 hours of proving tests acceptable to the Administrator including—

(1) Five hours of night time, if night flights are to be authorized;

(2) Five instrument approach procedures under simulated or actual conditions, if IFR flights are to be authorized; and

(3) Entry into a representative number of en route airports as determined by the Administrator.

(c) No program manager may carry passengers in an aircraft during proving tests, except those needed to make the tests and those designated by the Administrator to observe the tests. However, pilot flight training may be conducted during the proving tests.

(d) Validation testing is required to determine that a program manager is capable of conducting operations safely and in compliance with applicable regulatory standards. Validation tests are required for the following authorizations:

(1) The addition of an aircraft for which two pilots are required for operations under VFR or a turbojet airplane, if that aircraft or an aircraft of the same make or similar design has not been previously proved or validated in operations under this part.

(2) Operations outside U.S. airspace.

(3) Class II navigation authorizations.

(4) Special performance or operational authorizations.

(e) Validation tests must be accomplished by test methods acceptable to the Administrator. Actual flights may not be required when an applicant can demonstrate competence and compliance with appropriate regulations without conducting a flight.

(f) Proving tests and validation tests may be conducted simultaneously when appropriate.

(g) The Administrator may authorize deviations from this section if the Administrator finds that special circumstances make full compliance with this section unnecessary.

### § 91.1043 [Reserved]

### § 91.1045 Additional equipment requirements.

No person may operate a program aircraft on a program flight unless the aircraft is equipped with the following—

(a) Airplanes having a passenger-seat configuration of more than 30 seats or a payload capacity of more than 7,500 pounds:

(1) A cockpit voice recorder as required by § 121.359 of this chapter as applicable to the aircraft specified in that section.

(2) A flight recorder as required by § 121.343 or § 121.344 of this chapter as applicable to the aircraft specified in that section.

(3) A terrain awareness and warning system as required by § 121.354 of this chapter as applicable to the aircraft specified in that section.

(4) A traffic alert and collision avoidance system as required by § 121.356 of this chapter as applicable to the aircraft specified in that section.

(5) Airborne weather radar as required by § 121.357 of this chapter, as applicable to the aircraft specified in that section.

(b) Airplanes having a passenger-seat configuration of 30 seats or fewer, excluding each crewmember, and a payload capacity of 7,500 pounds or less, and any rotorcraft (as applicable):

(1) A cockpit voice recorder as required by § 135.151 of this chapter as applicable to the aircraft specified in that section.

(2) A flight recorder as required by § 135.152 of this chapter as applicable to the aircraft specified in that section.

(3) A terrain awareness and warning system as required by § 135.154 of this chapter as applicable to the aircraft specified in that section.

(4) A traffic alert and collision avoidance system as required by § 135.180 of this chapter as applicable to the aircraft specified in that section.

(5) As applicable to the aircraft specified in that section, either:

(i) Airborne thunderstorm detection equipment as required by § 135.173 of this chapter; or

(ii) Airborne weather radar as required by § 135.175 of this chapter.

### § 91.1047 Drug and alcohol misuse education program.

(a) Each program manager must provide each direct employee performing flight crewmember, flight attendant, flight instructor, or aircraft maintenance duties with drug and alcohol misuse education.

(b) No program manager may use any contract employee to perform flight crewmember, flight attendant, flight instructor, or aircraft maintenance duties for the program manager unless that contract employee has been provided with drug and alcohol misuse education.

(c) Program managers must disclose to their owners and prospective owners the existence of a company drug and alcohol misuse testing program. If the program manager has implemented a company testing program, the program

manager's disclosure must include the following:

(1) Information on the substances that they test for, for example, alcohol and a list of the drugs;

(2) The categories of employees tested, the types of tests, for example, preemployment, random, reasonable cause/suspicion, post accident, return to duty and follow-up; and

(3) The degree to which the program manager's company testing program is comparable to the federally mandated drug and alcohol testing program required under part 120 of this chapter regarding the information in paragraphs (c)(1) and (c)(2) of this section.

(d) If a program aircraft is operated on a program flight into an airport at which no maintenance personnel are available that are subject to the requirements of paragraphs (a) or (b) of this section and emergency maintenance is required, the program manager may use persons not meeting the requirements of paragraphs (a) or (b) of this section to provide such emergency maintenance under both of the following conditions:

(1) The program manager must notify the Drug Abatement Program Division, AAM–800, 800 Independence Avenue, SW., Washington, DC 20591 in writing within 10 days after being provided emergency maintenance in accordance with this paragraph. The program manager must retain copies of all such written notifications for two years.

(2) The aircraft must be reinspected by maintenance personnel who meet the requirements of paragraph (a) or (b) of this section when the aircraft is next at an airport where such maintenance personnel are available.

(e) For purposes of this section, emergency maintenance means maintenance that—

(1) Is not scheduled, and

(2) Is made necessary by an aircraft condition not discovered prior to the departure for that location.

(f) Notwithstanding paragraphs (a) and (b) of this section, drug and alcohol misuse education conducted under an FAA-approved drug and alcohol misuse prevention program may be used to satisfy these requirements.

[Doc. No. FAA–2001–10047, 68 FR 54561, Sept. 17, 2003, as amended by Amdt. 91–307, 74 FR 22653, May 14, 2009]

### § 91.1049 Personnel.

(a) Each program manager and each fractional owner must use in program operations on program aircraft flight crews meeting § 91.1053 criteria and qualified under the appropriate regulations. The program manager must provide oversight of those crews.

(b) Each program manager must employ (either directly or by contract) an adequate number of pilots per program aircraft. Flight crew staffing must be determined based on the following factors, at a minimum:

(1) Number of program aircraft.

(2) Program manager flight, duty, and rest time considerations, and in all cases within the limits set forth in §§ 91.1057 through 91.1061.

(3) Vacations.

(4) Operational efficiencies.

(5) Training.

(6) Single pilot operations, if authorized by deviation under paragraph (d) of this section.

(c) Each program manager must publish pilot and flight attendant duty schedules sufficiently in advance to follow the flight, duty, and rest time limits in §§ 91.1057 through 91.1061 in program operations.

(d) Unless otherwise authorized by the Administrator, when any program aircraft is flown in program operations with passengers onboard, the crew must consist of at least two qualified pilots employed or contracted by the program manager or the fractional owner.

(e) The program manager must ensure that trained and qualified scheduling or flight release personnel are on duty to schedule and release program aircraft during all hours that such aircraft are available for program operations.

### § 91.1050 Employment of former FAA employees.

(a) Except as specified in paragraph (c) of this section, no fractional owner or fractional ownership program manager may knowingly employ or make a

contractual arrangement which permits an individual to act as an agent or representative of the fractional owner or fractional ownership program manager in any matter before the Federal Aviation Administration if the individual, in the preceding 2 years—

(1) Served as, or was directly responsible for the oversight of, a Flight Standards Service aviation safety inspector; and

(2) Had direct responsibility to inspect, or oversee the inspection of, the operations of the fractional owner or fractional ownership program manager.

(b) For the purpose of this section, an individual shall be considered to be acting as an agent or representative of a fractional owner or fractional ownership program manager in a matter before the agency if the individual makes any written or oral communication on behalf of the fractional owner or fractional ownership program manager to the agency (or any of its officers or employees) in connection with a particular matter, whether or not involving a specific party and without regard to whether the individual has participated in, or had responsibility for, the particular matter while serving as a Flight Standards Service aviation safety inspector.

(c) The provisions of this section do not prohibit a fractional owner or fractional ownership program manager from knowingly employing or making a contractual arrangement which permits an individual to act as an agent or representative of the fractional owner or fractional ownership program manager in any matter before the Federal Aviation Administration if the individual was employed by the fractional owner or fractional ownership program manager before October 21, 2011.

[Doc. No. FAA–2008–1154, 76 FR 52235, Aug. 22, 2011]

### § 91.1051 Pilot safety background check.

Within 90 days of an individual beginning service as a pilot, the program manager must request the following information:

(a) FAA records pertaining to—

(1) Current pilot certificates and associated type ratings.

(2) Current medical certificates.

(3) Summaries of legal enforcement actions resulting in a finding by the Administrator of a violation.

(b) Records from all previous employers during the five years preceding the date of the employment application where the applicant worked as a pilot. If any of these firms are in bankruptcy, the records must be requested from the trustees in bankruptcy for those employees. If the previous employer is no longer in business, a documented good faith effort must be made to obtain the records. Records from previous employers must include, as applicable—

(1) Crew member records.

(2) Drug testing—collection, testing, and rehabilitation records pertaining to the individual.

(3) Alcohol misuse prevention program records pertaining to the individual.

(4) The applicant's individual record that includes certifications, ratings, aeronautical experience, effective date and class of the medical certificate.

### § 91.1053 Crewmember experience.

(a) No program manager or owner may use any person, nor may any person serve, as a pilot in command or second in command of a program aircraft, or as a flight attendant on a program aircraft, in program operations under this subpart unless that person has met the applicable requirements of part 61 of this chapter and has the following experience and ratings:

(1) Total flight time for all pilots:

(i) Pilot in command—A minimum of 1,500 hours.

(ii) Second in command—A minimum of 500 hours.

(2) For multi-engine turbine-powered fixed-wing and powered-lift aircraft, the following FAA certification and ratings requirements:

(i) Pilot in command—Airline transport pilot and applicable type ratings.

(ii) Second in command—Commercial pilot and instrument ratings.

(iii) Flight attendant (if required or used)—Appropriately trained personnel.

(3) For all other aircraft, the following FAA certification and rating requirements:

(i) Pilot in command—Commercial pilot and instrument ratings.

(ii) Second in command—Commercial pilot and instrument ratings.

(iii) Flight attendant (if required or used)—Appropriately trained personnel.

(b) The Administrator may authorize deviations from paragraph (a)(1) of this section if the Flight Standards District Office that issued the program manager's management specifications finds that the crewmember has comparable experience, and can effectively perform the functions associated with the position in accordance with the requirements of this chapter. Grants of deviation under this paragraph may be granted after consideration of the size and scope of the operation, the qualifications of the intended personnel and the circumstances set forth in §91.1055(b)(1) through (3). The Administrator may, at any time, terminate any grant of deviation authority issued under this paragraph.

### §91.1055 Pilot operating limitations and pairing requirement.

(a) If the second in command of a fixed-wing program aircraft has fewer than 100 hours of flight time as second in command flying in the aircraft make and model and, if a type rating is required, in the type aircraft being flown, and the pilot in command is not an appropriately qualified check pilot, the pilot in command shall make all takeoffs and landings in any of the following situations:

(1) Landings at the destination airport when a Destination Airport Analysis is required by §91.1037(c); and

(2) In any of the following conditions:

(i) The prevailing visibility for the airport is at or below ¾ mile.

(ii) The runway visual range for the runway to be used is at or below 4,000 feet.

(iii) The runway to be used has water, snow, slush, ice or similar contamination that may adversely affect aircraft performance.

(iv) The braking action on the runway to be used is reported to be less than ''good.''

(v) The crosswind component for the runway to be used is in excess of 15 knots.

(vi) Windshear is reported in the vicinity of the airport.

(vii) Any other condition in which the pilot in command determines it to be prudent to exercise the pilot in command's authority.

(b) No program manager may release a program flight under this subpart unless, for that aircraft make or model and, if a type rating is required, for that type aircraft, either the pilot in command or the second in command has at least 75 hours of flight time, either as pilot in command or second in command. The Administrator may, upon application by the program manager, authorize deviations from the requirements of this paragraph by an appropriate amendment to the management specifications in any of the following circumstances:

(1) A newly authorized program manager does not employ any pilots who meet the minimum requirements of this paragraph.

(2) An existing program manager adds to its fleet a new category and class aircraft not used before in its operation.

(3) An existing program manager establishes a new base to which it assigns pilots who will be required to become qualified on the aircraft operated from that base.

(c) No person may be assigned in the capacity of pilot in command in a program operation to more than two aircraft types that require a separate type rating.

### §91.1057 Flight, duty and rest time requirements: All crewmembers.

(a) For purposes of this subpart—

*Augmented flight crew* means at least three pilots.

*Calendar day* means the period of elapsed time, using Coordinated Universal Time or local time that begins at midnight and ends 24 hours later at the next midnight.

*Duty period* means the period of elapsed time between reporting for an assignment involving flight time and release from that assignment by the program manager. All time between these two points is part of the duty period, even if flight time is interrupted by nonflight-related duties. The time is calculated using either Coordinated Universal Time or local time to reflect the total elapsed time.

*Extension of flight time* means an increase in the flight time because of circumstances beyond the control of the program manager or flight crewmember (such as adverse weather) that are not known at the time of departure and that prevent the flightcrew from reaching the destination within the planned flight time.

*Flight attendant* means an individual, other than a flight crewmember, who is assigned by the program manager, in accordance with the required minimum crew complement under the program manager's management specifications or in addition to that minimum complement, to duty in an aircraft during flight time and whose duties include but are not necessarily limited to cabin-safety-related responsibilities.

*Multi-time zone* flight means an easterly or westerly flight or multiple flights in one direction in the same duty period that results in a time zone difference of 5 or more hours and is conducted in a geographic area that is south of 60 degrees north latitude and north of 60 degrees south latitude.

*Reserve status* means that status in which a flight crewmember, by arrangement with the program manager: Holds himself or herself fit to fly to the extent that this is within the control of the flight crewmember; remains within a reasonable response time of the aircraft as agreed between the flight crewmember and the program manager; and maintains a ready means whereby the flight crewmember may be contacted by the program manager. Reserve status is not part of any duty period or rest period.

*Rest period* means a period of time required pursuant to this subpart that is free of all responsibility for work or duty prior to the commencement of, or following completion of, a duty period, and during which the flight crewmember or flight attendant cannot be required to receive contact from the program manager. A rest period does not include any time during which the program manager imposes on a flight crewmember or flight attendant any duty or restraint, including any actual work or present responsibility for work should the occasion arise.

*Standby* means that portion of a duty period during which a flight crewmember is subject to the control of the program manager and holds himself or herself in a condition of readiness to undertake a flight. Standby is not part of any rest period.

(b) A program manager may assign a crewmember and a crewmember may accept an assignment for flight time only when the applicable requirements of this section and §§91.1059–91.1062 are met.

(c) No program manager may assign any crewmember to any duty during any required rest period.

(d) Time spent in transportation, not local in character, that a program manager requires of a crewmember and provides to transport the crewmember to an airport at which he or she is to serve on a flight as a crewmember, or from an airport at which he or she was relieved from duty to return to his or her home station, is not considered part of a rest period.

(e) A flight crewmember may continue a flight assignment if the flight to which he or she is assigned would normally terminate within the flight time limitations, but because of circumstances beyond the control of the program manager or flight crewmember (such as adverse weather conditions), is not at the time of departure expected to reach its destination within the planned flight time. The extension of flight time under this paragraph may not exceed the maximum time limits set forth in §91.1059.

(f) Each flight assignment must provide for at least 10 consecutive hours of rest during the 24-hour period that precedes the completion time of the assignment.

(g) The program manager must provide each crewmember at least 13 rest periods of at least 24 consecutive hours each in each calendar quarter.

(h) A flight crewmember may decline a flight assignment if, in the flight crewmember's determination, to do so would not be consistent with the standard of safe operation required under this subpart, this part, and applicable provisions of this title.

(i) Any rest period required by this subpart may occur concurrently with any other rest period.

(j) If authorized by the Administrator, a program manager may use the

applicable unscheduled flight time limitations, duty period limitations, and rest requirements of part 121 or part 135 of this chapter instead of the flight time limitations, duty period limitations, and rest requirements of this subpart.

### § 91.1059 Flight time limitations and rest requirements: One or two pilot crews.

(a) No program manager may assign any flight crewmember, and no flight crewmember may accept an assignment, for flight time as a member of a one- or two-pilot crew if that crewmember's total flight time in all commercial flying will exceed—

(1) 500 hours in any calendar quarter;

(2) 800 hours in any two consecutive calendar quarters;

(3) 1,400 hours in any calendar year.

(b) Except as provided in paragraph (c) of this section, during any 24 consecutive hours the total flight time of the assigned flight, when added to any commercial flying by that flight crewmember, may not exceed—

(1) 8 hours for a flight crew consisting of one pilot; or

(2) 10 hours for a flight crew consisting of two pilots qualified under this subpart for the operation being conducted.

(c) No program manager may assign any flight crewmember, and no flight crewmember may accept an assignment, if that crewmember's flight time or duty period will exceed, or rest time will be less than—

| | Normal duty | Extension of flight time |
|---|---|---|
| (1) Minimum Rest Immediately Before Duty | 10 Hours | 10 Hours. |
| (2) Duty Period | Up to 14 Hours | Up to 14 Hours. |
| (3) Flight Time For 1 Pilot | Up to 8 Hours | Exceeding 8 Hours up to 9 Hours. |
| (4) Flight Time For 2 Pilots | Up to 10 Hours | Exceeding 10 Hours up to 12 Hours. |
| (5) Minimum After Duty Rest | 10 Hours | 12 Hours. |
| (6) Minimum After Duty Rest Period for Multi-Time Zone Flights | 14 Hours | 18 Hours. |

### § 91.1061 Augmented flight crews.

(a) No program manager may assign any flight crewmember, and no flight crewmember may accept an assignment, for flight time as a member of an augmented crew if that crewmember's total flight time in all commercial flying will exceed—

(1) 500 hours in any calendar quarter;

(2) 800 hours in any two consecutive calendar quarters;

(3) 1,400 hours in any calendar year.

(b) No program manager may assign any pilot to an augmented crew, unless the program manager ensures:

(1) Adequate sleeping facilities are installed on the aircraft for the pilots.

(2) No more than 8 hours of flight deck duty is accrued in any 24 consecutive hours.

(3) For a three-pilot crew, the crew must consist of at least the following:

(i) A pilot in command (PIC) who meets the applicable flight crewmember requirements of this subpart and § 61.57 of this chapter.

(ii) A PIC qualified pilot who meets the applicable flight crewmember requirements of this subpart and § 61.57(c) and (d) of this chapter.

(iii) A second in command (SIC) who meets the SIC qualifications of this subpart. For flight under IFR, that person must also meet the recent instrument experience requirements of part 61 of this chapter.

(4) For a four-pilot crew, at least three pilots who meet the conditions of paragraph (b)(3) of this section, plus a fourth pilot who meets the SIC qualifications of this subpart. For flight under IFR, that person must also meet the recent instrument experience requirements of part 61 of this chapter.

(c) No program manager may assign any flight crewmember, and no flight crewmember may accept an assignment, if that crewmember's flight time or duty period will exceed, or rest time will be less than—

| | 3-Pilot crew | 4-Pilot crew |
|---|---|---|
| (1) Minimum Rest Immediately Before Duty | 10 Hours | 10 Hours |
| (2) Duty Period | Up to 16 Hours | Up to 18 Hours |
| (3) Flight Time | Up to 12 Hours | Up to 16 Hours |
| (4) Minimum After Duty Rest | 12 Hours | 18 Hours |
| (5) Minimum After Duty Rest Period for Multi-Time Zone Flights | 18 hours | 24 hours |

### § 91.1062 Duty periods and rest requirements: Flight attendants.

(a) Except as provided in paragraph (b) of this section, a program manager may assign a duty period to a flight attendant only when the assignment meets the applicable duty period limitations and rest requirements of this paragraph.

(1) Except as provided in paragraphs (a)(4), (a)(5), and (a)(6) of this section, no program manager may assign a flight attendant to a scheduled duty period of more than 14 hours.

(2) Except as provided in paragraph (a)(3) of this section, a flight attendant scheduled to a duty period of 14 hours or less as provided under paragraph (a)(1) of this section must be given a scheduled rest period of at least 9 consecutive hours. This rest period must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

(3) The rest period required under paragraph (a)(2) of this section may be scheduled or reduced to 8 consecutive hours if the flight attendant is provided a subsequent rest period of at least 10 consecutive hours; this subsequent rest period must be scheduled to begin no later than 24 hours after the beginning of the reduced rest period and must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

(4) A program manager may assign a flight attendant to a scheduled duty period of more than 14 hours, but no more than 16 hours, if the program manager has assigned to the flight or flights in that duty period at least one flight attendant in addition to the minimum flight attendant complement required for the flight or flights in that duty period under the program manager's management specifications.

(5) A program manager may assign a flight attendant to a scheduled duty period of more than 16 hours, but no more than 18 hours, if the program manager has assigned to the flight or flights in that duty period at least two flight attendants in addition to the minimum flight attendant complement required for the flight or flights in that duty period under the program manager's management specifications.

(6) A program manager may assign a flight attendant to a scheduled duty period of more than 18 hours, but no more than 20 hours, if the scheduled duty period includes one or more flights that land or take off outside the 48 contiguous states and the District of Columbia, and if the program manager has assigned to the flight or flights in that duty period at least three flight attendants in addition to the minimum flight attendant complement required for the flight or flights in that duty period under the program manager's management specifications.

(7) Except as provided in paragraph (a)(8) of this section, a flight attendant scheduled to a duty period of more than 14 hours but no more than 20 hours, as provided in paragraphs (a)(4), (a)(5), and (a)(6) of this section, must be given a scheduled rest period of at least 12 consecutive hours. This rest period must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

(8) The rest period required under paragraph (a)(7) of this section may be scheduled or reduced to 10 consecutive hours if the flight attendant is provided a subsequent rest period of at least 14 consecutive hours; this subsequent rest period must be scheduled to begin no later than 24 hours after the beginning of the reduced rest period and must occur between the completion of the scheduled duty period and the commencement of the subsequent duty period.

(9) Notwithstanding paragraphs (a)(4), (a)(5), and (a)(6) of this section, if

a program manager elects to reduce the rest period to 10 hours as authorized by paragraph (a)(8) of this section, the program manager may not schedule a flight attendant for a duty period of more than 14 hours during the 24-hour period commencing after the beginning of the reduced rest period.

(b) Notwithstanding paragraph (a) of this section, a program manager may apply the flight crewmember flight time and duty limitations and rest requirements of this part to flight attendants for all operations conducted under this part provided that the program manager establishes written procedures that—

(1) Apply to all flight attendants used in the program manager's operation;

(2) Include the flight crewmember rest and duty requirements of §§ 91.1057, 91.1059, and 91.1061, as appropriate to the operation being conducted, except that rest facilities on board the aircraft are not required;

(3) Include provisions to add one flight attendant to the minimum flight attendant complement for each flight crewmember who is in excess of the minimum number required in the aircraft type certificate data sheet and who is assigned to the aircraft under the provisions of § 91.1061; and

(4) Are approved by the Administrator and described or referenced in the program manager's management specifications.

### § 91.1063 Testing and training: Applicability and terms used.

(a) Sections 91.1065 through 91.1107:

(1) Prescribe the tests and checks required for pilots and flight attendant crewmembers and for the approval of check pilots in operations under this subpart;

(2) Prescribe the requirements for establishing and maintaining an approved training program for crewmembers, check pilots and instructors, and other operations personnel employed or used by the program manager in program operations;

(3) Prescribe the requirements for the qualification, approval and use of aircraft simulators and flight training devices in the conduct of an approved training program; and

(4) Permits training center personnel authorized under part 142 of this chapter who meet the requirements of § 91.1075 to conduct training, testing and checking under contract or other arrangements to those persons subject to the requirements of this subpart.

(b) If authorized by the Administrator, a program manager may comply with the applicable training and testing sections of subparts N and O of part 121 of this chapter instead of §§ 91.1065 through 91.1107, except for the operating experience requirements of § 121.434 of this chapter.

(c) If authorized by the Administrator, a program manager may comply with the applicable training and testing sections of subparts G and H of part 135 of this chapter instead of §§ 91.1065 through 91.1107, except for the operating experience requirements of § 135.244 of this chapter.

(d) For the purposes of this subpart, the following terms and definitions apply:

(1) *Initial training.* The training required for crewmembers who have not qualified and served in the same capacity on an aircraft.

(2) *Transition training.* The training required for crewmembers who have qualified and served in the same capacity on another aircraft.

(3) *Upgrade training.* The training required for crewmembers who have qualified and served as second in command on a particular aircraft type, before they serve as pilot in command on that aircraft.

(4) *Differences training.* The training required for crewmembers who have qualified and served on a particular type aircraft, when the Administrator finds differences training is necessary before a crewmember serves in the same capacity on a particular variation of that aircraft.

(5) *Recurrent training.* The training required for crewmembers to remain adequately trained and currently proficient for each aircraft crewmember position, and type of operation in which the crewmember serves.

(6) *In flight.* The maneuvers, procedures, or functions that will be conducted in the aircraft.

(7) *Training center.* An organization governed by the applicable requirements of part 142 of this chapter that conducts training, testing, and checking under contract or other arrangement to program managers subject to the requirements of this subpart.

(8) *Requalification training.* The training required for crewmembers previously trained and qualified, but who have become unqualified because of not having met within the required period any of the following:

(i) Recurrent crewmember training requirements of § 91.1107.

(ii) Instrument proficiency check requirements of § 91.1069.

(iii) Testing requirements of § 91.1065.

(iv) Recurrent flight attendant testing requirements of § 91.1067.

### § 91.1065 Initial and recurrent pilot testing requirements.

(a) No program manager or owner may use a pilot, nor may any person serve as a pilot, unless, since the beginning of the 12th month before that service, that pilot has passed either a written or oral test (or a combination), given by the Administrator or an authorized check pilot, on that pilot's knowledge in the following areas—

(1) The appropriate provisions of parts 61 and 91 of this chapter and the management specifications and the operating manual of the program manager;

(2) For each type of aircraft to be flown by the pilot, the aircraft powerplant, major components and systems, major appliances, performance and operating limitations, standard and emergency operating procedures, and the contents of the accepted operating manual or equivalent, as applicable;

(3) For each type of aircraft to be flown by the pilot, the method of determining compliance with weight and balance limitations for takeoff, landing and en route operations;

(4) Navigation and use of air navigation aids appropriate to the operation or pilot authorization, including, when applicable, instrument approach facilities and procedures;

(5) Air traffic control procedures, including IFR procedures when applicable;

(6) Meteorology in general, including the principles of frontal systems, icing, fog, thunderstorms, and windshear, and, if appropriate for the operation of the program manager, high altitude weather;

(7) Procedures for—

(i) Recognizing and avoiding severe weather situations;

(ii) Escaping from severe weather situations, in case of inadvertent encounters, including low-altitude windshear (except that rotorcraft aircraft pilots are not required to be tested on escaping from low-altitude windshear); and

(iii) Operating in or near thunderstorms (including best penetration altitudes), turbulent air (including clear air turbulence), icing, hail, and other potentially hazardous meteorological conditions; and

(8) New equipment, procedures, or techniques, as appropriate.

(b) No program manager or owner may use a pilot, nor may any person serve as a pilot, in any aircraft unless, since the beginning of the 12th month before that service, that pilot has passed a competency check given by the Administrator or an authorized check pilot in that class of aircraft, if single-engine aircraft other than turbojet, or that type of aircraft, if rotorcraft, multiengine aircraft, or turbojet airplane, to determine the pilot's competence in practical skills and techniques in that aircraft or class of aircraft. The extent of the competency check will be determined by the Administrator or authorized check pilot conducting the competency check. The competency check may include any of the maneuvers and procedures currently required for the original issuance of the particular pilot certificate required for the operations authorized and appropriate to the category, class and type of aircraft involved. For the purposes of this paragraph, type, as to an airplane, means any one of a group of airplanes determined by the Administrator to have a similar means of propulsion, the same manufacturer, and no significantly different handling or flight characteristics. For the purposes of this paragraph, type, as to a rotorcraft, means a basic make and model.

(c) The instrument proficiency check required by § 91.1069 may be substituted for the competency check required by this section for the type of aircraft used in the check.

(d) For the purpose of this subpart, competent performance of a procedure or maneuver by a person to be used as a pilot requires that the pilot be the obvious master of the aircraft, with the successful outcome of the maneuver never in doubt.

(e) The Administrator or authorized check pilot certifies the competency of each pilot who passes the knowledge or flight check in the program manager's pilot records.

(f) All or portions of a required competency check may be given in an aircraft simulator or other appropriate training device, if approved by the Administrator.

### § 91.1067 Initial and recurrent flight attendant crewmember testing requirements.

No program manager or owner may use a flight attendant crewmember, nor may any person serve as a flight attendant crewmember unless, since the beginning of the 12th month before that service, the program manager has determined by appropriate initial and recurrent testing that the person is knowledgeable and competent in the following areas as appropriate to assigned duties and responsibilities—

(a) Authority of the pilot in command;

(b) Passenger handling, including procedures to be followed in handling deranged persons or other persons whose conduct might jeopardize safety;

(c) Crewmember assignments, functions, and responsibilities during ditching and evacuation of persons who may need the assistance of another person to move expeditiously to an exit in an emergency;

(d) Briefing of passengers;

(e) Location and operation of portable fire extinguishers and other items of emergency equipment;

(f) Proper use of cabin equipment and controls;

(g) Location and operation of passenger oxygen equipment;

(h) Location and operation of all normal and emergency exits, including evacuation slides and escape ropes; and

(i) Seating of persons who may need assistance of another person to move rapidly to an exit in an emergency as prescribed by the program manager's operations manual.

### § 91.1069 Flight crew: Instrument proficiency check requirements.

(a) No program manager or owner may use a pilot, nor may any person serve, as a pilot in command of an aircraft under IFR unless, since the beginning of the 6th month before that service, that pilot has passed an instrument proficiency check under this section administered by the Administrator or an authorized check pilot.

(b) No program manager or owner may use a pilot, nor may any person serve, as a second command pilot of an aircraft under IFR unless, since the beginning of the 12th month before that service, that pilot has passed an instrument proficiency check under this section administered by the Administrator or an authorized check pilot.

(c) No pilot may use any type of precision instrument approach procedure under IFR unless, since the beginning of the 6th month before that use, the pilot satisfactorily demonstrated that type of approach procedure. No pilot may use any type of nonprecision approach procedure under IFR unless, since the beginning of the 6th month before that use, the pilot has satisfactorily demonstrated either that type of approach procedure or any other two different types of nonprecision approach procedures. The instrument approach procedure or procedures must include at least one straight-in approach, one circling approach, and one missed approach. Each type of approach procedure demonstrated must be conducted to published minimums for that procedure.

(d) The instrument proficiency checks required by paragraphs (a) and (b) of this section consists of either an oral or written equipment test (or a combination) and a flight check under simulated or actual IFR conditions. The equipment test includes questions on emergency procedures, engine operation, fuel and lubrication systems,

power settings, stall speeds, best engine-out speed, propeller and supercharger operations, and hydraulic, mechanical, and electrical systems, as appropriate. The flight check includes navigation by instruments, recovery from simulated emergencies, and standard instrument approaches involving navigational facilities which that pilot is to be authorized to use.

(e) Each pilot taking the instrument proficiency check must show that standard of competence required by § 91.1065(d).

(1) The instrument proficiency check must—

(i) For a pilot in command of an aircraft requiring that the PIC hold an airline transport pilot certificate, include the procedures and maneuvers for an airline transport pilot certificate in the particular type of aircraft, if appropriate; and

(ii) For a pilot in command of a rotorcraft or a second in command of any aircraft requiring that the SIC hold a commercial pilot certificate include the procedures and maneuvers for a commercial pilot certificate with an instrument rating and, if required, for the appropriate type rating.

(2) The instrument proficiency check must be given by an authorized check pilot or by the Administrator.

(f) If the pilot is assigned to pilot only one type of aircraft, that pilot must take the instrument proficiency check required by paragraph (a) of this section in that type of aircraft.

(g) If the pilot in command is assigned to pilot more than one type of aircraft, that pilot must take the instrument proficiency check required by paragraph (a) of this section in each type of aircraft to which that pilot is assigned, in rotation, but not more than one flight check during each period described in paragraph (a) of this section.

(h) If the pilot in command is assigned to pilot both single-engine and multiengine aircraft, that pilot must initially take the instrument proficiency check required by paragraph (a) of this section in a multiengine aircraft, and each succeeding check alternately in single-engine and multiengine aircraft, but not more than one flight check during each period described in paragraph (a) of this section.

(i) All or portions of a required flight check may be given in an aircraft simulator or other appropriate training device, if approved by the Administrator.

### § 91.1071 Crewmember: Tests and checks, grace provisions, training to accepted standards.

(a) If a crewmember who is required to take a test or a flight check under this subpart, completes the test or flight check in the month before or after the month in which it is required, that crewmember is considered to have completed the test or check in the month in which it is required.

(b) If a pilot being checked under this subpart fails any of the required maneuvers, the person giving the check may give additional training to the pilot during the course of the check. In addition to repeating the maneuvers failed, the person giving the check may require the pilot being checked to repeat any other maneuvers that are necessary to determine the pilot's proficiency. If the pilot being checked is unable to demonstrate satisfactory performance to the person conducting the check, the program manager may not use the pilot, nor may the pilot serve, as a flight crewmember in operations under this subpart until the pilot has satisfactorily completed the check. If a pilot who demonstrates unsatisfactory performance is employed as a pilot for a certificate holder operating under part 121, 125, or 135 of this chapter, he or she must notify that certificate holder of the unsatisfactory performance.

### § 91.1073 Training program: General.

(a) Each program manager must have a training program and must:

(1) Establish, obtain the appropriate initial and final approval of, and provide a training program that meets this subpart and that ensures that each crewmember, including each flight attendant if the program manager uses a flight attendant crewmember, flight instructor, check pilot, and each person assigned duties for the carriage and handling of hazardous materials (as defined in 49 CFR 171.8) is adequately

trained to perform these assigned duties.

(2) Provide adequate ground and flight training facilities and properly qualified ground instructors for the training required by this subpart.

(3) Provide and keep current for each aircraft type used and, if applicable, the particular variations within the aircraft type, appropriate training material, examinations, forms, instructions, and procedures for use in conducting the training and checks required by this subpart.

(4) Provide enough flight instructors, check pilots, and simulator instructors to conduct required flight training and flight checks, and simulator training courses allowed under this subpart.

(b) Whenever a crewmember who is required to take recurrent training under this subpart completes the training in the month before, or the month after, the month in which that training is required, the crewmember is considered to have completed it in the month in which it was required.

(c) Each instructor, supervisor, or check pilot who is responsible for a particular ground training subject, segment of flight training, course of training, flight check, or competence check under this subpart must certify as to the proficiency and knowledge of the crewmember, flight instructor, or check pilot concerned upon completion of that training or check. That certification must be made a part of the crewmember's record. When the certification required by this paragraph is made by an entry in a computerized recordkeeping system, the certifying instructor, supervisor, or check pilot, must be identified with that entry. However, the signature of the certifying instructor, supervisor, or check pilot is not required for computerized entries.

(d) Training subjects that apply to more than one aircraft or crewmember position and that have been satisfactorily completed during previous training while employed by the program manager for another aircraft or another crewmember position, need not be repeated during subsequent training other than recurrent training.

(e) Aircraft simulators and other training devices may be used in the program manager's training program if approved by the Administrator.

(f) Each program manager is responsible for establishing safe and efficient crew management practices for all phases of flight in program operations including crew resource management training for all crewmembers used in program operations.

(g) If an aircraft simulator has been approved by the Administrator for use in the program manager's training program, the program manager must ensure that each pilot annually completes at least one flight training session in an approved simulator for at least one program aircraft. The training session may be the flight training portion of any of the pilot training or check requirements of this subpart, including the initial, transition, upgrade, requalification, differences, or recurrent training, or the accomplishment of a competency check or instrument proficiency check. If there is no approved simulator for that aircraft type in operation, then all flight training and checking must be accomplished in the aircraft.

### § 91.1075 Training program: Special rules.

Other than the program manager, only the following are eligible under this subpart to conduct training, testing, and checking under contract or other arrangement to those persons subject to the requirements of this subpart.

(a) Another program manager operating under this subpart:

(b) A training center certificated under part 142 of this chapter to conduct training, testing, and checking required by this subpart if the training center—

(1) Holds applicable training specifications issued under part 142 of this chapter;

(2) Has facilities, training equipment, and courseware meeting the applicable requirements of part 142 of this chapter;

(3) Has approved curriculums, curriculum segments, and portions of curriculum segments applicable for use in training courses required by this subpart; and

(4) Has sufficient instructors and check pilots qualified under the applicable requirements of §§ 91.1089 through 91.1095 to conduct training, testing, and checking to persons subject to the requirements of this subpart.

(c) A part 119 certificate holder operating under part 121 or part 135 of this chapter.

(d) As authorized by the Administrator, a training center that is not certificated under part 142 of this chapter.

### § 91.1077 Training program and revision: Initial and final approval.

(a) To obtain initial and final approval of a training program, or a revision to an approved training program, each program manager must submit to the Administrator—

(1) An outline of the proposed or revised curriculum, that provides enough information for a preliminary evaluation of the proposed training program or revision; and

(2) Additional relevant information that may be requested by the Administrator.

(b) If the proposed training program or revision complies with this subpart, the Administrator grants initial approval in writing after which the program manager may conduct the training under that program. The Administrator then evaluates the effectiveness of the training program and advises the program manager of deficiencies, if any, that must be corrected.

(c) The Administrator grants final approval of the proposed training program or revision if the program manager shows that the training conducted under the initial approval in paragraph (b) of this section ensures that each person who successfully completes the training is adequately trained to perform that person's assigned duties.

(d) Whenever the Administrator finds that revisions are necessary for the continued adequacy of a training program that has been granted final approval, the program manager must, after notification by the Administrator, make any changes in the program that are found necessary by the Administrator. Within 30 days after the program manager receives the notice, it may file a petition to reconsider the notice with the Administrator. The filing of a petition to reconsider stays the notice pending a decision by the Administrator. However, if the Administrator finds that there is an emergency that requires immediate action in the interest of safety, the Administrator may, upon a statement of the reasons, require a change effective without stay.

### § 91.1079 Training program: Curriculum.

(a) Each program manager must prepare and keep current a written training program curriculum for each type of aircraft for each crewmember required for that type aircraft. The curriculum must include ground and flight training required by this subpart.

(b) Each training program curriculum must include the following:

(1) A list of principal ground training subjects, including emergency training subjects, that are provided.

(2) A list of all the training devices, mock-ups, systems trainers, procedures trainers, or other training aids that the program manager will use.

(3) Detailed descriptions or pictorial displays of the approved normal, abnormal, and emergency maneuvers, procedures and functions that will be performed during each flight training phase or flight check, indicating those maneuvers, procedures and functions that are to be performed during the inflight portions of flight training and flight checks.

### § 91.1081 Crewmember training requirements.

(a) Each program manager must include in its training program the following initial and transition ground training as appropriate to the particular assignment of the crewmember:

(1) Basic indoctrination ground training for newly hired crewmembers including instruction in at least the—

(i) Duties and responsibilities of crewmembers as applicable;

(ii) Appropriate provisions of this chapter;

(iii) Contents of the program manager's management specifications (not required for flight attendants); and

(iv) Appropriate portions of the program manager's operating manual.

(2) The initial and transition ground training in §§ 91.1101 and 91.1105, as applicable.

(3) Emergency training in § 91.1083.

(b) Each training program must provide the initial and transition flight training in § 91.1103, as applicable.

(c) Each training program must provide recurrent ground and flight training as provided in § 91.1107.

(d) Upgrade training in §§ 91.1101 and 91.1103 for a particular type aircraft may be included in the training program for crewmembers who have qualified and served as second in command on that aircraft.

(e) In addition to initial, transition, upgrade and recurrent training, each training program must provide ground and flight training, instruction, and practice necessary to ensure that each crewmember—

(1) Remains adequately trained and currently proficient for each aircraft, crewmember position, and type of operation in which the crewmember serves; and

(2) Qualifies in new equipment, facilities, procedures, and techniques, including modifications to aircraft.

### § 91.1083 Crewmember emergency training.

(a) Each training program must provide emergency training under this section for each aircraft type, model, and configuration, each crewmember, and each kind of operation conducted, as appropriate for each crewmember and the program manager.

(b) Emergency training must provide the following:

(1) Instruction in emergency assignments and procedures, including coordination among crewmembers.

(2) Individual instruction in the location, function, and operation of emergency equipment including—

(i) Equipment used in ditching and evacuation;

(ii) First aid equipment and its proper use; and

(iii) Portable fire extinguishers, with emphasis on the type of extinguisher to be used on different classes of fires.

(3) Instruction in the handling of emergency situations including—

(i) Rapid decompression;

(ii) Fire in flight or on the surface and smoke control procedures with emphasis on electrical equipment and related circuit breakers found in cabin areas;

(iii) Ditching and evacuation;

(iv) Illness, injury, or other abnormal situations involving passengers or crewmembers; and

(v) Hijacking and other unusual situations.

(4) Review and discussion of previous aircraft accidents and incidents involving actual emergency situations.

(c) Each crewmember must perform at least the following emergency drills, using the proper emergency equipment and procedures, unless the Administrator finds that, for a particular drill, the crewmember can be adequately trained by demonstration:

(1) Ditching, if applicable.

(2) Emergency evacuation.

(3) Fire extinguishing and smoke control.

(4) Operation and use of emergency exits, including deployment and use of evacuation slides, if applicable.

(5) Use of crew and passenger oxygen.

(6) Removal of life rafts from the aircraft, inflation of the life rafts, use of lifelines, and boarding of passengers and crew, if applicable.

(7) Donning and inflation of life vests and the use of other individual flotation devices, if applicable.

(d) Crewmembers who serve in operations above 25,000 feet must receive instruction in the following:

(1) Respiration.

(2) Hypoxia.

(3) Duration of consciousness without supplemental oxygen at altitude.

(4) Gas expansion.

(5) Gas bubble formation.

(6) Physical phenomena and incidents of decompression.

### § 91.1085 Hazardous materials recognition training.

No program manager may use any person to perform, and no person may perform, any assigned duties and responsibilities for the handling or carriage of hazardous materials (as defined in 49 CFR 171.8), unless that person has received training in the recognition of hazardous materials.

### § 91.1087 Approval of aircraft simulators and other training devices.

(a) Training courses using aircraft simulators and other training devices may be included in the program manager's training program if approved by the Administrator.

(b) Each aircraft simulator and other training device that is used in a training course or in checks required under this subpart must meet the following requirements:

(1) It must be specifically approved for—

(i) The program manager; and

(ii) The particular maneuver, procedure, or crewmember function involved.

(2) It must maintain the performance, functional, and other characteristics that are required for approval.

(3) Additionally, for aircraft simulators, it must be—

(i) Approved for the type aircraft and, if applicable, the particular variation within type for which the training or check is being conducted; and

(ii) Modified to conform with any modification to the aircraft being simulated that changes the performance, functional, or other characteristics required for approval.

(c) A particular aircraft simulator or other training device may be used by more than one program manager.

(d) In granting initial and final approval of training programs or revisions to them, the Administrator considers the training devices, methods, and procedures listed in the program manager's curriculum under § 91.1079.

### § 91.1089 Qualifications: Check pilots (aircraft) and check pilots (simulator).

(a) For the purposes of this section and § 91.1093:

(1) A check pilot (aircraft) is a person who is qualified to conduct flight checks in an aircraft, in a flight simulator, or in a flight training device for a particular type aircraft.

(2) A check pilot (simulator) is a person who is qualified to conduct flight checks, but only in a flight simulator, in a flight training device, or both, for a particular type aircraft.

(3) Check pilots (aircraft) and check pilots (simulator) are those check pilots who perform the functions described in § 91.1073(a)(4) and (c).

(b) No program manager may use a person, nor may any person serve as a check pilot (aircraft) in a training program established under this subpart unless, with respect to the aircraft type involved, that person—

(1) Holds the pilot certificates and ratings required to serve as a pilot in command in operations under this subpart;

(2) Has satisfactorily completed the training phases for the aircraft, including recurrent training, that are required to serve as a pilot in command in operations under this subpart;

(3) Has satisfactorily completed the proficiency or competency checks that are required to serve as a pilot in command in operations under this subpart;

(4) Has satisfactorily completed the applicable training requirements of § 91.1093;

(5) Holds at least a Class III medical certificate unless serving as a required crewmember, in which case holds a Class I or Class II medical certificate as appropriate; and

(6) Has been approved by the Administrator for the check pilot duties involved.

(c) No program manager may use a person, nor may any person serve as a check pilot (simulator) in a training program established under this subpart unless, with respect to the aircraft type involved, that person meets the provisions of paragraph (b) of this section, or—

(1) Holds the applicable pilot certificates and ratings, except medical certificate, required to serve as a pilot in command in operations under this subpart;

(2) Has satisfactorily completed the appropriate training phases for the aircraft, including recurrent training, that are required to serve as a pilot in command in operations under this subpart;

(3) Has satisfactorily completed the appropriate proficiency or competency checks that are required to serve as a pilot in command in operations under this subpart;

(4) Has satisfactorily completed the applicable training requirements of § 91.1093; and

(5) Has been approved by the Administrator for the check pilot (simulator) duties involved.

(d) Completion of the requirements in paragraphs (b)(2), (3), and (4) or (c)(2), (3), and (4) of this section, as applicable, must be entered in the individual's training record maintained by the program manager.

(e) A check pilot who does not hold an appropriate medical certificate may function as a check pilot (simulator), but may not serve as a flightcrew member in operations under this subpart.

(f) A check pilot (simulator) must accomplish the following—

(1) Fly at least two flight segments as a required crewmember for the type, class, or category aircraft involved within the 12-month period preceding the performance of any check pilot duty in a flight simulator; or

(2) Before performing any check pilot duty in a flight simulator, satisfactorily complete an approved line-observation program within the period prescribed by that program.

(g) The flight segments or line-observation program required in paragraph (f) of this section are considered to be completed in the month required if completed in the month before or the month after the month in which they are due.

### § 91.1091 Qualifications: Flight instructors (aircraft) and flight instructors (simulator).

(a) For the purposes of this section and § 91.1095:

(1) A flight instructor (aircraft) is a person who is qualified to instruct in an aircraft, in a flight simulator, or in a flight training device for a particular type, class, or category aircraft.

(2) A flight instructor (simulator) is a person who is qualified to instruct in a flight simulator, in a flight training device, or in both, for a particular type, class, or category aircraft.

(3) Flight instructors (aircraft) and flight instructors (simulator) are those instructors who perform the functions described in § 91.1073(a)(4) and (c).

(b) No program manager may use a person, nor may any person serve as a flight instructor (aircraft) in a training program established under this subpart unless, with respect to the type, class, or category aircraft involved, that person—

(1) Holds the pilot certificates and ratings required to serve as a pilot in command in operations under this subpart or part 121 or 135 of this chapter;

(2) Has satisfactorily completed the training phases for the aircraft, including recurrent training, that are required to serve as a pilot in command in operations under this subpart;

(3) Has satisfactorily completed the proficiency or competency checks that are required to serve as a pilot in command in operations under this subpart;

(4) Has satisfactorily completed the applicable training requirements of § 91.1095; and

(5) Holds at least a Class III medical certificate.

(c) No program manager may use a person, nor may any person serve as a flight instructor (simulator) in a training program established under this subpart, unless, with respect to the type, class, or category aircraft involved, that person meets the provisions of paragraph (b) of this section, or—

(1) Holds the pilot certificates and ratings, except medical certificate, required to serve as a pilot in command in operations under this subpart or part 121 or 135 of this chapter;

(2) Has satisfactorily completed the appropriate training phases for the aircraft, including recurrent training, that are required to serve as a pilot in command in operations under this subpart;

(3) Has satisfactorily completed the appropriate proficiency or competency checks that are required to serve as a pilot in command in operations under this subpart; and

(4) Has satisfactorily completed the applicable training requirements of § 91.1095.

(d) Completion of the requirements in paragraphs (b)(2), (3), and (4) or (c)(2), (3), and (4) of this section, as applicable, must be entered in the individual's training record maintained by the program manager.

(e) A pilot who does not hold a medical certificate may function as a flight instructor in an aircraft if functioning as a non-required crewmember, but

may not serve as a flightcrew member in operations under this subpart.

(f) A flight instructor (simulator) must accomplish the following—

(1) Fly at least two flight segments as a required crewmember for the type, class, or category aircraft involved within the 12-month period preceding the performance of any flight instructor duty in a flight simulator; or

(2) Satisfactorily complete an approved line-observation program within the period prescribed by that program preceding the performance of any flight instructor duty in a flight simulator.

(g) The flight segments or line-observation program required in paragraph (f) of this section are considered completed in the month required if completed in the month before, or in the month after, the month in which they are due.

[Doc. No. FAA–2001–10047, 68 FR 54561, Sept. 17, 2003, as amended by Amdt. 91–322, 76 FR 31823, June 2, 2011]

### §91.1093 Initial and transition training and checking: Check pilots (aircraft), check pilots (simulator).

(a) No program manager may use a person nor may any person serve as a check pilot unless—

(1) That person has satisfactorily completed initial or transition check pilot training; and

(2) Within the preceding 24 months, that person satisfactorily conducts a proficiency or competency check under the observation of an FAA inspector or an aircrew designated examiner employed by the program manager. The observation check may be accomplished in part or in full in an aircraft, in a flight simulator, or in a flight training device.

(b) The observation check required by paragraph (a)(2) of this section is considered to have been completed in the month required if completed in the month before or the month after the month in which it is due.

(c) The initial ground training for check pilots must include the following:

(1) Check pilot duties, functions, and responsibilities.

(2) The applicable provisions of the Code of Federal Regulations and the program manager's policies and procedures.

(3) The applicable methods, procedures, and techniques for conducting the required checks.

(4) Proper evaluation of student performance including the detection of—

(i) Improper and insufficient training; and

(ii) Personal characteristics of an applicant that could adversely affect safety.

(5) The corrective action in the case of unsatisfactory checks.

(6) The approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures in the aircraft.

(d) The transition ground training for a check pilot must include the approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures applicable to the aircraft to which the check pilot is in transition.

(e) The initial and transition flight training for a check pilot (aircraft) must include the following—

(1) The safety measures for emergency situations that are likely to develop during a check;

(2) The potential results of improper, untimely, or nonexecution of safety measures during a check;

(3) Training and practice in conducting flight checks from the left and right pilot seats in the required normal, abnormal, and emergency procedures to ensure competence to conduct the pilot flight checks required by this subpart; and

(4) The safety measures to be taken from either pilot seat for emergency situations that are likely to develop during checking.

(f) The requirements of paragraph (e) of this section may be accomplished in full or in part in flight, in a flight simulator, or in a flight training device, as appropriate.

(g) The initial and transition flight training for a check pilot (simulator) must include the following:

(1) Training and practice in conducting flight checks in the required normal, abnormal, and emergency procedures to ensure competence to conduct the flight checks required by this subpart. This training and practice

must be accomplished in a flight simulator or in a flight training device.

(2) Training in the operation of flight simulators, flight training devices, or both, to ensure competence to conduct the flight checks required by this subpart.

### § 91.1095 Initial and transition training and checking: Flight instructors (aircraft), flight instructors (simulator).

(a) No program manager may use a person nor may any person serve as a flight instructor unless—

(1) That person has satisfactorily completed initial or transition flight instructor training; and

(2) Within the preceding 24 months, that person satisfactorily conducts instruction under the observation of an FAA inspector, a program manager check pilot, or an aircrew designated examiner employed by the program manager. The observation check may be accomplished in part or in full in an aircraft, in a flight simulator, or in a flight training device.

(b) The observation check required by paragraph (a)(2) of this section is considered to have been completed in the month required if completed in the month before, or the month after, the month in which it is due.

(c) The initial ground training for flight instructors must include the following:

(1) Flight instructor duties, functions, and responsibilities.

(2) The applicable Code of Federal Regulations and the program manager's policies and procedures.

(3) The applicable methods, procedures, and techniques for conducting flight instruction.

(4) Proper evaluation of student performance including the detection of—

(i) Improper and insufficient training; and

(ii) Personal characteristics of an applicant that could adversely affect safety.

(5) The corrective action in the case of unsatisfactory training progress.

(6) The approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures in the aircraft.

(7) Except for holders of a flight instructor certificate—

(i) The fundamental principles of the teaching-learning process;

(ii) Teaching methods and procedures; and

(iii) The instructor-student relationship.

(d) The transition ground training for flight instructors must include the approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures applicable to the type, class, or category aircraft to which the flight instructor is in transition.

(e) The initial and transition flight training for flight instructors (aircraft) must include the following—

(1) The safety measures for emergency situations that are likely to develop during instruction;

(2) The potential results of improper or untimely safety measures during instruction;

(3) Training and practice from the left and right pilot seats in the required normal, abnormal, and emergency maneuvers to ensure competence to conduct the flight instruction required by this subpart; and

(4) The safety measures to be taken from either the left or right pilot seat for emergency situations that are likely to develop during instruction.

(f) The requirements of paragraph (e) of this section may be accomplished in full or in part in flight, in a flight simulator, or in a flight training device, as appropriate.

(g) The initial and transition flight training for a flight instructor (simulator) must include the following:

(1) Training and practice in the required normal, abnormal, and emergency procedures to ensure competence to conduct the flight instruction required by this subpart. These maneuvers and procedures must be accomplished in full or in part in a flight simulator or in a flight training device.

(2) Training in the operation of flight simulators, flight training devices, or both, to ensure competence to conduct the flight instruction required by this subpart.

### § 91.1097 Pilot and flight attendant crewmember training programs.

(a) Each program manager must establish and maintain an approved pilot

training program, and each program manager who uses a flight attendant crewmember must establish and maintain an approved flight attendant training program, that is appropriate to the operations to which each pilot and flight attendant is to be assigned, and will ensure that they are adequately trained to meet the applicable knowledge and practical testing requirements of §§91.1065 through 91.1071.

(b) Each program manager required to have a training program by paragraph (a) of this section must include in that program ground and flight training curriculums for—

(1) Initial training;

(2) Transition training;

(3) Upgrade training;

(4) Differences training;

(5) Recurrent training; and

(6) Requalification training.

(c) Each program manager must provide current and appropriate study materials for use by each required pilot and flight attendant.

(d) The program manager must furnish copies of the pilot and flight attendant crewmember training program, and all changes and additions, to the assigned representative of the Administrator. If the program manager uses training facilities of other persons, a copy of those training programs or appropriate portions used for those facilities must also be furnished. Curricula that follow FAA published curricula may be cited by reference in the copy of the training program furnished to the representative of the Administrator and need not be furnished with the program.

### §91.1099 Crewmember initial and recurrent training requirements.

No program manager may use a person, nor may any person serve, as a crewmember in operations under this subpart unless that crewmember has completed the appropriate initial or recurrent training phase of the training program appropriate to the type of operation in which the crewmember is to serve since the beginning of the 12th month before that service.

### §91.1101 Pilots: Initial, transition, and upgrade ground training.

Initial, transition, and upgrade ground training for pilots must include instruction in at least the following, as applicable to their duties:

(a) General subjects—

(1) The program manager's flight locating procedures;

(2) Principles and methods for determining weight and balance, and runway limitations for takeoff and landing;

(3) Enough meteorology to ensure a practical knowledge of weather phenomena, including the principles of frontal systems, icing, fog, thunderstorms, windshear and, if appropriate, high altitude weather situations;

(4) Air traffic control systems, procedures, and phraseology;

(5) Navigation and the use of navigational aids, including instrument approach procedures;

(6) Normal and emergency communication procedures;

(7) Visual cues before and during descent below Decision Altitude or MDA; and

(8) Other instructions necessary to ensure the pilot's competence.

(b) For each aircraft type—

(1) A general description;

(2) Performance characteristics;

(3) Engines and propellers;

(4) Major components;

(5) Major aircraft systems (that is, flight controls, electrical, and hydraulic), other systems, as appropriate, principles of normal, abnormal, and emergency operations, appropriate procedures and limitations;

(6) Knowledge and procedures for—

(i) Recognizing and avoiding severe weather situations;

(ii) Escaping from severe weather situations, in case of inadvertent encounters, including low-altitude windshear (except that rotorcraft pilots are not required to be trained in escaping from low-altitude windshear);

(iii) Operating in or near thunderstorms (including best penetration altitudes), turbulent air (including clear air turbulence), inflight icing, hail, and other potentially hazardous meteorological conditions; and

(iv) Operating airplanes during ground icing conditions, (that is, any

time conditions are such that frost, ice, or snow may reasonably be expected to adhere to the aircraft), if the program manager expects to authorize takeoffs in ground icing conditions, including:

(A) The use of holdover times when using deicing/anti-icing fluids;

(B) Airplane deicing/anti-icing procedures, including inspection and check procedures and responsibilities;

(C) Communications;

(D) Airplane surface contamination (that is, adherence of frost, ice, or snow) and critical area identification, and knowledge of how contamination adversely affects airplane performance and flight characteristics;

(E) Types and characteristics of deicing/anti-icing fluids, if used by the program manager;

(F) Cold weather preflight inspection procedures;

(G) Techniques for recognizing contamination on the airplane;

(7) Operating limitations;

(8) Fuel consumption and cruise control;

(9) Flight planning;

(10) Each normal and emergency procedure; and

(11) The approved Aircraft Flight Manual or equivalent.

### § 91.1103 Pilots: Initial, transition, upgrade, requalification, and differences flight training.

(a) Initial, transition, upgrade, requalification, and differences training for pilots must include flight and practice in each of the maneuvers and procedures contained in each of the curriculums that are a part of the approved training program.

(b) The maneuvers and procedures required by paragraph (a) of this section must be performed in flight, except to the extent that certain maneuvers and procedures may be performed in an aircraft simulator, or an appropriate training device, as allowed by this subpart.

(c) If the program manager's approved training program includes a course of training using an aircraft simulator or other training device, each pilot must successfully complete—

(1) Training and practice in the simulator or training device in at least the maneuvers and procedures in this subpart that are capable of being performed in the aircraft simulator or training device; and

(2) A flight check in the aircraft or a check in the simulator or training device to the level of proficiency of a pilot in command or second in command, as applicable, in at least the maneuvers and procedures that are capable of being performed in an aircraft simulator or training device.

### § 91.1105 Flight attendants: Initial and transition ground training.

Initial and transition ground training for flight attendants must include instruction in at least the following—

(a) General subjects—

(1) The authority of the pilot in command; and

(2) Passenger handling, including procedures to be followed in handling deranged persons or other persons whose conduct might jeopardize safety.

(b) For each aircraft type—

(1) A general description of the aircraft emphasizing physical characteristics that may have a bearing on ditching, evacuation, and inflight emergency procedures and on other related duties;

(2) The use of both the public address system and the means of communicating with other flight crewmembers, including emergency means in the case of attempted hijacking or other unusual situations; and

(3) Proper use of electrical galley equipment and the controls for cabin heat and ventilation.

### § 91.1107 Recurrent training.

(a) Each program manager must ensure that each crewmember receives recurrent training and is adequately trained and currently proficient for the type aircraft and crewmember position involved.

(b) Recurrent ground training for crewmembers must include at least the following:

(1) A quiz or other review to determine the crewmember's knowledge of the aircraft and crewmember position involved.

(2) Instruction as necessary in the subjects required for initial ground training by this subpart, as appropriate, including low-altitude windshear training and training on operating during ground icing conditions, as prescribed in §91.1097 and described in §91.1101, and emergency training.

(c) Recurrent flight training for pilots must include, at least, flight training in the maneuvers or procedures in this subpart, except that satisfactory completion of the check required by §91.1065 within the preceding 12 months may be substituted for recurrent flight training.

### §91.1109 Aircraft maintenance: Inspection program.

Each program manager must establish an aircraft inspection program for each make and model program aircraft and ensure each aircraft is inspected in accordance with that inspection program.

(a) The inspection program must be in writing and include at least the following information:

(1) Instructions and procedures for the conduct of inspections for the particular make and model aircraft, including necessary tests and checks. The instructions and procedures must set forth in detail the parts and areas of the airframe, engines, propellers, rotors, and appliances, including survival and emergency equipment required to be inspected.

(2) A schedule for performing the inspections that must be accomplished under the inspection program expressed in terms of the time in service, calendar time, number of system operations, or any combination thereof.

(3) The name and address of the person responsible for scheduling the inspections required by the inspection program. A copy of the inspection program must be made available to the person performing inspections on the aircraft and, upon request, to the Administrator.

(b) Each person desiring to establish or change an approved inspection program under this section must submit the inspection program for approval to the Flight Standards District Office that issued the program manager's management specifications. The inspection program must be derived from one of the following programs:

(1) An inspection program currently recommended by the manufacturer of the aircraft, aircraft engines, propellers, appliances, and survival and emergency equipment;

(2) An inspection program that is part of a continuous airworthiness maintenance program currently in use by a person holding an air carrier or operating certificate issued under part 119 of this chapter and operating that make and model aircraft under part 121 or 135 of this chapter;

(3) An aircraft inspection program approved under §135.419 of this chapter and currently in use under part 135 of this chapter by a person holding a certificate issued under part 119 of this chapter; or

(4) An airplane inspection program approved under §125.247 of this chapter and currently in use under part 125 of this chapter.

(5) An inspection program that is part of the program manager's continuous airworthiness maintenance program under §§91.1411 through 91.1443.

(c) The Administrator may require revision of the inspection program approved under this section in accordance with the provisions of §91.415.

### §91.1111 Maintenance training.

The program manager must ensure that all employees who are responsible for maintenance related to program aircraft undergo appropriate initial and annual recurrent training and are competent to perform those duties.

### §91.1113 Maintenance recordkeeping.

Each fractional ownership program manager must keep (using the system specified in the manual required in §91.1025) the records specified in §91.417(a) for the periods specified in §91.417(b).

### §91.1115 Inoperable instruments and equipment.

(a) No person may take off an aircraft with inoperable instruments or equipment installed unless the following conditions are met:

(1) An approved Minimum Equipment List exists for that aircraft.

(2) The program manager has been issued management specifications authorizing operations in accordance with an approved Minimum Equipment List. The flight crew must have direct access at all times prior to flight to all of the information contained in the approved Minimum Equipment List through printed or other means approved by the Administrator in the program manager's management specifications. An approved Minimum Equipment List, as authorized by the management specifications, constitutes an approved change to the type design without requiring recertification.

(3) The approved Minimum Equipment List must:

(i) Be prepared in accordance with the limitations specified in paragraph (b) of this section.

(ii) Provide for the operation of the aircraft with certain instruments and equipment in an inoperable condition.

(4) Records identifying the inoperable instruments and equipment and the information required by (a)(3)(ii) of this section must be available to the pilot.

(5) The aircraft is operated under all applicable conditions and limitations contained in the Minimum Equipment List and the management specifications authorizing use of the Minimum Equipment List.

(b) The following instruments and equipment may not be included in the Minimum Equipment List:

(1) Instruments and equipment that are either specifically or otherwise required by the airworthiness requirements under which the airplane is type certificated and that are essential for safe operations under all operating conditions.

(2) Instruments and equipment required by an airworthiness directive to be in operable condition unless the airworthiness directive provides otherwise.

(3) Instruments and equipment required for specific operations by this part.

(c) Notwithstanding paragraphs (b)(1) and (b)(3) of this section, an aircraft with inoperable instruments or equipment may be operated under a special flight permit under §§ 21.197 and 21.199 of this chapter.

(d) A person authorized to use an approved Minimum Equipment List issued for a specific aircraft under part 121, 125, or 135 of this chapter must use that Minimum Equipment List to comply with this section.

### § 91.1411 Continuous airworthiness maintenance program use by fractional ownership program manager.

Fractional ownership program aircraft may be maintained under a continuous airworthiness maintenance program (CAMP) under §§ 91.1413 through 91.1443. Any program manager who elects to maintain the program aircraft using a continuous airworthiness maintenance program must comply with §§ 91.1413 through 91.1443.

### § 91.1413 CAMP: Responsibility for airworthiness.

(a) For aircraft maintained in accordance with a Continuous Airworthiness Maintenance Program, each program manager is primarily responsible for the following:

(1) Maintaining the airworthiness of the program aircraft, including airframes, aircraft engines, propellers, rotors, appliances, and parts.

(2) Maintaining its aircraft in accordance with the requirements of this chapter.

(3) Repairing defects that occur between regularly scheduled maintenance required under part 43 of this chapter.

(b) Each program manager who maintains program aircraft under a CAMP must—

(1) Employ a Director of Maintenance or equivalent position. The Director of Maintenance must be a certificated mechanic with airframe and powerplant ratings who has responsibility for the maintenance program on all program aircraft maintained under a continuous airworthiness maintenance program. This person cannot also act as Chief Inspector.

(2) Employ a Chief Inspector or equivalent position. The Chief Inspector must be a certificated mechanic with airframe and powerplant ratings who has overall responsibility for inspection aspects of the CAMP. This person cannot also act as Director of Maintenance.

(3) Have the personnel to perform the maintenance of program aircraft, including airframes, aircraft engines, propellers, rotors, appliances, emergency equipment and parts, under its manual and this chapter; or make arrangements with another person for the performance of maintenance. However, the program manager must ensure that any maintenance, preventive maintenance, or alteration that is performed by another person is performed under the program manager's operating manual and this chapter.

### §91.1415 CAMP: Mechanical reliability reports.

(a) Each program manager who maintains program aircraft under a CAMP must report the occurrence or detection of each failure, malfunction, or defect in an aircraft concerning—

(1) Fires during flight and whether the related fire-warning system functioned properly;

(2) Fires during flight not protected by related fire-warning system;

(3) False fire-warning during flight;

(4) An exhaust system that causes damage during flight to the engine, adjacent structure, equipment, or components;

(5) An aircraft component that causes accumulation or circulation of smoke, vapor, or toxic or noxious fumes in the crew compartment or passenger cabin during flight;

(6) Engine shutdown during flight because of flameout;

(7) Engine shutdown during flight when external damage to the engine or aircraft structure occurs;

(8) Engine shutdown during flight because of foreign object ingestion or icing;

(9) Shutdown of more than one engine during flight;

(10) A propeller feathering system or ability of the system to control overspeed during flight;

(11) A fuel or fuel-dumping system that affects fuel flow or causes hazardous leakage during flight;

(12) An unwanted landing gear extension or retraction or opening or closing of landing gear doors during flight;

(13) Brake system components that result in loss of brake actuating force when the aircraft is in motion on the ground;

(14) Aircraft structure that requires major repair;

(15) Cracks, permanent deformation, or corrosion of aircraft structures, if more than the maximum acceptable to the manufacturer or the FAA; and

(16) Aircraft components or systems that result in taking emergency actions during flight (except action to shut down an engine).

(b) For the purpose of this section, *during flight* means the period from the moment the aircraft leaves the surface of the earth on takeoff until it touches down on landing.

(c) In addition to the reports required by paragraph (a) of this section, each program manager must report any other failure, malfunction, or defect in an aircraft that occurs or is detected at any time if, in the manager's opinion, the failure, malfunction, or defect has endangered or may endanger the safe operation of the aircraft.

(d) Each program manager must send each report required by this section, in writing, covering each 24-hour period beginning at 0900 hours local time of each day and ending at 0900 hours local time on the next day to the Flight Standards District Office that issued the program manager's management specifications. Each report of occurrences during a 24-hour period must be mailed or transmitted to that office within the next 72 hours. However, a report that is due on Saturday or Sunday may be mailed or transmitted on the following Monday and one that is due on a holiday may be mailed or transmitted on the next workday. For aircraft operated in areas where mail is not collected, reports may be mailed or transmitted within 72 hours after the aircraft returns to a point where the mail is collected.

(e) The program manager must transmit the reports required by this section on a form and in a manner prescribed by the Administrator, and must include as much of the following as is available:

(1) The type and identification number of the aircraft.

(2) The name of the program manager.

(3) The date.

(4) The nature of the failure, malfunction, or defect.

(5) Identification of the part and system involved, including available information pertaining to type designation of the major component and time since last overhaul, if known.

(6) Apparent cause of the failure, malfunction or defect (for example, wear, crack, design deficiency, or personnel error).

(7) Other pertinent information necessary for more complete identification, determination of seriousness, or corrective action.

(f) A program manager that is also the holder of a type certificate (including a supplemental type certificate), a Parts Manufacturer Approval, or a Technical Standard Order Authorization, or that is the licensee of a type certificate need not report a failure, malfunction, or defect under this section if the failure, malfunction, or defect has been reported by it under §21.3 of this chapter or under the accident reporting provisions of part 830 of the regulations of the National Transportation Safety Board.

(g) No person may withhold a report required by this section even when not all information required by this section is available.

(h) When the program manager receives additional information, including information from the manufacturer or other agency, concerning a report required by this section, the program manager must expeditiously submit it as a supplement to the first report and reference the date and place of submission of the first report.

### §91.1417 CAMP: Mechanical interruption summary report.

Each program manager who maintains program aircraft under a CAMP must mail or deliver, before the end of the 10th day of the following month, a summary report of the following occurrences in multiengine aircraft for the preceding month to the Flight Standards District Office that issued the management specifications:

(a) Each interruption to a flight, unscheduled change of aircraft en route, or unscheduled stop or diversion from a route, caused by known or suspected mechanical difficulties or malfunctions that are not required to be reported under §91.1415.

(b) The number of propeller featherings in flight, listed by type of propeller and engine and aircraft on which it was installed. Propeller featherings for training, demonstration, or flight check purposes need not be reported.

### §91.1423 CAMP: Maintenance organization.

(a) Each program manager who maintains program aircraft under a CAMP that has its personnel perform any of its maintenance (other than required inspections), preventive maintenance, or alterations, and each person with whom it arranges for the performance of that work, must have an organization adequate to perform the work.

(b) Each program manager who has personnel perform any inspections required by the program manager's manual under §91.1427(b) (2) or (3), (in this subpart referred to as required inspections), and each person with whom the program manager arranges for the performance of that work, must have an organization adequate to perform that work.

(c) Each person performing required inspections in addition to other maintenance, preventive maintenance, or alterations, must organize the performance of those functions so as to separate the required inspection functions from the other maintenance, preventive maintenance, or alteration functions. The separation must be below the level of administrative control at which overall responsibility for the required inspection functions and other maintenance, preventive maintenance, or alterations is exercised.

### §91.1425 CAMP: Maintenance, preventive maintenance, and alteration programs.

Each program manager who maintains program aircraft under a CAMP must have an inspection program and a program covering other maintenance, preventive maintenance, or alterations that ensures that—

(a) Maintenance, preventive maintenance, or alterations performed by its

personnel, or by other persons, are performed under the program manager's manual;

(b) Competent personnel and adequate facilities and equipment are provided for the proper performance of maintenance, preventive maintenance, or alterations; and

(c) Each aircraft released to service is airworthy and has been properly maintained for operation under this part.

**§91.1427 CAMP: Manual requirements.**

(a) Each program manager who maintains program aircraft under a CAMP must put in the operating manual the chart or description of the program manager's organization required by §91.1423 and a list of persons with whom it has arranged for the performance of any of its required inspections, and other maintenance, preventive maintenance, or alterations, including a general description of that work.

(b) Each program manager must put in the operating manual the programs required by §91.1425 that must be followed in performing maintenance, preventive maintenance, or alterations of that program manager's aircraft, including airframes, aircraft engines, propellers, rotors, appliances, emergency equipment, and parts, and must include at least the following:

(1) The method of performing routine and nonroutine maintenance (other than required inspections), preventive maintenance, or alterations.

(2) A designation of the items of maintenance and alteration that must be inspected (required inspections) including at least those that could result in a failure, malfunction, or defect endangering the safe operation of the aircraft, if not performed properly or if improper parts or materials are used.

(3) The method of performing required inspections and a designation by occupational title of personnel authorized to perform each required inspection.

(4) Procedures for the reinspection of work performed under previous required inspection findings (buy-back procedures).

(5) Procedures, standards, and limits necessary for required inspections and acceptance or rejection of the items required to be inspected and for periodic inspection and calibration of precision tools, measuring devices, and test equipment.

(6) Procedures to ensure that all required inspections are performed.

(7) Instructions to prevent any person who performs any item of work from performing any required inspection of that work.

(8) Instructions and procedures to prevent any decision of an inspector regarding any required inspection from being countermanded by persons other than supervisory personnel of the inspection unit, or a person at the level of administrative control that has overall responsibility for the management of both the required inspection functions and the other maintenance, preventive maintenance, or alterations functions.

(9) Procedures to ensure that maintenance (including required inspections), preventive maintenance, or alterations that are not completed because of work interruptions are properly completed before the aircraft is released to service.

(c) Each program manager must put in the manual a suitable system (which may include an electronic or coded system) that provides for the retention of the following information—

(1) A description (or reference to data acceptable to the Administrator) of the work performed;

(2) The name of the person performing the work if the work is performed by a person outside the organization of the program manager; and

(3) The name or other positive identification of the individual approving the work.

(d) For the purposes of this part, the program manager must prepare that part of its manual containing maintenance information and instructions, in whole or in part, in a format acceptable to the Administrator, that is retrievable in the English language.

### § 91.1429 CAMP: Required inspection personnel.

(a) No person who maintains an aircraft under a CAMP may use any person to perform required inspections unless the person performing the inspection is appropriately certificated, properly trained, qualified, and authorized to do so.

(b) No person may allow any person to perform a required inspection unless, at the time the work was performed, the person performing that inspection is under the supervision and control of the chief inspector.

(c) No person may perform a required inspection if that person performed the item of work required to be inspected.

(d) Each program manager must maintain, or must ensure that each person with whom it arranges to perform required inspections maintains, a current listing of persons who have been trained, qualified, and authorized to conduct required inspections. The persons must be identified by name, occupational title, and the inspections that they are authorized to perform. The program manager (or person with whom it arranges to perform its required inspections) must give written information to each person so authorized, describing the extent of that person's responsibilities, authorities, and inspectional limitations. The list must be made available for inspection by the Administrator upon request.

### § 91.1431 CAMP: Continuing analysis and surveillance.

(a) Each program manager who maintains program aircraft under a CAMP must establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventive maintenance, and alterations and for the correction of any deficiency in those programs, regardless of whether those programs are carried out by employees of the program manager or by another person.

(b) Whenever the Administrator finds that the programs described in paragraph (a) of this section does not contain adequate procedures and standards to meet this part, the program manager must, after notification by the Administrator, make changes in those programs requested by the Administrator.

(c) A program manager may petition the Administrator to reconsider the notice to make a change in a program. The petition must be filed with the Director, Flight Standards Service, within 30 days after the program manager receives the notice. Except in the case of an emergency requiring immediate action in the interest of safety, the filing of the petition stays the notice pending a decision by the Administrator.

### § 91.1433 CAMP: Maintenance and preventive maintenance training program.

Each program manager who maintains program aircraft under a CAMP or a person performing maintenance or preventive maintenance functions for it must have a training program to ensure that each person (including inspection personnel) who determines the adequacy of work done is fully informed about procedures and techniques and new equipment in use and is competent to perform that person's duties.

### § 91.1435 CAMP: Certificate requirements.

(a) Except for maintenance, preventive maintenance, alterations, and required inspections performed by repair stations located outside the United States certificated under the provisions of part 145 of this chapter, each person who is directly in charge of maintenance, preventive maintenance, or alterations for a CAMP, and each person performing required inspections for a CAMP must hold an appropriate airman certificate.

(b) For the purpose of this section, a person ''directly in charge'' is each person assigned to a position in which that person is responsible for the work of a shop or station that performs maintenance, preventive maintenance, alterations, or other functions affecting airworthiness. A person who is directly in charge need not physically observe and direct each worker constantly but must be available for consultation and decision on matters requiring instruction or decision from

higher authority than that of the person performing the work.

### § 91.1437 CAMP: Authority to perform and approve maintenance.

A program manager who maintains program aircraft under a CAMP may employ maintenance personnel, or make arrangements with other persons to perform maintenance and preventive maintenance as provided in its maintenance manual. Unless properly certificated, the program manager may not perform or approve maintenance for return to service.

### § 91.1439 CAMP: Maintenance recording requirements.

(a) Each program manager who maintains program aircraft under a CAMP must keep (using the system specified in the manual required in § 91.1427) the following records for the periods specified in paragraph (b) of this section:

(1) All the records necessary to show that all requirements for the issuance of an airworthiness release under § 91.1443 have been met.

(2) Records containing the following information:

(i) The total time in service of the airframe, engine, propeller, and rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of each item installed on the aircraft that are required to be overhauled on a specified time basis.

(iv) The identification of the current inspection status of the aircraft, including the time since the last inspections required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives, including the date and methods of compliance, and, if the airworthiness directive involves recurring action, the time and date when the next action is required.

(vi) A list of current major alterations and repairs to each airframe, engine, propeller, rotor, and appliance.

(b) Each program manager must retain the records required to be kept by this section for the following periods:

(1) Except for the records of the last complete overhaul of each airframe, engine, propeller, rotor, and appliance the records specified in paragraph (a)(1) of this section must be retained until the work is repeated or superseded by other work or for one year after the work is performed.

(2) The records of the last complete overhaul of each airframe, engine, propeller, rotor, and appliance must be retained until the work is superseded by work of equivalent scope and detail.

(3) The records specified in paragraph (a)(2) of this section must be retained as specified unless transferred with the aircraft at the time the aircraft is sold.

(c) The program manager must make all maintenance records required to be kept by this section available for inspection by the Administrator or any representative of the National Transportation Safety Board.

### § 91.1441 CAMP: Transfer of maintenance records.

When a U.S.-registered fractional ownership program aircraft maintained under a CAMP is removed from the list of program aircraft in the management specifications, the program manager must transfer to the purchaser, at the time of the sale, the following records of that aircraft, in plain language form or in coded form that provides for the preservation and retrieval of information in a manner acceptable to the Administrator:

(a) The records specified in § 91.1439(a)(2).

(b) The records specified in § 91.1439(a)(1) that are not included in the records covered by paragraph (a) of this section, except that the purchaser may allow the program manager to keep physical custody of such records. However, custody of records by the program manager does not relieve the purchaser of its responsibility under § 91.1439(c) to make the records available for inspection by the Administrator or any representative of the National Transportation Safety Board.

### § 91.1443 CAMP: Airworthiness release or aircraft maintenance log entry.

(a) No program aircraft maintained under a CAMP may be operated after maintenance, preventive maintenance, or alterations are performed unless

qualified, certificated personnel employed by the program manager prepare, or cause the person with whom the program manager arranges for the performance of the maintenance, preventive maintenance, or alterations, to prepare—

(1) An airworthiness release; or

(2) An appropriate entry in the aircraft maintenance log.

(b) The airworthiness release or log entry required by paragraph (a) of this section must—

(1) Be prepared in accordance with the procedure in the program manager's manual;

(2) Include a certification that—

(i) The work was performed in accordance with the requirements of the program manager's manual;

(ii) All items required to be inspected were inspected by an authorized person who determined that the work was satisfactorily completed;

(iii) No known condition exists that would make the aircraft unairworthy;

(iv) So far as the work performed is concerned, the aircraft is in condition for safe operation; and

(3) Be signed by an authorized certificated mechanic.

(c) Notwithstanding paragraph (b)(3) of this section, after maintenance, preventive maintenance, or alterations performed by a repair station certificated under the provisions of part 145 of this chapter, the approval for return to service or log entry required by paragraph (a) of this section may be signed by a person authorized by that repair station.

(d) Instead of restating each of the conditions of the certification required by paragraph (b) of this section, the program manager may state in its manual that the signature of an authorized certificated mechanic or repairman constitutes that certification.

## Subpart L—Continued Airworthiness and Safety Improvements

SOURCE: Amdt. 91–297, 72 FR 63410, Nov. 8, 2007, unless otherwise noted.

### § 91.1501 Purpose and definition.

(a) This subpart requires operators to support the continued airworthiness of each airplane. These requirements may include, but are not limited to, revising the inspection program, incorporating design changes, and incorporating revisions to Instructions for Continued Airworthiness.

(b) For purposes of this subpart, the ''FAA Oversight Office'' is the aircraft certification office or office of the Transport Airplane Directorate with oversight responsibility for the relevant type certificate or supplemental type certificate, as determined by the Administrator.

### § 91.1503 [Reserved]

### § 91.1505 Repairs assessment for pressurized fuselages.

(a) No person may operate an Airbus Model A300 (excluding the –600 series), British Aerospace Model BAC 1–11, Boeing Model, 707, 720, 727, 737 or 747, McDonnell Douglas Model DC–8, DC–9/MD–80 or DC–10, Fokker Model F28, or Lockheed Model L–1011 airplane beyond applicable flight cycle implementation time specified below, or May 25, 2001, whichever occurs later, unless repair assessment guidelines applicable to the fuselage pressure boundary (fuselage skin, door skin, and bulkhead webs) that have been approved by the FAA Aircraft Certification Office (ACO), or office of the Transport Airplane Directorate, having cognizance over the type certificate for the affected airplane are incorporated within its inspection program:

(1) For the Airbus Model A300 (excluding the –600 series), the flight cycle implementation time is:

(i) Model B2: 36,000 flights.

(ii) Model B4–100 (including Model B4–2C): 30,000 flights above the window line, and 36,000 flights below the window line.

(iii) Model B4–200: 25,500 flights above the window line, and 34,000 flights below the window line.

(2) For all models of the British Aerospace BAC 1–11, the flight cycle implementation time is 60,000 flights.

(3) For all models of the Boeing 707, the flight cycle implementation time is 15,000 flights.

(4) For all models of the Boeing 720, the flight cycle implementation time is 23,000 flights.

(5) For all models of the Boeing 727, the flight cycle implementation time is 45,000 flights.

(6) For all models of the Boeing 737, the flight cycle implementation time is 60,000 flights.

(7) For all models of the Boeing 747, the flight cycle implementation time is 15,000 flights.

(8) For all models of the McDonnell Douglas DC–8, the flight cycle implementation time is 30,000 flights.

(9) For all models of the McDonnell Douglas DC–9/MD–80, the flight cycle implementation time is 60,000 flights.

(10) For all models of the McDonnell Douglas DC–10, the flight cycle implementation time is 30,000 flights.

(11) For all models of the Lockheed L–1011, the flight cycle implementation time is 27,000 flights.

(12) For the Fokker F–28 Mark 1000, 2000, 3000, and 4000, the flight cycle implementation time is 60,000 flights.

(b) [Reserved]

[Doc. No. 29104, 65 FR 24125, Apr. 25, 2000; 65 FR 35703, June 5, 2000; 65 FR 50744, Aug. 21, 2000, as amended by Amdt. 91–266, 66 FR 23130, May 7, 2001; Amdt. 91–277, 67 FR 72834, Dec. 9, 2002; Amdt. 91–283, 69 FR 45941, July 30, 2004. Redesignated and amended by Amdt. 91–297, 72 FR 63410, Nov. 8, 2007]

### §91.1507 Fuel tank system inspection program.

(a) Except as provided in paragraph (g) of this section, this section applies to transport category, turbine-powered airplanes with a type certificate issued after January 1, 1958, that, as a result of original type certification or later increase in capacity, have—

(1) A maximum type-certificated passenger capacity of 30 or more, or

(2) A maximum payload capacity of 7,500 pounds or more.

(b) For each airplane on which an auxiliary fuel tank is installed under a field approval, before June 16, 2008, the operator must submit to the FAA Oversight Office proposed maintenance instructions for the tank that meet the requirements of Special Federal Aviation Regulation No. 88 (SFAR 88) of this chapter.

(c) After December 16, 2008, no operator may operate an airplane identified in paragraph (a) of this section unless the inspection program for that airplane has been revised to include applicable inspections, procedures, and limitations for fuel tank systems.

(d) The proposed fuel tank system inspection program revisions specified in paragraph (c) of this section must be based on fuel tank system Instructions for Continued Airworthiness (ICA) that have been developed in accordance with the applicable provisions of SFAR 88 of this chapter or §25.1529 and part 25, Appendix H, of this chapter, in effect on June 6, 2001 (including those developed for auxiliary fuel tanks, if any, installed under supplemental type certificates or other design approval) and that have been approved by the FAA Oversight Office.

(e) After December 16, 2008, before returning an airplane to service after any alterations for which fuel tank ICA are developed under SFAR 88, or under §25.1529 in effect on June 6, 2001, the operator must include in the inspection program for the airplane inspections and procedures for the fuel tank system based on those ICA.

(f) The fuel tank system inspection program changes identified in paragraphs (d) and (e) of this section and any later fuel tank system revisions must be submitted to the Flight Standards District Office (FSDO) responsible for review and approval.

(g) This section does not apply to the following airplane models:

(1) Bombardier CL–44

(2) Concorde

(3) deHavilland D.H. 106 Comet 4C

(4) VFW-Vereinigte Flugtechnische Werk VFW–614

(5) Illyushin Aviation IL 96T

(6) Bristol Aircraft Britannia 305

(7) Handley Page Herald Type 300

(8) Avions Marcel Dassault—Breguet Aviation Mercure 100C

(9) Airbus Caravelle

(10) Lockheed L–300

## Subpart M—Special Federal Aviation Regulations

### §91.1603 Special Federal Aviation Regulation No. 112—Prohibition Against Certain Flights Within the Tripoli (HLLL) Flight Information Region (FIR).

(a) *Applicability*. This section applies to the following persons:

(1) All U.S. air carriers and U.S. commercial operators;

(2) All persons exercising the privileges of an airman certificate issued by the FAA, except when such persons are operating a U.S.-registered aircraft for a foreign air carrier; and

(3) All operators of U.S.-registered civil aircraft, except operators of such aircraft that are foreign air carriers.

(b) *Flight prohibition.* Except as provided in paragraphs (c) and (d) of this section, no person described in paragraph (a) of this section may conduct flight operations within the Tripoli (HLLL) FIR.

(c) *Permitted operations.* This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations within the Tripoli (HLLL) FIR under the following conditions:

(1) Flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person described in paragraph (a) of this section), with the approval of the FAA, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: first, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

(2) [Reserved]

(d) *Emergency situations.* In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of 14 CFR parts 119, 121, 125, or 135, each person who deviates from this section must, within 10 days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

(e) *Expiration.* This Special Federal Aviation Regulation will remain in effect until March 20, 2017. The FAA may amend, rescind, or extend this Special Federal Aviation Regulation as necessary.

[Doc. No. FAA–2011–0246, 76 FR 16238, Mar. 23, 2011, as amended by Amdt. 91–321A, 79 FR 15680, Mar. 21, 2014; Amdt. 91–321B, 80 FR 15507, Mar. 24, 2015]

### § 91.1605 Special Federal Aviation Regulation No. 77—Prohibition Against Certain Flights in the Baghdad (ORBB) Flight Information Region (FIR).

(a) *Applicability.* This rule applies to the following persons:

(1) All U.S. air carriers and U.S. commercial operators;

(2) All persons exercising the privileges of an airman certificate issued by the FAA, except such persons operating U.S.-registered aircraft for a foreign air carrier; and

(3) All operators of aircraft registered in the United States, except where the operator of such aircraft is a foreign air carrier.

(b) *Flight prohibition.* No person may conduct flight operations in the Baghdad (ORBB) Flight Information Region (FIR), except as provided in paragraphs (c) and (d) of this section.

(c) *Permitted operations.* This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in the ORBB FIR, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person described in paragraph (a)), with the approval of the FAA, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: First, for those operations in support of U.S. government-sponsored activities; second, for

those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

(d) *Emergency situations.* In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of parts 119, 121, 125, or 135, each person who deviates from this section must, within 10 days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office (FSDO) a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

(e) *Expiration.* This SFAR will remain in effect until May 11, 2017. The FAA may amend, rescind, or extend this SFAR as necessary.

[Doc. No. FAA–2003–14766, 80 FR 26828, May 11, 2015]

EFFECTIVE DATE NOTE: By Amdt. 91–327A, 80 FR 26828, May 11, 2015, §91.1605 was revised, effective May 11, 2015 through May 11, 2017.

### §91.1607 Special Federal Aviation Regulation No. 113—Prohibition Against Certain Flights in the Simferopol (UKFV) and the Dnipropetrovsk (UKDV) Flight Information Regions (FIRs).

(a) *Applicability.* This Special Federal Aviation Regulation (SFAR) applies to the following persons:

(1) All U.S. air carriers and U.S. commercial operators;

(2) All persons exercising the privileges of an airman certificate issued by the FAA, except when such persons are operating U.S.-registered aircraft for a foreign air carrier; and

(3) All operators of U.S.-registered civil aircraft, except where the operator of such aircraft is a foreign air carrier.

(b) *Flight prohibition.* Except as provided in paragraphs (c) and (d) of this section, no person described in paragraph (a) of this section may conduct flight operations in the Simferopol (UKFV) FIR or the Dnipropetrovsk (UKDV) FIR.

(c) *Permitted operations.* This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in either or both of the Simferopol (UKFV) or Dnipropetrovsk (UKDV) FIRs, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality and the person described in paragraph (a) of this section) with the approval of the FAA, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: first, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

(d) *Emergency situations.* In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of 14 CFR parts 119, 121, 125, or 135, each person who deviates from this section must, within 10 days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office (FSDO) a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

(e) *Expiration.* This SFAR will remain in effect until October 27, 2016. The FAA may amend, rescind, or extend this SFAR as necessary.

[Doc. No. FAA–2014–0225, 79 FR 77862, Dec. 29, 2014, as amended by Amdt. 91–331B, 80 FR 65625, Oct. 27, 2015]

### § 91.1609 Special Federal Aviation Regulation No. 114—Prohibition Against Certain Flights in the Damascus (OSTT) Flight Information Region (FIR).

(a) *Applicability.* This rule applies to the following persons:

(1) All U.S. air carriers and U.S. commercial operators;

(2) All persons exercising the privileges of an airman certificate issued by the FAA, except such persons operating U.S.-registered aircraft for a foreign air carrier; and

(3) All operators of aircraft registered in the United States, except where the operator of such aircraft is a foreign air carrier.

(b) *Flight prohibition.* No person may conduct flight operations in the Damascus (OSTT) Flight Information Region (FIR), except as provided in paragraphs (c) and (d) of this section.

(c) *Permitted operations.* This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in the Damascus (OSTT) FIR, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person described in paragraph (a)), with FAA approval, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: first, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

(d) *Emergency situations.* In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of parts 119, 121, 125, or 135 of this chapter, each person who deviates from this section must, within ten (10) days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office (FSDO) a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

(e) *Expiration.* This SFAR will remain in effect until December 30, 2016. The FAA may amend, rescind, or extend this SFAR No. 114, §91.1609, as necessary.

[Doc. No. FAA–2014–0708, 79 FR 78303, Dec. 30, 2014]

EFFECTIVE DATE NOTE: By Doc. No. FAA–2014–0708, 79 FR 78303, Dec. 30, 2014, §91.1609 was added, effective Dec. 30, 2014 through Dec. 30, 2016.

## APPENDIX A TO PART 91—CATEGORY II OPERATIONS: MANUAL, INSTRUMENTS, EQUIPMENT, AND MAINTENANCE

### *1. Category II Manual*

(a) *Application for approval.* An applicant for approval of a Category II manual or an amendment to an approved Category II manual must submit the proposed manual or amendment to the Flight Standards District Office having jurisdiction of the area in which the applicant is located. If the application requests an evaluation program, it must include the following:

(1) The location of the aircraft and the place where the demonstrations are to be conducted; and

(2) The date the demonstrations are to commence (at least 10 days after filing the application).

(b) *Contents.* Each Category II manual must contain:

(1) The registration number, make, and model of the aircraft to which it applies;

(2) A maintenance program as specified in section 4 of this appendix; and

(3) The procedures and instructions related to recognition of decision height, use of runway visual range information, approach monitoring, the decision region (the region between the middle marker and the decision height), the maximum permissible deviations of the basic ILS indicator within the decision region, a missed approach, use of airborne low approach equipment, minimum altitude for the use of the autopilot, instrument and equipment failure warning systems, instrument failure, and other procedures, instructions, and limitations that may be found necessary by the Administrator.

*2. Required Instruments and Equipment*

The instruments and equipment listed in this section must be installed in each aircraft operated in a Category II operation. This section does not require duplication of instruments and equipment required by §91.205 or any other provisions of this chapter.

(a) *Group I.* (1) Two localizer and glide slope receiving systems. Each system must provide a basic ILS display and each side of the instrument panel must have a basic ILS display. However, a single localizer antenna and a single glide slope antenna may be used.

(2) A communications system that does not affect the operation of at least one of the ILS systems.

(3) A marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle markers.

(4) Two gyroscopic pitch and bank indicating systems.

(5) Two gyroscopic direction indicating systems.

(6) Two airspeed indicators.

(7) Two sensitive altimeters adjustable for barometric pressure, each having a placarded correction for altimeter scale error and for the wheel height of the aircraft. After June 26, 1979, two sensitive altimeters adjustable for barometric pressure, having markings at 20-foot intervals and each having a placarded correction for altimeter scale error and for the wheel height of the aircraft.

(8) Two vertical speed indicators.

(9) A flight control guidance system that consists of either an automatic approach coupler or a flight director system. A flight director system must display computed information as steering command in relation to an ILS localizer and, on the same instrument, either computed information as pitch command in relation to an ILS glide slope or basic ILS glide slope information. An automatic approach coupler must provide at least automatic steering in relation to an ILS localizer. The flight control guidance system may be operated from one of the receiving systems required by subparagraph (1) of this paragraph.

(10) For Category II operations with decision heights below 150 feet either a marker beacon receiver providing aural and visual indications of the inner marker or a radio altimeter.

(b) *Group II.* (1) Warning systems for immediate detection by the pilot of system faults in items (1), (4), (5), and (9) of Group I and, if installed for use in Category III operations, the radio altimeter and autothrottle system.

(2) Dual controls.

(3) An externally vented static pressure system with an alternate static pressure source.

(4) A windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touchdown and rollout.

(5) A heat source for each airspeed system pitot tube installed or an equivalent means of preventing malfunctioning due to icing of the pitot system.

*3. Instruments and Equipment Approval*

(a) *General.* The instruments and equipment required by section 2 of this appendix must be approved as provided in this section before being used in Category II operations. Before presenting an aircraft for approval of the instruments and equipment, it must be shown that since the beginning of the 12th calendar month before the date of submission—

(1) The ILS localizer and glide slope equipment were bench checked according to the manufacturer's instructions and found to meet those standards specified in RTCA Paper 23–63/DO–117 dated March 14, 1963, ''Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers,'' which may be obtained from the RTCA Secretariat, 1425 K St., NW., Washington, DC 20005.

(2) The altimeters and the static pressure systems were tested and inspected in accordance with appendix E to part 43 of this chapter; and

(3) All other instruments and items of equipment specified in section 2(a) of this appendix that are listed in the proposed maintenance program were bench checked and found to meet the manufacturer's specifications.

(b) *Flight control guidance system.* All components of the flight control guidance system must be approved as installed by the evaluation program specified in paragraph (e) of this section if they have not been approved for Category III operations under applicable type or supplemental type certification procedures. In addition, subsequent changes to make, model, or design of the components must be approved under this paragraph. Related systems or devices, such as the autothrottle and computed missed approach guidance system, must be approved in the same manner if they are to be used for Category II operations.

(c) *Radio altimeter.* A radio altimeter must meet the performance criteria of this paragraph for original approval and after each subsequent alteration.

(1) It must display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain.

(2) It must display wheel height above the terrain to an accuracy of plus or minus 5 feet or 5 percent, whichever is greater, under the following conditions:

(i) Pitch angles of zero to plus or minus 5 degrees about the mean approach attitude.

(ii) Roll angles of zero to 20 degrees in either direction.

(iii) Forward velocities from minimum approach speed up to 200 knots.

(iv) Sink rates from zero to 15 feet per second at altitudes from 100 to 200 feet.

(3) Over level ground, it must track the actual altitude of the aircraft without significant lag or oscillation.

(4) With the aircraft at an altitude of 200 feet or less, any abrupt change in terrain representing no more than 10 percent of the aircraft's altitude must not cause the altimeter to unlock, and indicator response to such changes must not exceed 0.1 seconds and, in addition, if the system unlocks for greater changes, it must reacquire the signal in less than 1 second.

(5) Systems that contain a push-to-test feature must test the entire system (with or without an antenna) at a simulated altitude of less than 500 feet.

(6) The system must provide to the flight crew a positive failure warning display any time there is a loss of power or an absence of ground return signals within the designed range of operating altitudes.

(d) *Other instruments and equipment.* All other instruments and items of equipment required by §2 of this appendix must be capable of performing as necessary for Category II operations. Approval is also required after each subsequent alteration to these instruments and items of equipment.

(e) *Evaluation program*—(1) *Application.* Approval by evaluation is requested as a part of the application for approval of the Category II manual.

(2) *Demonstrations.* Unless otherwise authorized by the Administrator, the evaluation program for each aircraft requires the demonstrations specified in this paragraph. At least 50 ILS approaches must be flown with at least five approaches on each of three different ILS facilities and no more than one half of the total approaches on any one ILS facility. All approaches shall be flown under simulated instrument conditions to a 100-foot decision height and 90 percent of the total approaches made must be successful. A successful approach is one in which—

(i) At the 100-foot decision height, the indicated airspeed and heading are satisfactory for a normal flare and landing (speed must be plus or minus 5 knots of programmed airspeed, but may not be less than computed threshold speed if autothrottles are used);

(ii) The aircraft at the 100-foot decision height, is positioned so that the cockpit is within, and tracking so as to remain within, the lateral confines of the runway extended;

(iii) Deviation from glide slope after leaving the outer marker does not exceed 50 percent of full-scale deflection as displayed on the ILS indicator;

(iv) No unusual roughness or excessive attitude changes occur after leaving the middle marker; and

(v) In the case of an aircraft equipped with an approach coupler, the aircraft is sufficiently in trim when the approach coupler is disconnected at the decision height to allow for the continuation of a normal approach and landing.

(3) *Records.* During the evaluation program the following information must be maintained by the applicant for the aircraft with respect to each approach and made available to the Administrator upon request:

(i) Each deficiency in airborne instruments and equipment that prevented the initiation of an approach.

(ii) The reasons for discontinuing an approach, including the altitude above the runway at which it was discontinued.

(iii) Speed control at the 100-foot decision height if auto throttles are used.

(iv) Trim condition of the aircraft upon disconnecting the auto coupler with respect to continuation to flare and landing.

(v) Position of the aircraft at the middle marker and at the decision height indicated both on a diagram of the basic ILS display and a diagram of the runway extended to the middle marker. Estimated touchdown point must be indicated on the runway diagram.

(vi) Compatibility of flight director with the auto coupler, if applicable.

(vii) Quality of overall system performance.

(4) *Evaluation.* A final evaluation of the flight control guidance system is made upon successful completion of the demonstrations. If no hazardous tendencies have been displayed or are otherwise known to exist, the system is approved as installed.

*4. Maintenance program*

(a) Each maintenance program must contain the following:

(1) A list of each instrument and item of equipment specified in §2 of this appendix that is installed in the aircraft and approved for Category II operations, including the make and model of those specified in §2(a).

(2) A schedule that provides for the performance of inspections under subparagraph (5) of this paragraph within 3 calendar months after the date of the previous inspection. The inspection must be performed by a person authorized by part 43 of this chapter, except that each alternate inspection may be replaced by a functional flight check. This functional flight check must be performed by a pilot holding a Category II pilot authorization for the type aircraft checked.

(3) A schedule that provides for the performance of bench checks for each listed instrument and item of equipment that is specified in section 2(a) within 12 calendar months after the date of the previous bench check.

(4) A schedule that provides for the performance of a test and inspection of each static pressure system in accordance with

appendix E to part 43 of this chapter within 12 calendar months after the date of the previous test and inspection.

(5) The procedures for the performance of the periodic inspections and functional flight checks to determine the ability of each listed instrument and item of equipment specified in section 2(a) of this appendix to perform as approved for Category II operations including a procedure for recording functional flight checks.

(6) A procedure for assuring that the pilot is informed of all defects in listed instruments and items of equipment.

(7) A procedure for assuring that the condition of each listed instrument and item of equipment upon which maintenance is performed is at least equal to its Category II approval condition before it is returned to service for Category II operations.

(8) A procedure for an entry in the maintenance records required by §43.9 of this chapter that shows the date, airport, and reasons for each discontinued Category II operation because of a malfunction of a listed instrument or item of equipment.

(b) *Bench check.* A bench check required by this section must comply with this paragraph.

(1) It must be performed by a certificated repair station holding one of the following ratings as appropriate to the equipment checked:

(i) An instrument rating.

(ii) A radio rating.

(2) It must consist of removal of an instrument or item of equipment and performance of the following:

(i) A visual inspection for cleanliness, impending failure, and the need for lubrication, repair, or replacement of parts;

(ii) Correction of items found by that visual inspection; and

(iii) Calibration to at least the manufacturer's specifications unless otherwise specified in the approved Category II manual for the aircraft in which the instrument or item of equipment is installed.

(c) *Extensions.* After the completion of one maintenance cycle of 12 calendar months, a request to extend the period for checks, tests, and inspections is approved if it is shown that the performance of particular equipment justifies the requested extension.

[Doc. No. 18334, 54 FR 34325, Aug. 18, 1989, as amended by Amdt. 91–269, 66 FR 41116, Aug. 6, 2001]

## APPENDIX B TO PART 91—AUTHORIZATIONS TO EXCEED MACH 1 (§91.817)

### *Section 1. Application*

(a) An applicant for an authorization to exceed Mach 1 must apply in a form and manner prescribed by the Administrator and must comply with this appendix.

(b) In addition, each application for an authorization to exceed Mach 1 covered by section 2(a) of this appendix must contain all information requested by the Administrator necessary to assist him in determining whether the designation of a particular test area or issuance of a particular authorization is a ''major Federal action significantly affecting the quality of the human environment'' within the meaning of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), and to assist him in complying with that act and with related Executive Orders, guidelines, and orders prior to such action.

(c) In addition, each application for an authorization to exceed Mach 1 covered by section 2(a) of this appendix must contain—

(1) Information showing that operation at a speed greater than Mach 1 is necessary to accomplish one or more of the purposes specified in section 2(a) of this appendix, including a showing that the purpose of the test cannot be safely or properly accomplished by overocean testing;

(2) A description of the test area proposed by the applicant, including an environmental analysis of that area meeting the requirements of paragraph (b) of this section; and

(3) Conditions and limitations that will ensure that no measurable sonic boom overpressure will reach the surface outside of the designated test area.

(d) An application is denied if the Administrator finds that such action is necessary to protect or enhance the environment.

### *Section 2. Issuance*

(a) For a flight in a designated test area, an authorization to exceed Mach 1 may be issued when the Administrator has taken the environmental protective actions specified in section 1(b) of this appendix and the applicant shows one or more of the following:

(1) The flight is necessary to show compliance with airworthiness requirements.

(2) The flight is necessary to determine the sonic boom characteristics of the airplane or to establish means of reducing or eliminating the effects of sonic boom.

(3) The flight is necessary to demonstrate the conditions and limitations under which speeds greater than a true flight Mach number of 1 will not cause a measurable sonic boom overpressure to reach the surface.

(b) For a flight outside of a designated test area, an authorization to exceed Mach 1 may be issued if the applicant shows conservatively under paragraph (a)(3) of this section that—

(1) The flight will not cause a measurable sonic boom overpressure to reach the surface when the aircraft is operated under conditions and limitations demonstrated under paragraph (a)(3) of this section; and

(2) Those conditions and limitations represent all foreseeable operating conditions.

*Section 3. Duration*

(a) An authorization to exceed Mach 1 is effective until it expires or is surrendered, or until it is suspended or terminated by the Administrator. Such an authorization may be amended or suspended by the Administrator at any time if the Administrator finds that such action is necessary to protect the environment. Within 30 days of notification of amendment, the holder of the authorization must request reconsideration or the amendment becomes final. Within 30 days of notification of suspension, the holder of the authorization must request reconsideration or the authorization is automatically terminated. If reconsideration is requested within the 30-day period, the amendment or suspension continues until the holder shows why the authorization should not be amended or terminated. Upon such showing, the Administrator may terminate or amend the authorization if the Administrator finds that such action is necessary to protect the environment, or he may reinstate the authorization without amendment if he finds that termination or amendment is not necessary to protect the environment.

(b) Findings and actions by the Administrator under this section do not affect any certificate issued under title VI of the Federal Aviation Act of 1958.

[Doc. No. 18334, 54 FR 34327, Aug. 18, 1989]

## APPENDIX C TO PART 91—OPERATIONS IN THE NORTH ATLANTIC (NAT) MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS) AIRSPACE

*Section 1*

NAT MNPS airspace is that volume of airspace between FL 285 and FL 420 extending between latitude 27 degrees north and the North Pole, bounded in the east by the eastern boundaries of control areas Santa Maria Oceanic, Shanwick Oceanic, and Reykjavik Oceanic and in the west by the western boundary of Reykjavik Oceanic Control Area, the western boundary of Gander Oceanic Control Area, and the western boundary of New York Oceanic Control Area, excluding the areas west of 60 degrees west and south of 38 degrees 30 minutes north.

*Section 2*

The navigation performance capability required for aircraft to be operated in the airspace defined in section 1 of this appendix is as follows:

(a) The standard deviation of lateral track errors shall be less than 6.3 NM (11.7 Km). Standard deviation is a statistical measure of data about a mean value. The mean is zero nautical miles. The overall form of data is such that the plus and minus 1 standard deviation about the mean encompasses approximately 68 percent of the data and plus or minus 2 deviations encompasses approximately 95 percent.

(b) The proportion of the total flight time spent by aircraft 30 NM (55.6 Km) or more off the cleared track shall be less than $5.3 \times 10^{-4}$ (less than 1 hour in 1,887 flight hours).

(c) The proportion of the total flight time spent by aircraft between 50 NM and 70 NM (92.6 Km and 129.6 Km) off the cleared track shall be less than $13 \times 10^{-5}$ (less than 1 hour in 7,693 flight hours.)

*Section 3*

Air traffic control (ATC) may authorize an aircraft operator to deviate from the requirements of §91.705 for a specific flight if, at the time of flight plan filing for that flight, ATC determines that the aircraft may be provided appropriate separation and that the flight will not interfere with, or impose a burden upon, the operations of other aircraft which meet the requirements of §91.705.

[Doc. No. 18334, 54 FR 34327, Aug. 18, 1989, as amended by Amdt. 91–254, 62 FR 17487, Apr. 9, 1997]

## APPENDIX D TO PART 91—AIRPORTS/LOCATIONS: SPECIAL OPERATING RESTRICTIONS

*Section 1.* Locations at which the requirements of §91.215(b)(2) and §91.225(d)(2) apply. The requirements of §§91.215(b)(2) and 91.225(d)(2) apply below 10,000 feet MSL within a 30-nautical-mile radius of each location in the following list.

Atlanta, GA (The William B. Hartsfield Atlanta International Airport)
Baltimore, MD (Baltimore Washington International Airport)
Boston, MA (General Edward Lawrence Logan International Airport)
Chantilly, VA (Washington Dulles International Airport)
Charlotte, NC (Charlotte/Douglas International Airport)
Chicago, IL Chicago-O'Hare International Airport)
Cleveland, OH (Cleveland-Hopkins International Airport)
Covington, KY (Cincinnati Northern Kentucky International Airport)
Dallas, TX (Dallas/Fort Worth Regional Airport)
Denver, CO (Denver International Airport)
Detroit, MI (Metropolitan Wayne County Airport)
Honolulu, HI (Honolulu International Airport)
Houston, TX (George Bush Intercontinental Airport/Houston)
Houston, TX (William P. Hobby Airport)
Kansas City, KS (Mid-Continent International Airport)

Las Vegas, NV (McCarran International Airport)
Los Angeles, CA (Los Angeles International Airport)
Memphis, TN (Memphis International Airport)
Miami, FL (Miami International Airport)
Minneapolis, MN (Minneapolis-St. Paul International Airport)
Newark, NJ (Newark International Airport)
New Orleans, LA (New Orleans International Airport-Moisant Field)
New York, NY (John F. Kennedy International Airport)
New York, NY (LaGuardia Airport)
Orlando, FL (Orlando International Airport)
Philadelphia, PA (Philadelphia International Airport)
Phoenix, AZ (Phoenix Sky Harbor International Airport)
Pittsburgh, PA (Greater Pittsburgh International Airport)
St. Louis, MO (Lambert-St. Louis International Airport)
Salt Lake City, UT (Salt Lake City International Airport)
San Diego, CA (Marine Corps Air Station Miramar)
San Diego, CA (San Diego International Airport)
San Francisco, CA (San Francisco International Airport)
Seattle, WA (Seattle-Tacoma International Airport)
Tampa, FL (Tampa International Airport)
Washington, DC (Ronald Reagan Washington National Airport and Andrews Air Force Base, MD)

*Section 2.* Airports at which the requirements of §91.215(b)(5)(ii) apply. [Reserved]

*Section 3.* Locations at which fixed-wing Special VFR operations are prohibited.

The Special VFR weather minimums of §91.157 do not apply to the following airports:

Atlanta, GA (The William B. Hartsfield Atlanta International Airport)
Baltimore, MD (Baltimore/Washington International Airport)
Boston, MA (General Edward Lawrence Logan International Airport)
Buffalo, NY (Greater Buffalo International Airport)
Chicago, IL (Chicago-O'Hare International Airport)
Cleveland, OH (Cleveland-Hopkins International Airport)
Columbus, OH (Port Columbus International Airport)
Covington, KY (Cincinnati Northern Kentucky International Airport)
Dallas, TX (Dallas/Fort Worth Regional Airport)
Dallas, TX (Love Field)
Denver, CO (Denver International Airport)
Detroit, MI (Metropolitan Wayne County Airport)
Honolulu, HI (Honolulu International Airport)
Houston, TX (George Bush Intercontinental Airport/Houston)
Indianapolis, IN (Indianapolis International Airport)
Los Angeles, CA (Los Angeles International Airport)
Louisville, KY (Standiford Field)
Memphis, TN (Memphis International Airport)
Miami, FL (Miami International Airport)
Minneapolis, MN (Minneapolis-St. Paul International Airport)
Newark, NJ (Newark International Airport)
New York, NY (John F. Kennedy International Airport)
New York, NY (LaGuardia Airport)
New Orleans, LA (New Orleans International Airport-Moisant Field)
Philadelphia, PA (Philadelphia International Airport)
Pittsburgh, PA (Greater Pittsburgh International Airport)
Portland, OR (Portland International Airport)
San Francisco, CA (San Francisco International Airport)
Seattle, WA (Seattle-Tacoma International Airport)
St. Louis, MO (Lambert-St. Louis International Airport)
Tampa, FL (Tampa International Airport)
Washington, DC (Ronald Reagan Washington National Airport and Andrews Air Force Base, MD)

*Section 4.* Locations at which solo student, sport, and recreational pilot activity is not permitted.

Pursuant to §91.131(b)(2), solo student, sport, and recreational pilot operations are not permitted at any of the following airports.

Atlanta, GA (The William B. Hartsfield Atlanta International Airport)
Boston, MA (General Edward Lawrence Logan International Airport)
Chicago, IL (Chicago-O'Hare International Airport)
Dallas, TX (Dallas/Fort Worth Regional Airport)
Los Angeles, CA (Los Angeles International Airport)
Miami, FL (Miami International Airport)
Newark, NJ (Newark International Airport)
New York, NY (John F. Kennedy International Airport)
New York, NY (LaGuardia Airport)
San Francisco, CA (San Francisco International Airport)
Washington, DC (Ronald Reagan Washington National Airport)
Andrews Air Force Base, MD

[Amdt. 91–227, 56 FR 65661, Dec. 17, 1991]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting Appendix D to Part 91, see

the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

EFFECTIVE DATE NOTE: By Amdt. 91–236, 59 FR 2918, Jan. 19, 1994, as corrected by Amdt. 91–237, 59 FR 6547, Feb. 11, 1994, appendix D to part 91 was amended in sections 1 and 3 in the Denver, CO, entry by revising ''Stapleton'' to read ''Denver'' effective Mar. 9, 1994. By Amdt. 91–238, 59 FR 10958, Mar. 9, 1994, the effective date was delayed to May 15, 1994. By Amdt. 91–241, 59 FR 24916, May 13, 1994, the effective date was suspended indefinitely.

## APPENDIX E TO PART 91—AIRPLANE FLIGHT RECORDER SPECIFICATIONS

| Parameters | Range | Installed system [1] minimum accuracy (to recovered data) | Sampling interval (per second) | Resolution [4] read out |
|---|---|---|---|---|
| Relative Time (From Recorded on Prior to Takeoff). | 8 hr minimum | ±0.125% per hour | 1 | 1 sec. |
| Indicated Airspeed | Vso to VD (KIAS) | ±5% or ±10 kts., whichever is greater. Resolution 2 kts. below 175 KIAS. | 1 | 1% [3] |
| Altitude | −1,000 ft. to max cert. alt. of A/C. | ±100 to ±700 ft. (see Table 1, TSO C51–a). | 1 | 25 to 150 ft. |
| Magnetic Heading | 360° | ±5° | 1 | 1° |
| Vertical Acceleration | −3g to + 6g | ±0.2g in addition to ±0.3g maximum datum. | 4 (or 1 per second where peaks, ref. to 1g are recorded). | 0.03g. |
| Longitudinal Acceleration. | ±1.0g | ±1.5% max. range excluding datum error of ±5%. | 2 | 0.01g. |
| Pitch Attitude | 100% of usable | ±2° | 1 | 0.8° |
| Roll Attitude | ±60° or 100% of usable range, whichever is greater. | ±2° | 1 | 0.8° |
| Stabilizer Trim Position, or. Pitch Control Position [5]. | Full Range | ±3% unless higher uniquely required. | 1 | 1% [3] |
| Engine Power, Each Engine: | Full Range | ±3% unless higher uniquely required. | 1 | 1% [3] |
| Fan or N [1] Speed or EPR or Cockpit indications Used for Aircraft Certification OR. | Maximum Range | ±5% | 1 | 1% [3] |
| Prop. speed and Torque (Sample Once/Sec as Close together as Practicable). | | | 1 (prop Speed)<br>1 (torque) | 1% [3]<br>1% [3] |
| Altitude Rate [2] (need depends on altitude resolution). | ±8,000 fpm | ±10%. Resolution 250 fpm below 12,000 ft. indicated. | 1 | 250 fpm. below 12,000 |
| Angle of Attack [2] (need depends on altitude resolution). | −20° to 40° or 100% of usable range. | ±2° | 1 | 0.8% [3] |
| Radio Transmitter Keying (Discrete). | On/Off | | 1. | |
| TE Flaps (Discrete or Analog). | Each discrete position (U, D, T/O, AAP) OR. | | 1. | |
| LE Flaps (Discrete or Analog). | Analog 0–100% range | ±3% | 1 | 1% [3] |
| | Each discrete position (U, D, T/O, AAP) OR. | | 1. | |
| Thrust Reverser, Each Engine (Discrete). | Analog 0–100% range | ±3° | 1 | 1% [3] |
| | Stowed or full reverse. | | | |
| Spoiler/Speedbrake (Discrete). | Stowed or out | | 1. | |

| Parameters | Range | Installed system [1] minimum accuracy (to recovered data) | Sampling interval (per second) | Resolution [4] read out |
|---|---|---|---|---|
| Autopilot Engaged (Discrete). | Engaged or Disengaged | ..... | 1. | |

[1] When data sources are aircraft instruments (except altimeters) of acceptable quality to fly the aircraft the recording system excluding these sensors (but including all other characteristics of the recording system) shall contribute no more than half of the values in this column.
[2] If data from the altitude encoding altimeter (100 ft. resolution) is used, then either one of these parameters should also be recorded. If however, altitude is recorded at a minimum resolution of 25 feet, then these two parameters can be omitted.
[3] Per cent of full range.
[4] This column applies to aircraft manufactured after October 11, 1991.
[5] For Pitch Control Position only, for all aircraft manufactured on or after April 6, 2012, the sampling interval (per second) is 8. Each input must be recorded at this rate. Alternately sampling inputs (interleaving) to meet this sampling interval is prohibited.

[Doc. No. 18334, 54 FR 34327, Aug. 18, 1989, as amended by Amdt. 91–300, 73 FR 12565, Mar. 7, 2008; 73 FR 15280, Mar. 21, 2008; Amdt. 91–313, 75 FR 17046, Apr. 5, 2010; Amdt. 91–329, 78 FR 39971, July 3, 2013]

## APPENDIX F TO PART 91—HELICOPTER FLIGHT RECORDER SPECIFICATIONS

| Parameters | Range | Installed system [1] minimum accuracy (to recovered data) | Sampling interval (per second) | Resolution 3 read out |
|---|---|---|---|---|
| Relative Time (From Recorded on Prior to Takeoff). | 4 hr minimum ..... | ±0.125% per hour ..... | 1 ..... | 1 sec. |
| Indicated Airspeed ..... | VM in to VD (KIAS) (minimum airspeed signal attainable with installed pilot-static system). | ±5% or ±10 kts., whichever is greater. | 1 ..... | 1 kt. |
| Altitude ..... | −1,000 ft. to 20,000 ft. pressure altitude. | ±100 to ±700 ft. (see Table 1, TSO C51–a). | 1 ..... | 25 to 150 ft. |
| Magnetic Heading ..... | 360° ..... | ±5° ..... | 1 ..... | 1° |
| Vertical Acceleration .. | −3g to + 6g ..... | ±0.2g in addition to ±0.3g maximum datum. | 4 (or 1 per second where peaks, ref. to 1g are recorded). | 0.05g. |
| Longitudinal Acceleration. | ±1.0g ..... | ±1.5% max. range excluding datum error of ±5%. | 2 ..... | 0.03g. |
| Pitch Attitude ..... | 100% of usable range ..... | ±2° ..... | 1 ..... | 0.8° |
| Roll Attitude ..... | ±60 or 100% of usable range, whichever is greater. | ±2° ..... | 1 ..... | 0.8° |
| Altitude Rate ..... | ±8,000 fpm ..... | ±10% Resolution 250 fpm below 12,000 ft. indicated. | 1 ..... | 250 fpm below 12,000. |
| *Engine Power, Each Engine* | | | | |
| Main Rotor Speed ..... | Maximum Range ..... | ±5% ..... | 1 ..... | 1%2. |
| Free or Power Turbine. | Maximum Range ..... | ±5% ..... | 1 ..... | 1%2. |
| Engine Torque ..... | Maximum Range ..... | ±5% ..... | 1 ..... | 1%2. |
| *Flight Control Hydraulic Pressure* | | | | |
| Primary (Discrete) ..... | High/Low ..... | ..... | 1. | |
| Secondary—if applicable (Discrete). | High/Low ..... | ..... | 1. | |
| Radio Transmitter Keying (Discrete). | On/Off ..... | ..... | 1. | |
| Autopilot Engaged (Discrete). | Engaged or Disengaged | ..... | 1. | |
| SAS Status-Engaged (Discrete). | Engaged or Disengaged | ..... | 1. | |
| SAS Fault Status (Discrete). | Fault/OK ..... | ..... | 1. | |
| *Flight Controls* | | | | |
| Collective [4] ..... | Full range ..... | ±3% ..... | 2 ..... | 1%2. |
| Pedal Position [4] ..... | Full range ..... | ±3% ..... | 2 ..... | 1%2. |
| Lat. Cyclic [4] ..... | Full range ..... | ±3% ..... | 2 ..... | 1%2. |
| Long. Cyclic [4] ..... | Full range ..... | ±3% ..... | 2 ..... | 1%2. |

| Parameters | Range | Installed system [1] minimum accuracy (to recovered data) | Sampling interval (per second) | Resolution 3 read out |
|---|---|---|---|---|
| Controllable Stabilator Position [4]. | Full range ..... | ±3% ..... | 2 ..... | 1%2. |

[1] When data sources are aircraft instruments (except altimeters) of acceptable quality to fly the aircraft the recording system excluding these sensors (but including all other characteristics of the recording system) shall contribute no more than half of the values in this column.
[2] Per cent of full range.
[3] This column applies to aircraft manufactured after October 11, 1991.
[4] For all aircraft manufactured on or after April 6, 2012, the sampling interval per second is 4.

[Doc. No. 18334, 54 FR 34328, Aug. 18, 1989; 54 FR 41211, Oct. 5, 1989; 54 FR 53036, Dec. 26, 1989; Amdt. 91–300, 73 FR 12565, Mar. 7, 2008; 73 FR 15280, Mar. 21, 2008; Amdt. 91–313, 75 FR 17046, Apr. 5, 2010]

## APPENDIX G TO PART 91—OPERATIONS IN REDUCED VERTICAL SEPARATION MINIMUM (RVSM) AIRSPACE

### *Section 1. Definitions*

*Reduced Vertical Separation Minimum (RVSM) Airspace.* Within RVSM airspace, air traffic control (ATC) separates aircraft by a minimum of 1,000 feet vertically between flight level (FL) 290 and FL 410 inclusive. RVSM airspace is special qualification airspace; the operator and the aircraft used by the operator must be approved by the Administrator. Air-traffic control notifies operators of RVSM by providing route planning information. Section 8 of this appendix identifies airspace where RVSM may be applied.

*RVSM Group Aircraft.* Aircraft within a group of aircraft, approved as a group by the Administrator, in which each of the aircraft satisfy each of the following:

(a) The aircraft have been manufactured to the same design, and have been approved under the same type certificate, amended type certificate, or supplemental type certificate.

(b) The static system of each aircraft is installed in a manner and position that is the same as those of the other aircraft in the group. The same static source error correction is incorporated in each aircraft of the group.

(c) The avionics units installed in each aircraft to meet the minimum RVSM equipment requirements of this appendix are:

(1) Manufactured to the same manufacturer specification and have the same part number; or

(2) Of a different manufacturer or part number, if the applicant demonstrates that the equipment provides equivalent system performance.

*RVSM Nongroup Aircraft.* An aircraft that is approved for RVSM operations as an individual aircraft.

*RVSM Flight envelope.* An RVSM flight envelope includes the range of Mach number, weight divided by atmospheric pressure ratio, and altitudes over which an aircraft is approved to be operated in cruising flight within RVSM airspace. RVSM flight envelopes are defined as follows:

(a) The *full RVSM flight envelope* is bounded as follows:

(1) The altitude flight envelope extends from FL 290 upward to the lowest altitude of the following:

(i) FL 410 (the RVSM altitude limit);

(ii) The maximum certificated altitude for the aircraft; or

(iii) The altitude limited by cruise thrust, buffet, or other flight limitations.

(2) The airspeed flight envelope extends:

(i) From the airspeed of the slats/flaps-up maximum endurance (holding) airspeed, or the maneuvering airspeed, whichever is lower;

(ii) To the maximum operating airspeed ($V_{mo}/M_{mo}$), or airspeed limited by cruise thrust buffet, or other flight limitations, whichever is lower.

(3) All permissible gross weights within the flight envelopes defined in paragraphs (1) and (2) of this definition.

(b) The *basic RVSM flight envelope* is the same as the full RVSM flight envelope except that the airspeed flight envelope extends:

(1) From the airspeed of the slats/flaps-up maximum endurance (holding) airspeed, or the maneuver airspeed, whichever is lower;

(2) To the upper Mach/airspeed boundary defined for the full RVSM flight envelope, or a specified lower value not less than the long-range cruise Mach number plus .04 Mach, unless further limited by available cruise thrust, buffet, or other flight limitations.

### *Section 2. Aircraft Approval*

(a) An operator may be authorized to conduct RVSM operations if the Administrator finds that its aircraft comply with this section.

(b) The applicant for authorization shall submit the appropriate data package for aircraft approval. The package must consist of at least the following:

(1) An identification of the RVSM aircraft group or the nongroup aircraft;

(2) A definition of the RVSM flight envelopes applicable to the subject aircraft;

(3) Documentation that establishes compliance with the applicable RVSM aircraft requirements of this section; and

(4) The conformity tests used to ensure that aircraft approved with the data package meet the RVSM aircraft requirements.

(c) *Altitude-keeping equipment: All aircraft.* To approve an aircraft group or a nongroup aircraft, the Administrator must find that the aircraft meets the following requirements:

(1) The aircraft must be equipped with two operational independent altitude measurement systems.

(2) The aircraft must be equipped with at least one automatic altitude control system that controls the aircraft altitude—

(i) Within a tolerance band of ±65 feet about an acquired altitude when the aircraft is operated in straight and level flight under nonturbulent, nongust conditions; or

(ii) Within a tolerance band of ±130 feet under nonturbulent, nongust conditions for aircraft for which application for type certification occurred on or before April 9, 1997 that are equipped with an automatic altitude control system with flight management/performance system inputs.

(3) The aircraft must be equipped with an altitude alert system that signals an alert when the altitude displayed to the flight crew deviates from the selected altitude by more than:

(i) ±300 feet for aircraft for which application for type certification was made on or before April 9, 1997; or

(ii) ±200 feet for aircraft for which application for type certification is made after April 9, 1997.

(d) *Altimetry system error containment: Group aircraft for which application for type certification was made on or before April 9, 1997.* To approve group aircraft for which application for type certification was made on or before April 9, 1997, the Administrator must find that the altimetry system error (ASE) is contained as follows:

(1) At the point in the basic RVSM flight envelope where mean ASE reaches its largest absolute value, the absolute value may not exceed 80 feet.

(2) At the point in the basic RVSM flight envelope where mean ASE plus three standard deviations reaches its largest absolute value, the absolute value may not exceed 200 feet.

(3) At the point in the full RVSM flight envelope where mean ASE reaches its largest absolute value, the absolute value may not exceed 120 feet.

(4) At the point in the full RVSM flight envelope where mean ASE plus three standard deviations reaches its largest absolute value, the absolute value may not exceed 245 feet.

(5) *Necessary operating restrictions.* If the applicant demonstrates that its aircraft otherwise comply with the ASE containment requirements, the Administrator may establish an operating restriction on that applicant's aircraft to restrict the aircraft from operating in areas of the basic RVSM flight envelope where the absolute value of mean ASE exceeds 80 feet, and/or the absolute value of mean ASE plus three standard deviations exceeds 200 feet; or from operating in areas of the full RVSM flight envelope where the absolute value of the mean ASE exceeds 120 feet and/or the absolute value of the mean ASE plus three standard deviations exceeds 245 feet.

(e) *Altimetry system error containment: Group aircraft for which application for type certification is made after April 9, 1997.* To approve group aircraft for which application for type certification is made after April 9, 1997, the Administrator must find that the altimetry system error (ASE) is contained as follows:

(1) At the point in the full RVSM flight envelope where mean ASE reaches its largest absolute value, the absolute value may not exceed 80 feet.

(2) At the point in the full RVSM flight envelope where mean ASE plus three standard deviations reaches its largest absolute value, the absolute value may not exceed 200 feet.

(f) *Altimetry system error containment: Nongroup aircraft.* To approve a nongroup aircraft, the Administrator must find that the altimetry system error (ASE) is contained as follows:

(1) For each condition in the basic RVSM flight envelope, the largest combined absolute value for residual static source error plus the avionics error may not exceed 160 feet.

(2) For each condition in the full RVSM flight envelope, the largest combined absolute value for residual static source error plus the avionics error may not exceed 200 feet.

(g) Traffic Alert and Collision Avoidance System (TCAS) Compatibility With RVSM Operations: All aircraft. After March 31, 2002, unless otherwise authorized by the Administrator, if you operate an aircraft that is equipped with TCAS II in RVSM airspace, it must be a TCAS II that meets TSO C–119b (Version 7.0), or a later version.

(h) If the Administrator finds that the applicant's aircraft comply with this section, the Administrator notifies the applicant in writing.

*Section 3. Operator Authorization*

(a) Authority for an operator to conduct flight in airspace where RVSM is applied is issued in operations specifications, a Letter of Authorization, or management specifications issued under subpart K of this part, as appropriate. To issue an RVSM authorization, the Administrator must find that the

operator's aircraft have been approved in accordance with Section 2 of this appendix and the operator complies with this section.

(b) An applicant for authorization to operate within RVSM airspace shall apply in a form and manner prescribed by the Administrator. The application must include the following:

(1) An approved RVSM maintenance program outlining procedures to maintain RVSM aircraft in accordance with the requirements of this appendix. Each program must contain the following:

(i) Periodic inspections, functional flight tests, and maintenance and inspection procedures, with acceptable maintenance practices, for ensuring continued compliance with the RVSM aircraft requirements.

(ii) A quality assurance program for ensuring continuing accuracy and reliability of test equipment used for testing aircraft to determine compliance with the RVSM aircraft requirements.

(iii) Procedures for returning noncompliant aircraft to service.

(2) For an applicant who operates under part 121 or 135 of this chapter or under subpart K of this part, initial and recurring pilot training requirements.

(3) Policies and procedures: An applicant who operates under part 121 or 135 of this chapter or under subpart K of this part must submit RVSM policies and procedures that will enable it to conduct RVSM operations safely.

(c) Validation and Demonstration. In a manner prescribed by the Administrator, the operator must provide evidence that:

(1) It is capable to operate and maintain each aircraft or aircraft group for which it applies for approval to operate in RVSM airspace; and

(2) Each pilot has an adequate knowledge of RVSM requirements, policies, and procedures.

*Section 4. RVSM Operations*

(a) Each person requesting a clearance to operate within RVSM airspace shall correctly annotate the flight plan filed with air traffic control with the status of the operator and aircraft with regard to RVSM approval. Each operator shall verify RVSM applicability for the flight planned route through the appropriate flight planning information sources.

(b) No person may show, on the flight plan filed with air traffic control, an operator or aircraft as approved for RVSM operations, or operate on a route or in an area where RVSM approval is required, unless:

(1) The operator is authorized by the Administrator to perform such operations; and

(2) The aircraft has been approved and complies with the requirements of Section 2 of this appendix.

*Section 5. Deviation Authority Approval*

The Administrator may authorize an aircraft operator to deviate from the requirements of §91.180 or §91.706 for a specific flight in RVSM airspace if that operator has not been approved in accordance with section 3 of this appendix if:

(a) The operator submits a request in a time and manner acceptable to the Administrator; and

(b) At the time of filing the flight plan for that flight, ATC determines that the aircraft may be provided appropriate separation and that the flight will not interfere with, or impose a burden on, the operations of operators who have been approved for RVSM operations in accordance with Section 3 of this appendix.

*Section 6. Reporting Altitude-Keeping Errors*

Each operator shall report to the Administrator each event in which the operator's aircraft has exhibited the following altitude-keeping performance:

(a) Total vertical error of 300 feet or more;

(b) Altimetry system error of 245 feet or more; or

(c) Assigned altitude deviation of 300 feet or more.

*Section 7. Removal or Amendment of Authority*

The Administrator may amend operations specifications or management specifications issued under subpart K of this part to revoke or restrict an RVSM authorization, or may revoke or restrict an RVSM letter of authorization, if the Administrator determines that the operator is not complying, or is unable to comply, with this appendix or subpart H of this part. Examples of reasons for amendment, revocation, ore restriction include, but are not limited to, an operator's:

(a) Committing one or more altitude-keeping errors in RVSM airspace;

(b) Failing to make an effective and timely response to identify and correct an altitude-keeping error; or

(c) Failing to report an altitude-keeping error.

*Section 8. Airspace Designation*

(a) *RVSM in the North Atlantic.* (1) RVSM may be applied in the NAT in the following ICAO Flight Information Regions (FIRs): New York Oceanic, Gander Oceanic, Sondrestrom FIR, Reykjavik Oceanic, Shanwick Oceanic, and Santa Maria Oceanic.

(2) RVSM may be effective in the Minimum Navigation Performance Specification (MNPS) airspace within the NAT. The MNPS airspace within the NAT is defined by the volume of airspace between FL 285 and FL 420 (inclusive) extending between latitude 27 degrees north and the North Pole, bounded in the east by the eastern boundaries of control areas Santa Maria Oceanic, Shanwick

Oceanic, and Reykjavik Oceanic and in the west by the western boundaries of control areas Reykjavik Oceanic, Gander Oceanic, and New York Oceanic, excluding the areas west of 60 degrees west and south of 38 degrees 30 minutes north.

(b) *RVSM in the Pacific.* (1) RVSM may be applied in the Pacific in the following ICAO Flight Information Regions (FIRs): Anchorage Arctic, Anchorage Continental, Anchorage Oceanic, Auckland Oceanic, Brisbane, Edmonton, Honiara, Los Angeles, Melbourne, Nadi, Naha, Nauru, New Zealand, Oakland, Oakland Oceanic, Port Moresby, Seattle, Tahiti, Tokyo, Ujung Pandang and Vancouver.

(c) *RVSM in the West Atlantic Route System (WATRS).* RVSM may be applied in the New York FIR portion of the West Atlantic Route System (WATRS). The area is defined as beginning at a point 38°30′ N/60°00′W direct to 38°30′ N/69°15′ W direct to 38°20′ N/69°57′ W direct to 37°31′ N/71°41′ W direct to 37°13′ N/72°40′ W direct to 35°05′ N/72°40′ W direct to 34°54′ N/72°57′ W direct to 34°29′ N/73°34′ W direct to 34°33′ N/73°41′ W direct to 34°19′ N/74°02′ W direct to 34°14′ N/73°57′ W direct to 32°12′ N/76°49′ W direct to 32°20′ N/77°00′ W direct to 28°08′ N/77°00′ W direct to 27°50′ N/76°32′ W direct to 27°50′ N/74°50′ W direct to 25°00′ N/73°21′ W direct to 25°00′05′ N/69°13′06′ W direct to 25°00′ N/69°07′ W direct to 23°30′ N/68°40′ W direct to 23°30′ N/60°00′ W to the point of beginning.

(d) *RVSM in the United States.* RVSM may be applied in the airspace of the 48 contiguous states, District of Columbia, and Alaska, including that airspace overlying the waters within 12 nautical miles of the coast.

(e) *RVSM in the gulf of Mexico.* RVSM may be applied in the Gulf of Mexico in the following areas: Gulf of Mexico High Offshore Airspace, Houston Oceanic ICAO FIR and Miami Oceanic ICAO FIR.

(f) *RVSM in Atlantic High Offshore Airspace and the San Juan FIR.* RVSM may be applied in Atlantic High Offshore Airspace and in the San Juan ICAO FIR.

[Doc. No. 28870, 62 FR 17487, Apr. 9, 1997, as amended by Amdt. 91–261, 65 FR 5942, Feb. 7, 2000; Amdt. 91–271, 66 FR 63895, Dec. 10, 2001; Amdt. 91–274, 68 FR 54584, Sept. 17, 2003; Amdt. 91–276, 68 FR 70133, Dec. 17, 2003]

# PART 93—SPECIAL AIR TRAFFIC RULES

SPECIAL FEDERAL AVIATION REGULATION NO. 60 [NOTE]

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AUTHORITY: 49 U.S.C. 106(g), 40103, 40106, 40109, 40113, 44502, 44514, 44701, 44715, 44719, 46301.

EFFECTIVE DATE NOTE: By Admt. 93–98, 79 FR 35490, June 23, 2014, the authority citation to part 93 was revised, effective Aug. 6, 2014 through Aug. 6, 2016.

SPECIAL FEDERAL AVIATION REGULATION NO. 60

EDITORIAL NOTE: For the text of SFAR No. 60, see part 91 of this chapter.

## Subpart A—General

### § 93.1 Applicability.

This part prescribes special air traffic rules for operating aircraft in certain areas described in this part, unless otherwise authorized by air traffic control.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

## Subparts B–C [Reserved]

## Subpart D—Anchorage, Alaska, Terminal Area

SOURCE: Docket No. 29029, 64 FR 14976, Mar. 29, 1999, unless otherwise noted.

### § 93.51 Applicability.

This subpart prescribes special air traffic rules for aircraft operating in the Anchorage, Alaska, Terminal Area.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

### § 93.53 Description of area.

The Anchorage, Alaska, Terminal Area is designated as that airspace extending upward from the surface to the upper limit of each of the segments described in § 93.55. It is bounded by a line beginning at Point MacKenzie, extending westerly along the bank of Knik Arm to a point intersecting the 350° bearing from the Anchorage International ATCT; thence north to intercept the 5.2-mile arc centered on the geographical center of Anchorage, Alaska, ATCT; thence counterclockwise along that arc to its intersection with a line bearing 180° from the intersection of the new Seward Highway and International Airport Road; thence due north to O'Malley Road; thence east along O'Malley Road to its intersection with Lake Otis Parkway; thence northerly along Lake Otis Parkway to its intersection with Abbott Road; thence east along Abbott Road to its intersection with Abbott Loop Road; thence north to its intersection with Tudor Road; thence easterly along Tudor Road to its intersection with Muldoon Road; thence northerly along Muldoon Road to the intersection of the Glenn Highway; thence north and east along the Glenn Highway to Ski Bowl Road; thence southeast along the Ski Bowl Road to a point one-half mile south of the Glenn Highway; thence north and east one-half mile south of and parallel to the Glenn Highway to its intersection with a line one-half mile east of and parallel to the Bryant Airport Runway 16/34 extended centerline; thence northeast along a line one-half mile east of and parallel to Bryant Airport Runway 16/34 extended centerline to lat. 61°17′13″ N., long. 149°37′35″ W.; thence west along lat. 61°17′13″ N., to long. 149°43′08″ W.; thence north along long. 149°43′08″ W., to lat. 61°17′30″ N.; thence to lat. 61°17′58″ N., long 149°44′08″ W.; thence to lat. 61°19′10″ N., long. 149°46′44″ W.; thence north along long. 149°46′44″ W., to intercept the 4.7-mile radius arc centered on Elmendorf Air Force Base (AFB), Alaska; thence counterclockwise along the 4.7-mile radius arc to its intersection with the west bank of Knik Arm; thence southerly along the west bank of Knik Arm to the point of beginning.

[Doc. No. 29029, 64 FR 14976, Mar. 29, 1999; Amdt. 93–77, 64 FR 17439, Apr. 9, 1999]

### § 93.55 Subdivision of Terminal Area.

The Anchorage, Alaska, Terminal Area is subdivided as follows:

(a) *International segment.* That area from the surface to and including 4,100 feet MSL, within a 5.2-mile radius of the Anchorage International ATCT; excluding that airspace east of the 350° bearing from the Anchorage International ATCT and north of the 090° bearing from the Anchorage International ATCT and east of a line bearing 180° and 360° from the intersection of the new Seward Highway and International Airport Road and the airspace extending upward from the surface to but not including 600 feet MSL, south of lat. 61°08′28″ N.

(b) *Merrill segment.* That area from the surface to and including 2,500 feet MSL, within a line beginning at Point Noname; thence direct to the mouth of Ship Creek; thence direct to the intersection of the Glenn Highway and Muldoon Road; thence south along Muldoon Road to Tudor Road; thence west along Tudor Road to the new Seward Highway; thence direct to West Anchorage High School; thence direct to Point MacKenzie; thence via the north bank of Knik Arm to the point of beginning.

(c) *Lake Hood segment.* That area from the surface to and including 2,500 feet MSL, within a line beginning at Point MacKenzie; thence direct to West Anchorage High School; thence direct to the intersection of Tudor Road and the new Seward Highway; thence south along the new Seward Highway to the 090° bearing from the Anchorage International ATCT; thence west direct to

the Anchorage International ATCT; thence north along the 350° bearing from the Anchorage International ATCT to the north bank of Knik arm; thence via the north bank of Knik Arm to the point of beginning.

(d) *Elmendorf segment.* That area from the surface to and including 3,000 feet MSL, within a line beginning at Point Noname; thence via the north bank of Knik Arm to the intersection of the 4.7-mile radius of Elmendorf AFB; thence clockwise along the 4.7-mile radius of Elmendorf AFB to long. 149°46′44″ W.; thence south along long. 149°46′44″ W. to lat. 61°19′10″ N.; thence to lat. 61°17′58″ N., long. 149°44′08″ W.; thence to lat. 61°17′30″ N., long. 149°43′08″ W.; thence south along long. 149°43′08″ W. to the Glenn Highway; thence south and west along the Glenn Highway to Muldoon Road; thence direct to the mouth of Ship Creek; thence direct to the point of beginning.

(e) *Bryant segment.* That area from the surface to and including 2,000 feet MSL, within a line beginning at lat. 61°17′13″ N., long. 149°37′35″ W.; thence west along lat. 61°17′13″ N., to long. 149°43′08″ W.; thence south along long. 149°43′08″ W., to the Glenn Highway; thence north and east along the Glenn Highway to Ski Bowl Road; thence southeast along the Ski Bowl Road to a point one-half mile south of the Glenn Highway; thence north and east one-half mile south of and parallel to the Glenn Highway to its intersection with a line one-half mile east of and parallel to the Bryant Airport Runway 16/34 extended centerline; thence northeast along a line one-half mile east of and parallel to Bryant Airport runway 16/34 extended centerline to the point of beginning.

(f) *Seward Highway segment.* That area from the surface to and including 4,100 feet MSL, within a line beginning at the intersection of a line bearing 180° from the intersection of the new Seward Highway and International Airport Road, and O'Malley Road; thence east along O'Malley Road to its intersection with Lake Otis Park Way, lat. 61°07′23″ N., long 149°50′03″ W.; thence northerly along Lake Otis Park Way to its intersection with Abbott Road, lat. 61°08′14″ N., long. 149°50′03″ W.; thence east along Abbott Road to its intersection with Abbott Loop Road, lat. 61°08′14″ N., long. 149°48′16″ W.; thence due north to intersect with Tudor Road, lat. 61°10′51″ N., long. 149°48′16″ W.; thence west along Tudor Road to its intersection with the new Seward Highway, lat. 61°10′51″ N., long. 149°51′38″ W.; thence south along the new Seward Highway to its intersection with a line bearing 180° and 360° from the intersection of the new Seward Highway and International Airport Road; thence south to the point of beginning.

[Doc. No. 29029, 64 FR 14976, Mar. 29, 1999; Amdt. 93–77, 64 FR 17439, Apr. 9, 1999]

### § 93.57 General rules: All segments.

(a) Each person operating an aircraft to, from, or on an airport within the Anchorage, Alaska, Terminal Area shall operate that aircraft according to the rules set forth in this section and §§ 93.59, 93.61, 93.63, 93.65, 93.67, or 93.68 as applicable, unless otherwise authorized or required by ATC.

(b) Each person operating an airplane within the Anchorage, Alaska Terminal Area shall conform to the flow of traffic depicted on the appropriate aeronautical charts.

(c) Each person operating a helicopter shall operate it in a manner so as to avoid the flow of airplanes.

(d) Except as provided in § 93.65 (d) and (e), and § 93.67(b), each person operating an aircraft in the Anchorage, Alaska, Terminal Area shall operate that aircraft only within the designated segment containing the arrival or departure airport.

(e) Except as provided in §§ 93.63(d) and 93.67(b), each person operating an aircraft in the Anchorage, Alaska, Terminal Area shall maintain two-way radio communications with the ATCT serving the segment containing the arrival or departure airport.

### § 93.59 General rules: International segment.

(a) No person may operate an aircraft at an altitude between 1,200 feet MSL and 2,000 feet MSL in that portion of this segment lying north of the midchannel of Knik Arm.

(b) Each person operating an airplane at a speed of more than 105 knots within this segment (except that part described in paragraph (a) of this section) shall operate that airplane at an altitude of at least 1,600 feet MSL until maneuvering for a safe landing requires further descent.

(c) Each person operating an airplane at a speed of 105 knots or less within this segment (except that part described in paragraph (a) of this section) shall operate that airplane at an altitude of at least 900 feet MSL until maneuvering for a safe landing requires further descent.

### § 93.61 General rules: Lake Hood segment.

(a) No person may operate an aircraft at an altitude between 1,200 feet MSL and 2,000 feet MSL in that portion of this segment lying north of the midchannel of Knik Arm.

(b) Each person operating an airplane within this segment (except that part described in paragraph (a) of this section) shall operate that airplane at an altitude of at least 600 feet MSL until maneuvering for a safe landing requires further descent.

### § 93.63 General rules: Merrill segment.

(a) No person may operate an aircraft at an altitude between 600 feet MSL and 2,000 feet MSL in that portion of this segment lying north of the midchannel of Knik Arm.

(b) Each person operating an airplane at a speed of more than 105 knots within this segment (except for that part described in paragraph (a) of this section) shall operate that airplane at an altitude of at least 1,200 feet MSL until maneuvering for a safe landing requires further descent.

(c) Each person operating an airplane at a speed of 105 knots or less within this segment (except for that part described in paragraph (a) of this section) shall operate that airplane at an altitude of at least 900 feet MSL until maneuvering for a safe landing requires further descent.

(d) Whenever the Merrill ATCT is not operating, each person operating an aircraft either in that portion of the Merrill segment north of midchannel of Knik Arm, or in the Seward Highway segment at or below 1200 feet MSL, shall contact Anchorage Approach Control for wake turbulence and other advisories. Aircraft operating within the remainder of the segment should self-announce intentions on the Merrill Field CTAF.

### § 93.65 General rules: Elmendorf segment.

(a) Each person operating a turbine-powered aircraft within this segment shall operate that aircraft at an altitude of at least 1,700 feet MSL until maneuvering for a safe landing requires further descent.

(b) Each person operating an airplane (other than turbine-powered aircraft) at a speed of more than 105 knots within this segment shall operate that airplane at an altitude of at least 1,200 feet MSL until maneuvering for a safe landing requires further descent.

(c) Each person operating an airplane (other than turbine-powered aircraft) at a speed of 105 knots or less within the segment shall operate that airplane at an altitude of at least 800 feet MSL until maneuvering for a safe landing requires further descent.

(d) A person landing or departing from Elmendorf AFB, may operate that aircraft at an altitude between 1,500 feet MSL and 1,700 feet MSL within that portion of the International and Lake Hood segments lying north of the midchannel of Knik Arm.

(e) A person landing or departing from Elmendorf AFB, may operate that aircraft at an altitude between 900 feet MSL and 1,700 feet MSL within that portion of the Merrill segment lying north of the midchannel of Knik Arm.

(f) A person operating in VFR conditions, at or below 600 feet MSL, north of a line beginning at the intersection of Farrell Road and the long. 149°43′08″ W.; thence west along Farrell Road to the east end of Sixmile Lake; thence west along a line bearing on the middle of Lake Lorraine to the northwest bank of Knik Arm; is not required to establish two-way radio communications with ATC.

[Doc. No. 29029, 64 FR 14977, Mar. 29, 1999; Amdt. 93–77, 64 FR 17439, Apr. 9, 1999]

### § 93.67 General rules: Bryant segment.

(a) Each person operating an airplane to or from the Bryant Airport shall conform to the flow of traffic shown on the appropriate aeronautical charts, and while in the traffic pattern, shall operate that airplane at an altitude of at least 1,000 feet MSL until maneuvering for a safe landing requires further descent.

(b) Each person operating an aircraft within the Bryant segment should self-announce intentions on the Bryant Airport CTAF.

### § 93.68 General rules: Seward Highway segment.

(a) Each person operating an airplane in the Seward Highway segment shall operate that airplane at an altitude of at least 1,000 feet MSL unless maneuvering for a safe landing requires further descent.

(b) Each person operating an aircraft at or below 1,200 feet MSL that will transition to or from the Lake Hood or Merrill segment shall contact the appropriate ATCT prior to entering the Seward Highway segment. All other persons operating an airplane at or below 1,200 feet MSL in this segment shall contact Anchorage Approach Control.

(c) At all times, each person operating an aircraft above 1,200 MSL shall contact Anchorage Approach Control prior to entering the Seward Highway segment.

### § 93.69 Special requirements, Lake Campbell and Sixmile Lake Airports.

Each person operating an aircraft to or from Lake Campbell or Sixmile Lake Airport shall conform to the flow of traffic for the Lake operations that are depicted on the appropriate aeronautical charts.

## Subpart E—Flight Restrictions in the Vicinity of Niagara Falls, New York

### § 93.71 General operating procedures.

(a) Flight restrictions are in effect below 3,500 feet MSL in the airspace above Niagara Falls, New York, west of a line from latitude 43°06′33″ N., longitude 79°03′30″ W. (the Whirlpool Rapids Bridge) to latitude 43°04′47″ N., longitude 79°02′44″ W. (the Niagara River Inlet) to latitude 43°04′29″ N., longitude 79°03′30″ W. (the International Control Dam) to the United States/Canadian Border and thence along the border to the point of origin.

(b) No flight is authorized below 3,500 feet MSL in the area described in paragraph (a) of this section, except for aircraft operations conducted directly to or from an airport/heliport within the area, aircraft operating on an ATC-approved IFR flight plan, aircraft operating the Scenic Falls Route pursuant to approval of Transport Canada, aircraft carrying law enforcement officials, or aircraft carrying properly accredited news representatives for which a flight plan has been filed with Buffalo NY (BUF) Automated Flight Service Station (AFSS).

(c) Check with Transport Canada for flight restrictions in Canadian airspace. Commercial air tour operations approved by Transport Canada will be conducting a north/south orbit of the Niagara Falls area below 3,500 feet MSL over the Niagara River.

(d) The minimum altitude for VFR flight over the Scenic Falls area is 3,500 feet MSL.

(e) Comply with the following procedures when conducting flight over the area described in paragraph (a) of this section:

(1) Fly a clockwise pattern;

(2) Do not proceed north of the Rainbow Bridge;

(3) Prior to joining the pattern, broadcast flight intentions on frequency 122.05 Mhz, giving altitude and position, and monitor the frequency while in the pattern;

(4) Use the Niagara Falls airport altimeter setting. Contact Niagara Falls Airport Traffic Control Tower to obtain the current altimeter setting, to facilitate the exchange of traffic advisories/restrictions, and to reduce the risk of midair collisions between aircraft operating in the vicinity of the Falls. If the Control Tower is closed, use the appropriate Automatic Terminal Information Service (ATIS) Frequency;

(5) Do not exceed 130 knots;

(6) Anticipate heavy congestion of VFR traffic at or above 3,500 feet MSL; and

(7) Use caution to avoid high-speed civil and military aircraft transiting the area to or from Niagara Falls Airport.

(f) These procedures do not relieve pilots from the requirements of § 91.113 of this chapter to see and avoid other aircraft.

(g) Flight following, to and from the area, is available through Buffalo Approach.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

## Subpart F—Valparaiso, Florida, Terminal Area

### § 93.80 Applicability.

This subpart prescribes special air traffic rules for aircraft operating in the Valparaiso, Florida, Terminal Area.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

### § 93.81 Applicability and description of area.

The Valparaiso, Florida Terminal Area is designated as follows:

(a) North-South Corridor. The North-South Corridor includes the airspace extending upward from the surface up to, but not including, 18,000 feet MSL, bounded by a line beginning at:

Latitude 30°42′51″ N., Longitude 86°38′02″ W.;
to
Latitude 30°43′18″ N., Longitude 86°27′37″ W.;
to
Latitude 30°37′01″ N., Longitude 86°27′37″ W.;
to
Latitude 30°37′01″ N., Longitude 86°25′30″ W.;
to
Latitude 30°33′01″ N., Longitude 86°25′30″ W.;
to
Latitude 30°33′01″ N., Longitude 86°25′00″ W.;
to
Latitude 30°25′01″ N., Longitude 86°25′00″ W.;
to
Latitude 30°25′01″ N., Longitude 86°38′12″ W.;
to
Latitude 30°29′02″ N., Longitude 86°38′02″ W.;
to point of beginning.

(b) East-West Corridor—The East-West Corridor is divided into three sections to accommodate the different altitudes as portions of the corridor underlie restricted areas R–2915C, R–2919B, and R–2914B.

(1) The west section would include that airspace extending upward from the surface to but not including 8,500 feet MSL, bounded by a line beginning at: Latitude 30°22′47″ N., Longitude 86°51′30″ W.: then along the shoreline to Latitude 30°23′46″ N., Longitude 86°38′15″ W.; to Latitude 30°20′51″ N., Longitude 86°38′50″ W.; then 3 NM from and parallel to the shoreline to Latitude 30°19′31″ N., Longitude 86°51′30″ W.; to the beginning.

(2) The center section would include that airspace extending upward from the surface to but not including 18,000 feet MSL, bounded by a line beginning at:

Latitude 30°25′01″ N., Longitude 86°38′12″ W.;
to
Latitude 30°25′01″ N., Longitude 86°25′00″ W.;
to
Latitude 30°25′01″ N., Longitude 86°22′26″ W.;
to
Latitude 30°19′46″ N., Longitude 86°23′45″ W.;
then 3 NM from and parallel to the shoreline to Latitude 30°20′51″ N.,
Longitude 86°38′50″ W.; to Latitude 30°23′46″ N.,
Longitude 86°38′15″ W.; to the beginning.

(3) The east section would include that airspace extending upward from the surface to but not including 8,500 feet MSL, bounded by a line beginning at:

Latitude 30°25′01″ N., Longitude 86°22′26″ W.;
to
Latitude 30°22′01″ N., Longitude 86°08′00″ W.;
to
Latitude 30°19′16″ N., Longitude 85°56′00″ W.;
to
Latitude 30°11′01″ N., Longitude 85°56′00″ W.;
then 3 NM from and parallel to the shoreline to Latitude 30°19′46″ N., Longitude 86°23′45″ W.; to the beginning.

[Amdt. 93–70, 59 FR 46154, Sept. 6, 1994, as amended by Amdt. 93–82, 68 FR 9795, Feb. 28, 2003]

### § 93.83 Aircraft operations.

(a) *North-South Corridor.* Unless otherwise authorized by ATC (including the Eglin Radar Control Facility), no person may operate an aircraft in flight within the North-South Corridor designated in § 93.81(b)(1) unless—

(1) Before operating within the corridor, that person obtains a clearance from the Eglin Radar Control Facility

or an appropriate FAA ATC facility; and

(2) That person maintains two-way radio communication with the Eglin Radar Control Facility or an appropriate FAA ATC facility while within the corridor.

(b) *East-West Corridor.* Unless otherwise authorized by ATC (including the Eglin Radar Control Facility), no person may operate an aircraft in flight within the East-West Corridor designated in § 93.81(b)(2) unless—

(1) Before operating within the corridor, that person establishes two-way radio communications with Eglin Radar Control Facility or an appropriate FAA ATC facility and receives an ATC advisory concerning operations being conducted therein; and

(2) That person maintains two-way radio communications with the Eglin Radar Control Facility or an appropriate FAA ATC facility while within the corridor.

[Amdt. 93–70, 59 FR 46155, Sept. 6, 1994]

## Subpart G—Special Flight Rules in the Vicinity of Los Angeles International Airport

SOURCE: Docket No. FAA–2002–14149, 68 FR 41214, July 10, 2003, unless otherwise noted.

### § 93.91 Applicability.

This subpart prescribes special air traffic rules for aircraft conducting VFR operations in the Los Angeles, California Special Flight Rules Area.

### § 93.93 Description of area.

The Los Angeles Special Flight Rules Area is designated as that part of Area A of the Los Angeles Class B airspace area at 3,500 feet above mean sea level (MSL) and at 4,500 feet MSL, beginning at Ballona Creek/Pacific Ocean (lat. 33°57′42″ N, long. 118°27′23″ W), then eastbound along Manchester Blvd. to the intersection of Manchester/405 Freeway (lat. 33°57′42″ N, long. 118°22′10″ W), then southbound along the 405 Freeway to the intersection of the 405 Freeway/lmperial Highway (lat. 33°55′51″ N, long. 118°22′06″ W), then westbound along Imperial Highway to the intersection of Imperial Highway/Pacific Ocean (lat. 33°55′51″ N, long. 118°26′05″ W), then northbound along the shoreline to the point of beginning.

### § 93.95 General operating procedures.

Unless otherwise authorized by the Administrator, no person may operate an aircraft in the airspace described in § 93.93 unless the operation is conducted in accordance with the following procedures:

(a) The flight must be conducted under VFR and only when operation may be conducted in compliance with § 91.155(a) of this chapter.

(b) The aircraft must be equipped as specified in § 91.215(b) of this chapter replying on code 1201 prior to entering and while operating in this area.

(c) The pilot shall have a current Los Angeles Terminal Area Chart in the aircraft.

(d) The pilot shall operate on the Santa Monica very high frequency omni-directional radio range (VOR) 132° radial.

(e) Aircraft navigating in a southeasterly direction shall be in level flight at 3,500 feet MSL.

(f) Aircraft navigating in a northwesterly direction shall be in level flight at 4,500 feet MSL.

(g) Indicated airspeed shall not exceed 140 knots.

(h) Anti-collision lights and aircraft position/navigation lights shall be on. Use of landing lights is recommended.

(i) Turbojet aircraft are prohibited from VFR operations in this area.

### § 93.97 Operations in the SFRA.

Notwithstanding the provisions of § 91.131(a) of this chapter, an air traffic control authorization is not required in the Los Angeles Special Flight Rules Area for operations in compliance with § 93.95. All other provisions of § 91.131 of this chapter apply to operations in the Los Angeles Special Flight Rules Area.

## Subpart H—Mandatory Use of the New York North Shore Helicopter Route

EFFECTIVE DATE NOTE: By Admt. 93–98A, 80 FR 8242, Feb. 17, 2015, subpart H was added, consisting of §§ 93.101 and 93.103, with effectiveness to expire Aug. 6, 2016.

### § 93.101 Applicability.

This subpart prescribes a special air traffic rule for civil helicopters operating VFR along the North Shore, Long Island, New York, between August 6, 2012 and August 6, 2016.

EFFECTIVE DATE NOTE: By Admt. 93–98, 79 FR 35490, June 23, 2014, § 93.101 was revised, effective Aug. 6, 2014 through Aug. 6, 2016.

### § 93.103 Helicopter operations.

(a) Unless otherwise authorized, each person piloting a helicopter along Long Island, New York's northern shoreline between the VPLYD waypoint and Orient Point, shall utilize the North Shore Helicopter route and altitude, as published.

(b) Pilots may deviate from the route and altitude requirements of paragraph (a) of this section when necessary for safety, weather conditions or transitioning to or from a destination or point of landing.

[Doc. No. FAA–2010–0302, 80 FR 8242, Feb. 17, 2015]

## Subpart I [Reserved]

## Subpart J—Lorain County Regional Airport Traffic Rule

### § 93.117 Applicability.

This subpart prescribes a special air traffic rule for aircraft operating at the Lorain County Regional Airport, Lorain County, Ohio.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

### § 93.119 Aircraft operations.

Each person piloting an airplane landing at the Lorain County Regional Airport shall enter the traffic pattern north of the airport and shall execute a right traffic pattern for a landing to the southwest or a left traffic pattern for a landing to the northeast. Each person taking off from the airport shall execute a departure turn to the north as soon as practicable after takeoff.

[Doc. No. 8669, 33 FR 11749, Aug. 20, 1968]

## Subpart K—High Density Traffic Airports

### § 93.121 Applicability.

This subpart designates high density traffic airports and prescribes air traffic rules for operating aircraft, other than helicopters, to or from those airports.

[Doc. No. 9974, 35 FR 16592, Oct. 24, 1970, as amended by Amdt. 93–27, 38 FR 29464, Oct. 25, 1973]

### § 93.123 High density traffic airports.

(a) Each of the following airports is designated as a high density traffic airport and, except as provided in § 93.129 and paragraph (b) of this section, or unless otherwise authorized by ATC, is limited to the hourly number of allocated IFR operations (takeoffs and landings) that may be reserved for the specified classes of users for that airport:

IFR OPERATIONS PER HOUR

AIRPORT

| Class of user | LaGuardia [4, 5] | Newark | O'Hare [2, 3, 5] | Ronald Reagan National [1] |
|---|---|---|---|---|
| Air carriers .. | 48 | 40 | 120 | 37 |
| Commuters | 14 | 10 | 25 | 11 |
| Other ..... | 6 | 10 | 10 | 12 |

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| | Air carriers | Commuters | Other |
|---|---|---|---|
| 1500 ..... | 69 | 15 | 2 |
| 1600 ..... | 74 | 12 | 2 |
| 1700 ..... | 80 | 13 | 0 |
| 1800 ..... | 75 | 10 | 2 |
| 1900 ..... | 63 | 12 | 2 |

[1] Washington National Airport operations are subject to modifications per Section 93.124.

[2] The hour period in effect at O'Hare begins at 6:45 a.m. and continues in 30-minute increments until 9:15 p.m.

[3] Operations at O'Hare International Airport shall not—

(a) Except as provided in paragraph (c) of the note, exceed 62 for air carriers and 13 for commuters and 5 for "other" during any 30-minute period beginning at 6:45 a.m. and continuing every 30 minutes thereafter.

(b) Except as provided in paragraph (c) of the note, exceed more than 120 for air carriers, 25 for commuters, and 10 for "other" in any two consecutive 30-minute periods.

(c) For the hours beginning at 6:45 a.m., 7:45 a.m., 11:45 a.m., 7:45 p.m. and 8:45 p.m., the hourly limitations shall be 105 for air carriers, 40 for commuters and 10 for "other," and the 30-minute limitations shall be 55 for air carriers, 20 for commuters and 5 for "other." For the hour beginning at 3:45 p.m., the hourly limitations shall be 115 for air carriers, 30 for commuters and 10 for "others", and the 30-minute limitations shall be 60 for air carriers, 15 for commuters and 5 for "other."

[4] Operations at LaGuardia Airport shall not—

(a) Exceed 26 for air carriers, 7 for commuters and 3 for ''other'' during any 30-minute period.
(b) Exceed 48 for air carriers, 14 for commuters, and 6 for ''other'' in any two consecutive 30-minute periods.
[5] Pursuant to bilateral agreement, 14 slots at LaGuardia and 24 slots at O'Hare are allocated to the Canadian carriers. These slots are excluded from the hourly quotas set forth in § 93.123 above.

(b) The following exceptions apply to the allocations of reservations prescribed in paragraph (a) Of this section.

(1) The allocations of reservations among the several classes of users do not apply from 12 midnight to 6 a.m. local time, but the total hourly limitation remains applicable.

(2) [Reserved]

(3) The allocation of 37 IFR reservations per hour for air carriers except commuters at Washington National Airport does not include charter flights, or other nonscheduled flights of scheduled or supplemental air carriers. These flights may be conducted without regard to the limitation of 37 IFR reservations per hour.

(4) The allocation of IFR reservations for air carriers except commuters at LaGuardia, Newark, O'Hare, and Washington National Airports does not include extra sections of scheduled flights. The allocation of IFR reservations for scheduled commuters at Washington National Airport does not include extra sections of scheduled flights. These flights may be conducted without regard to the limitation upon the hourly IFR reservations at those airports.

(5) Any reservation allocated to, but not taken by, air carrier operations (except commuters) is available for a scheduled commuter operation.

(6) Any reservation allocated to, but not taken by, air carrier operations (except commuters) or scheduled commuter operations is available for other operations.

(c) For purposes of this subpart—

(1) The number of operations allocated to *air carriers except commuters*, as used in paragraph (a) of this section refers to the number of operations conducted by air carriers with turboprop and reciprocating engine aircraft having a certificated maximum passenger seating capacity of 75 or more or with turbojet powered aircraft having a certificated maximum passenger seating capacity of 56 or more, or, if used for cargo service in air transportation, with any aircraft having a maximum payload capacity of 18,000 pounds or more.

(2) The number of operations allocated to scheduled commuters, as used in paragraph (a) of this section, refers to the number of operations conducted by air carriers with turboprop and reciprocating engine aircraft having a certificated maximum passenger seating capacity of less than 75 or by turbojet aircraft having a certificated maximum passenger seating capacity of less than 56, or if used for cargo service in air transportation, with any aircraft having a maximum payload capacity of less than 18,000 pounds. For purposes of aircraft operations at Ronald Reagan Washington National Airport, the term ''commuters'' means aircraft operations using aircraft having a certificated maximum seating capacity of 76 or less.

(3) Notwithstanding the provisions of paragraph (c)(2) of this section, a limited number of operations allocated for ''scheduled commuters'' under paragraph (a) of this section may be conducted with aircraft described in § 93.221(e) of this part pursuant to the requirements of § 93.221(e).

[Doc. No. 9113, 34 FR 2603, Feb. 26, 1969, as amended by Amdt. 93–37, 45 FR 62408, Sept. 18, 1980; Amdt. 93–44, 46 FR 58048, Nov. 27, 1981; Amdt. 93–46, 49 FR 8244, Mar. 6, 1984; Amdt. 93–57, 54 FR 34906, Aug. 22, 1989; 54 FR 37303, Sept. 8, 1989; Amdt. 93–59, 54 FR 39843, Sept. 28, 1989; Amdt. 93–62, 56 FR 41207, Aug. 19, 1991; Amdt. 93–78, 64 FR 53564, Oct. 1, 1999; Amdt. 93–84, 70 FR 29063, May 19, 2005]

### § 93.125 Arrival or departure reservation.

Except between 12 Midnight and 6 a.m. local time, no person may operate an aircraft to or from an airport designated as a high density traffic airport unless he has received, for that operation, an arrival or departure reservation from ATC.

[Doc. No. 9974, 37 FR 22794, Oct. 25, 1972]

### § 93.129 Additional operations.

(a) *IFR.* The operator of an aircraft may take off or land the aircraft under IFR at a designated high density traffic airport without regard to the maximum number of operations allocated for that airport if the operation is not

a scheduled operation to or from a high density airport and he obtains a departure or arrival reservation, as appropriate, from ATC. The reservation is granted by ATC whenever the aircraft may be accommodated without significant additional delay to the operations allocated for the airport for which the reservations is requested.

(b) *VFR.* The operator of an aircraft may take off and land the aircraft under VFR at a designated high density traffic airport without regard to the maximum number of operations allocated for that airport if the operation is not a scheduled operation to or from a high density airport and he obtains a departure or arrival reservation, as appropriate, from ATC. The reservation is granted by ATC whenever the aircraft may be accommodated without significant additional delay to the operations allocated for the airport for which the reservation is requested and the ceiling reported at the airport is at least 1,000 feet and the ground visibility reported at the airport is at least 3 miles.

(c) For the purpose of this section a *scheduled operation to or from the high* density airport is any operation regularly conducted by an air carrier or commuter between a high density airport and another point regularly served by that operator unless the service is conducted pursuant to irregular charter or hiring of aircraft or is a nonpassenger flight.

(d) An aircraft operator must obtain an IFR reservation in accordance with procedures established by the Administrator. For IFR flights to or from a high density airport, reservations for takeoff and arrival shall be obtained prior to takeoff.

[Doc. No. 9113, 34 FR 2603, Feb. 26, 1969, as amended by Amdt. 93–25, 37 FR 22794, Oct. 25, 1972; Amdt. 93–44, 46 FR 58049, Nov. 27, 1981; Amdt. 93–46, 49 FR 8244, Mar. 6, 1984]

### § 93.130 Suspension of allocations.

The Administrator may suspend the effectiveness of any allocation prescribed in § 93.123 and the reservation requirements prescribed in § 93.125 if he finds such action to be consistent with the efficient use of the airspace. Such suspension may be terminated whenever the Administrator determines that such action is necessary for the efficient use of the airspace.

[Doc. No. 9974, 35 FR 16592, Oct. 24, 1970, as amended by Amdt. 93–21, 35 FR 16636, Oct. 27, 1970; Amdt. 93–27, 38 FR 29464, Oct. 25, 1973]

### § 93.133 Exceptions.

Except as provided in § 93.130, the provisions of §§ 93.123 and 93.125 do not apply to—

(a) The Newark Airport, Newark, NJ;

(b) The Kennedy International Airport, New York, NY, except during the hours from 3 p.m. through 7:59 p.m., local time; and

(c) O'Hare International Airport from 9:15 p.m. to 6:44 a.m., local time.

[Doc. No. 24471, 49 FR 8244, Mar. 6, 1984]

## Subpart L [Reserved]

## Subpart M—Ketchikan International Airport Traffic Rule

SOURCE: Docket No. 14687, 41 FR 14879, Apr. 8, 1976, unless otherwise noted.

### § 93.151 Applicability.

This subpart prescribes a special air traffic rule for aircraft conducting VFR operations in the vicinity of the Ketchikan International Airport or Ketchikan Harbor, Alaska.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

### § 93.152 Description of area.

Within that airspace below 3,000 feet MSL within the lateral boundary of the surface area of the Ketchikan Class E airspace regardless of whether that airspace is in effect.

[Doc. No. FAA–2002–13235, 68 FR 9795, Feb. 28, 2003]

### § 93.153 Communications.

(a) When the Ketchikan Flight Service Station is in operation, no person may operate an aircraft within the airspace specified in § 93.151, or taxi onto the runway at Ketchikan International Airport, unless that person has established two-way radio communications with the Ketchikan Flight Service Station for the purpose of receiving traffic advisories and continues to monitor the advisory frequency at all times

while operating within the specified airspace.

(b) When the Ketchikan Flight Service Station is not in operation, no person may operate an aircraft within the airspace specified in §93.151, or taxi onto the runway at Ketchikan International Airport, unless that person continuously monitors and communicates, as appropriate, on the designated common traffic advisory frequency as follows:

(1) *For inbound flights.* Announces position and intentions when no less than 10 miles from Ketchikan International Airport, and monitors the designated frequency until clear of the movement area on the airport or Ketchikan Harbor.

(2) *For departing flights.* Announces position and intentions prior to taxiing onto the active runway on the airport or onto the movement area of Ketchikan Harbor and monitors the designated frequency until outside the airspace described in §93.151 and announces position and intentions upon departing that airspace.

(c) Notwithstanding the provisions of paragraphs (a) and (b) of this section, if two-way radio communications failure occurs in flight, a person may operate an aircraft within the airspace specified in §93.151, and land, if weather conditions are at or above basic VFR weather minimums.

[Doc. No. 26653, 56 FR 48094, Sept. 23, 1991]

### §93.155 Aircraft operations.

(a) When an advisory is received from the Ketchikan Flight Service Station stating that an aircraft is on final approach to the Ketchikan International Airport, no person may taxi onto the runway of that airport until the approaching aircraft has landed and has cleared the runway.

(b) Unless otherwise authorized by ATC, each person operating a large airplane or a turbine engine powered airplane shall—

(1) When approaching to land at the Ketchikan International Airport, maintain an altitude of at least 900 feet MSL until within three miles of the airport; and

(2) After takeoff from the Ketchikan International Airport, maintain runway heading until reaching an altitude of 900 feet MSL.

## Subpart N [Reserved]

## Subpart O—Special Flight Rules in the Vicinity of Luke AFB, AZ

SOURCE: 74 FR 69278, Dec. 31, 2009, unless otherwise noted.

### §93.175 Applicability.

This subpart prescribes a Special Air Traffic Rule for aircraft conducting VFR operations in the vicinity of Luke Air Force Base, AZ.

### §93.176 Description of area.

The Luke Air Force Base, Arizona Terminal Area is designated during official daylight hours Monday through Friday while Luke pilot flight training is underway, as broadcast on the local Automatic Terminal Information Service (ATIS), and other times by Notice to Airmen (NOTAM), as follows:

(a) East Sector:

(1) South section includes airspace extending from 3,000 feet MSL to the base of the overlaying Phoenix Class B airspace bounded by a line beginning at: Lat. 33°23′56″ N; Long. 112°28′37″ W; to Lat. 33°22′32″ N; Long. 112°37′14″ W; to Lat. 33°25′39″ N; Long. 112°37′29″ W; to Lat. 33°31′55″ N; Long. 112°30′32″ W; to Lat. 33°28′00″ N; Long. 112°28′41″ W; to point of beginning.

(2) South section lower includes airspace extending from 2,100 feet MSL to the base of the overlaying Phoenix Class B airspace, excluding the Luke Class D airspace area bounded by a line beginning at: Lat. 33°28′00″ N; Long. 112°28′41″ W; to Lat. 33°23′56″ N; Long. 112°28′37″ W; to Lat. 33°27′53″ N; Long. 112°24′12″ W; to point of beginning.

(3) Center section includes airspace extending from surface to the base of the overlaying Phoenix Class B airspace, excluding the Luke Class D airspace area bounded by a line beginning at: Lat. 33°42′22″ N; Long. 112°19′16″ W; to Lat. 33°38′40″ N; Long. 112°14′03″ W; to Lat. 33°27′53″ N; Long. 112°24′12″ W; to Lat. 33°28′00″ N; Long. 112°28′41″ W; to Lat. 33°31′55″ N; Long. 112°30′32″ W; to point of beginning.

(4) The north section includes that airspace extending upward from 3,000 feet MSL to 4,000 feet MSL, bounded by a line beginning at: Lat. 33°42′22″ N; Long. 112°19′16″ W; to Lat. 33°46′58″ N; Long. 112°16′41″ W; to Lat. 33°44′48″ N; Long. 112°10′59″ W; to Lat. 33°38′40″ N; Long. 112°14′03″ W; to point of beginning.

(b) West Sector:

(1) The north section includes that airspace extending upward from 3,000 feet MSL to 6,000 feet MSL, bounded by a line beginning at: Lat. 33°51′52″ N; Long. 112°37′54″ W; to Lat. 33°49′34″ N; Long. 112°23′34″ W; to Lat. 33°46′58″ N; Long. 112°16′41″ W; to Lat. 33°42′22″ N; Long. 112°19′16″ W; to Lat. 33°39′27″ N; Long. 112°22′27″ W; to point of beginning.

(2) The south section includes that airspace extending upward from the surface to 6,000 feet MSL, bounded by a line beginning at: Lat. 33°39′27″ N; Long. 112°22′27″ W; to Lat. 33°38′06″ N; Long. 112°23′51″ W; to Lat. 33°38′07″ N; Long. 112°28′50″ W; to Lat. 33°39′34″ N; Long. 112°31′39″ W; to Lat. 33°39′32″ N; Long. 112°37′36″ W; to Lat. 33°51′52″ N; Long. 112°37′54″ W; to point of beginning.

### § 93.177 Operations in the Special Air Traffic Rule Area.

(a) Unless otherwise authorized by Air Traffic Control (ATC), no person may operate an aircraft in flight within the Luke Terminal Area designated in § 93.176 unless—

(1) Before operating within the Luke Terminal area, that person establishes radio contact with the Luke RAPCON; and

(2) That person maintains two-way radio communication with the Luke RAPCON or an appropriate ATC facility while within the designated area.

(b) Requests for deviation from the provisions of this section apply only to aircraft not equipped with an operational radio. The request must be submitted at least 24 hours before the proposed operation to Luke RAPCON.

## Subparts P–R [Reserved]

## Subpart S—Allocation of Commuter and Air Carrier IFR Operations at High Density Traffic Airports

SOURCE: Docket No. 24105, 50 FR 52195, Dec. 20, 1985, unless otherwise noted.

### § 93.211 Applicability.

(a) This subpart prescribes rules applicable to the allocation and withdrawal of IFR operational authority (takeoffs and landings) to individual air carriers and commuter operators at the High Density Traffic Airports identified in subpart K of this part except for Newark Airport.

(b) This subpart also prescribes rules concerning the transfer of allocated IFR operational authority and the use of that authority once allocated.

### § 93.213 Definitions and general provisions.

(a) For purposes of this subpart—

(1) *New entrant carrier* means a commuter operator or air carrier which does not hold a slot at a particular airport and has never sold or given up a slot at that airport after December 16, 1985.

(2) *Slot* means the operational authority to conduct one IFR landing or takeoff operation each day during a specific hour or 30 minute period at one of the High Density Traffic Airports, as specified in subpart K of this part.

(3) *Summer season* means the period of time from the first Sunday in April until the last Sunday in October.

(4) *Winter season* means the period of time from the last Sunday in October until the first Sunday in April.

(5) *Limited incumbent carrier* means an air carrier or commuter operator that holds or operates fewer than 12 air carrier or commuter slots, in any combination, at a particular airport, not including international slots, Essential Air Service Program slots, or slots between the hours of 2200 and 0659 at Washington National Airport or LaGuardia Airport. However, for the purposes of this paragraph (a)(5), the carrier is considered to hold the number of slots at that airport that the carrier has, since December 16, 1985:

(i) Returned to the FAA;

(ii) Had recalled by the FAA under § 93.227(a); or

(iii) Transferred to another party other than by trade for one or more slots at the same airport.

(b) The definitions specified in subpart K of this part also apply to this subpart.

(c) For purposes of this subpart, if an air carrier, commuter operator, or other person has more than a 50-percent ownership or control of one or more other air carriers, commuter operators, or other persons, they shall be considered to be a single air carrier, commuter operator, or person. In addition, if a single company has more than a 50-percent ownership or control of two or more air carriers and/or commuter operators or any combination thereof, those air carriers and/or commuter operators shall be considered to be a single operator. A single operator may be considered to be both an air carrier and commuter operator for purposes of this subpart.

[Doc. No. 24105, 50 FR 52195, Dec. 20, 1985, as amended by Amdt. 93–52, 51 FR 21717, June 13, 1986; Amdt. 93–57, 54 FR 34906, Aug. 22, 1989; 54 FR 37303, Sept. 8, 1989; Amdt. 93–65, 57 FR 37314, Aug. 18, 1992]

### § 93.215 Initial allocation of slots.

(a) Each air carrier and commuter operator holding a permanent slot on December 16, 1985, as evidenced by the records of the air carrier and commuter operator scheduling committees, shall be allocated those slots subject to withdrawal under the provisions of this subpart. The Chief Counsel of the FAA shall be the final decisionmaker for initial allocation determinations.

(b) Any permanent slot whose use on December 16, 1985 is divided among different operators, by day of the week, or otherwise, as evidenced by records of the scheduling committees, shall be allocated in conformity with those records. The Chief Counsel of the FAA shall be the final decisionmaker for these determinations.

(c) A carrier may permanently designate a slot it holds at Kennedy International Airport as a seasonal slot, to be held by the carrier only during the corresponding season in future years, if it notifies the FAA (at the address specified in § 93.225(e)), in writing, the preceding winter seasons or by October 15 of the preceding year for summer seasons.

(d) Within 30 days after December 16, 1985, each U.S. air carrier and commuter operator must notify the office specified in § 93.221(a)(1), in writing, of those slots used for operations described in § 93.217(a)(1) on December 16, 1985.

(e) Any slot not held by an operator on December 16, 1985 shall be allocated in accordance with the provisions of §§ 93.217, 93.219 or 93.225 of this subpart.

[Doc. No. 24105, 50 FR 52195, Dec. 20, 1985, as amended by Amdt. 93–52, 51 FR 21717, June 13, 1986]

### § 93.217 Allocation of slots for international operations and applicable limitations.

(a) Any air carrier of commuter operator having the authority to conduct international operations shall be provided slots for those operations, excluding transborder service solely between HDR airports and Canada, subject to the following conditions and the other provisions of this section:

(1) The slot may be used only for a flight segment in which either the takeoff or landing is at a foreign point or, for foreign operators, the flight segment is a continuation of a flight that begins or ends at a foreign point. Slots may be obtained and used under this section only for operations at Kennedy and O'Hare airports unless otherwise required by bilateral agreement and only for scheduled service unless the requesting carrier qualifies for the slot on the basis of historic seasonal operations, under § 93.217(a)(5).

(2) Slots used for an operation described in paragraph (a)(1) of this section may not be bought, sold, leased, or otherwise transferred, except that such a slot may be traded to another slotholder on a one-for-one basis for a slot at the same airport in a different hour or half-hour period if the trade is for the purpose of conducting such an operation in a different hour or half-hour period.

(3) Slots used for operations described in paragraph (a)(1) of this section must be returned to the FAA if the slot will not be used for such operations for more than a 2-week period.

(4) Each air carrier or commuter operator having a slot that is used for operations described in paragraph (a)(1) of this section but is not used every day of the week shall notify the office specified in § 93.221(a)(1) in writing of those days on which the slots will not be used.

(5) Except as provided in paragraph (a)(10) of this section, at Kennedy and O'Hare Airports, a slot shall be allocated, upon request, for seasonal international operations, including charter operations, if the Chief Counsel of the FAA determines that the slot had been permanently allocated to and used by the requesting carrier in the same hour and for the same time period during the corresponding season of the preceding year. Requests for such slots must be submitted to the office specified in § 93.221(a)(1), by the deadline published in a FEDERAL REGISTER notice for each season. For operations during the 1986 summer season, requests under this paragraph must have been submitted to the FAA on or before February 1, 1986. Each carrier requesting a slot under this paragraph must submit its entire international schedule at the relevant airport for the particular season, noting which requests are in addition to or changes from the previous year.

(6) Except as provided in paragraph (a)(10) of this section, additional slots shall be allocated at O'Hare Airport for international scheduled air carrier and commuter operations (beyond those slots allocated under §§ 93.215 and 93.217(a)(5) if a request is submitted to the office specified in § 93.221(a)(1) and filed by the deadline published in a FEDERAL REGISTER notice for each season. These slots will be allocated at the time requested unless a slot is available within one hour of the requested time, in which case the unallocated slots will be used to satisfy the request.

(7) If required by bilateral agreement, additional slots shall be allocated at LaGuardia Airport for international scheduled passenger operations within the hour requested.

(8) To the extent vacant slots are available, additional slots during the high density hours shall be allocated at Kennedy Airport for new international scheduled air carrier and commuter operations (beyond those operations for which slots have been allocated under §§ 93.215 and 93.217(a)(5)), if a request is submitted to the office specified in § 93.221(a)(1) by the deadline published in a FEDERAL REGISTER notice for each season. In addition, slots may be withdrawn from domestic operations for operations at Kennedy Airport under this paragraph if required by international obligations.

(9) In determining the hour in which a slot request under §§ 93.217(a)(6) and 93.217(a)(8) will be granted, the following will be taken into consideration, among other things:

(i) The availability of vacant slot times;

(ii) International obligations;

(iii) Airport terminal capacity, including facilities and personnel of the U.S. Customs Service and the U.S. Immigration and Naturalization Service;

(iv) The extent and regularity of intended use of a slot; and

(v) Schedule constraints of carriers requesting slots.

(10) At O'Hare Airport, a slot will not be allocated under this section to a carrier holding or operating 100 or more permanent slots on the previous May 15 for a winter season or October 15 for a summer season unless:

(i) Allocation of the slot does not result in a total allocation to that carrier under this section that exceeds the number of slots allocated to and scheduled by that carrier under this section on February 23, 1990, and as reduced by the number of slots reclassified under § 93.218, and does not exceed by more than 2 the number of slots allocated to and scheduled by that carrier during any half hour of that day, or

(ii) Notwithstanding the number of slots allocated under paragraph (a)(10)(i) of this section, a slot is available for allocation without withdrawal of a permanent slot from any carrier.

(b) If a slot allocated under § 93.215 was scheduled for an operation described in paragraph (a)(1) of this section on December 16, 1985, its use shall be subject to the requirements of paragraphs (a)(1) through (a)(4) of this section. The requirements also apply to slots used for international operations at LaGuardia Airport.

(c) If a slot is offered to a carrier in other than the hour requested, the carrier shall have 14 days after the date of the offer to accept the newly offered slot. Acceptance must be in writing and sent to the office specified in §93.221(a)(1) and must repeat the certified statements required by paragraph (e) of this section.

(d) The Office of the Secretary of Transportation reserves the right not to apply the provisions of this section, concerning the allocation of slots, to any foreign air carrier or commuter operator of a country that provides slots to U.S. air carriers and commuter operators on a basis more restrictive than provided by this subpart. Decisions not to apply the provisions of this section will be made by the Office of the Secretary of Transportation.

(e) Each request for slots under this section shall state the airport, days of the week and time of the day of the desired slots and the period of time the slots are to be used. Each request shall identify whether the slot is requested under paragraph (a)(5), (6), or (8) and identify any changes from the previous year if requested under both paragraphs. The request must be accompanied by a certified statement signed by an officer of the operator indicating that the operator has or has contracted for aircraft capable of being utilized in using the slots requested and that the operator has bona fide plans to use the requested slots for operations described in paragraph (a).

[Doc. No. 24105, 51 FR 21717, June 13, 1986, as amended by Amdt. 93–61, 55 FR 53243, Dec. 27, 1990; 56 FR 1059, Jan. 10, 1991; Amdt. 93–78, 64 FR 53565, Oct. 1, 1999]

### §93.218 Slots for transborder service to and from Canada.

(a) Except as otherwise provided in this subpart, international slots identified by U.S. carriers for international operations in December 1985 and the equivalent number of international slots held as of February 24, 1998, will be domestic slots. The Chief Counsel of the FAA shall be the final decisionmaker for these determinations.

(b) Canadian carriers shall have a guaranteed base level of slots of 42 slots at LaGuardia, 36 slots at O'Hare for the Sumner season, and 32 slots at O'Hare in the Winter season.

(c) Any modification to the slot base by the Government of Canada or the Canadian carriers that results in a decrease of the guaranteed base in paragraph (b) of this section shall permanently modify the base number of slots.

[Doc. No. FAA–1999–4971, 64 FR 53565, Oct. 1, 1999]

### §93.219 Allocation of slots for essential air service operations and applicable limitations.

Whenever the Office of the Secretary of Transportation determines that slots are needed for operations to or from a High Density Traffic Airport under the Department of Transportation's Essential Air Service (EAS) Program, those slots shall be provided to the designated air carrier or commuter operator subject to the following limitations:

(a) Slots obtained under this section may not be bought, sold, leased or otherwise transferred, except that such slots may be traded for other slots on a one-for-one basis at the same airport.

(b) Any slot obtained under this section must be returned to the FAA if it will not be used for EAS purposes for more than a 2-week period. A slot returned under this paragraph may be reallocated to the operator which returned it upon request to the FAA office specified in §93.221(a)(1) if that slot has not been reallocated to an operator to provide substitute essential air service.

(c) Slots shall be allocated for EAS purposes in a time period within 90 minutes of the time period requested.

(d) The Department will not honor requests for slots for EAS purposes to a point if the requesting carrier has previously traded away or sold slots it had used or obtained for use in providing essential air service to that point.

(e) Slots obtained under Civil Aeronautics Board Order No. 84–11–40 shall be considered to have been obtained under this section.

### §93.221 Transfer of slots.

(a) Except as otherwise provided in this subpart, effective April 1, 1986, slots may be bought, sold or leased for

any consideration and any time period and they may be traded in any combination for slots at the same airport or any other high density traffic airport. Transfers, including leases, shall comply with the following conditions:

(1) Requests for confirmation must be submitted in writing to Slot Administration Office, AGC–230, Office of the Chief Counsel, Federal Aviation Administration, 800 Independence Ave., SW., Washington, DC 20591, in a format to be prescribed by the Administrator. Requests will provide the names of the transferor and recipient; business address and telephone number of the persons representing the transferor and recipient; whether the slot is to be used for an arrival or departure; the date the slot was acquired by the transferor; the section of this subpart under which the slot was allocated to the transferor; whether the slot has been used by the transferor for international or essential air service operations; and whether the slot will be used by the recipient for international or essential air service operations. After withdrawal priorities have been established under § 93.223 of this part, the requests must include the slot designations of the transferred slots as described in § 93.223(b)(5).

(2) The slot transferred must come from the transferor's then-current FAA-approved base.

(3) Written evidence of each transferor's consent to the transfer must be provided to the FAA.

(4) The recipient of a transferred slot may not use the slot until written confirmation has been received from the FAA.

(5)(i) Until a slot obtained by a new entrant or limited incumbent carrier in a lottery held under § 93.225 after June 1, 1991, has been used by the carrier that obtained it for a continuous 24-month period after the lottery in accordance with § 93.227(a), that slot may be transferred only by trade for one or more slots at the same airport or to other new entrant or limited incumbent carriers under § 93.221(a)(5)(iii). This transfer restriction shall apply to the same extent to any slot or slots acquired by trading the slot obtained in a lottery. To remove the transfer restriction, documentation of 24 months' continuous use must be submitted to the FAA Office of the Chief Counsel.

(ii) Failure to use a slot acquired by trading a slot obtained in a lottery for a continuous 24-month period after the lottery, shall void all trades involving the lottery slot, which shall be returned to the FAA. All use of the lottery slot shall be counted toward fulfilling the minimum use requirements under § 93.227(a) applicable to the slot or slots for which the lottery slot was traded, including subsequent trades.

(iii) Slots obtained by new entrant or limited incumbent carriers in a lottery may be sold, leased, or otherwise transferred to another entrant or limited incumbent carrier after a minimum of 60 days of use by the obtaining carrier. The transfer restrictions of § 93.221(a)(5)(i) shall continue to apply to the slot until documentation of 24 months' continuous use has been submitted and the transfer restriction removed.

(6) The Office of the Secretary of Transportation must determine that the transfer will not be injurious to the essential air service program.

(b) A record of each slot transfer shall be kept on file by the office specified in paragraph (a)(1) of this section and will be made available to the public upon request.

(c) Any person may buy or sell slots and any air carrier or commuter may use them. Notwithstanding § 93.123, air carrier slots may be used with aircraft of the kind described in § 93.123 (c)(1) or (c)(2) but commuter slots may only be used with aircraft of the kind described in § 93.0123(c)(2).

(d) Air carriers and commuter operators considered to be a single operator under the provisions of § 93.213(c) of this subpart but operating under separate names shall report transfers of slots between them.

(e) Notwithstanding § 93.123(c)(2) of this part, a commuter slot at O'Hare International Airport may be used with an aircraft described in § 93.123(c)(1) of this part on the following conditions:

(1) Air carrier aircraft that may be operated under this paragraph are limited to aircraft:

(i) Having an actual seating configuration of 110 or fewer passengers; and

(ii) Having a maximum certificated takeoff weight of less than 126,000 pounds.

(2) No more than 50 percent of the total number of commuter slots held by a slot holder at O'Hare International Airport may be used with aircraft described in paragraph (e)(1) of this section.

(3) An air carrier or commuter operator planning to operate an aircraft described in paragraph (e)(1) of this section in a commuter slot shall notify ATC at least 75 days in advance of the planned start date of such operation. The notice shall include the slot number, proposed time of operation, aircraft type, aircraft series, actual aircraft seating configuration, and planned start date. ATC will approve or disapprove the proposed operation no later than 45 days prior to the planned start date. If an operator does not initiate operation of a commuter slot under this section within 30 days of the planned start date first submitted to the FAA, the ATC approval for that operation will expire. That operator may file a new or revised notice for the same half-hour slot time.

(4) An operation may not be conducted under paragraph (e)(1) of this section unless a gate is available for that operation without planned waiting time.

(5) For the purposes of this paragraph (e), notice to ATC shall be submitted in writing to: Director, Air Traffic System Management, ATM–1, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591.

[Doc. No. 24105, 50 FR 52195, Dec. 20, 1985, as amended by Amdt. 93–52, 51 FR 21717, June 13, 1986; Amdt. 93–58, 54 FR 39293, Sept. 25, 1989; Amdt. 93–62, 56 FR 41208, Aug. 19, 1991; Amdt. 93–65, 57 FR 37314, Aug. 18, 1992; Amdt. 93–68, 58 FR 39616, July 23, 1993]

### § 93.223 Slot withdrawal.

(a) Slots do not represent a property right but represent an operating privilege subject to absolute FAA control. Slots may be withdrawn at any time to fulfill the Department's operational needs, such as providing slots for international or essential air service operations or eliminating slots. Before withdrawing any slots under this section to provide them for international operations, essential air services or other operational needs, those slots returned under § 93.224 of this part and those recalled by the agency under § 93.227 will be allocated.

(b) Separate slot pools shall be established for air carriers and commuter operators at each airport. The FAA shall assign, by random lottery, withdrawal priority numbers for the recall priority of slots at each airport. Each additional permanent slot, if any, will be assigned the next higher number for air carrier or commuter slots, as appropriate, at each airport. Each slot shall be assigned a designation consisting of the applicable withdrawal priority number; the airport code; a code indicating whether the slot is an air carrier or commuter operator slot; and the time period of the slot. The designation shall also indicate, as appropriate, if the slot is daily or for certain days of the week only; is limited to arrivals or departures; is allocated for international operations or for EAS purposes; and, at Kennedy International Airport, is a summer or winter slot.

(c) Whenever slots must be withdrawn, they will be withdrawn in accordance with the priority list established under paragraph (b) of this section, except:

(1) Slots obtained in a lottery held pursuant to § 93.225 of this part shall be subject to withdrawal pursuant to paragraph (i) of that section, and

(2) Slots necessary for international and essential air service operations shall be exempt from withdrawal for use for other international or essential air service operations.

(3) Except as provided in § 93.227(a), the FAA shall not withdraw slots held at an airport by an air carrier or commuter operator holding and operating 12 or fewer slots at that airport (excluding slots used for operations described in § 93.212(a)(1)), if withdrawal would reduce the number of slots held below the number of slots operated.

(4) No slot comprising the guaranteed base of slots, as defined in section 93.318(b), shall be withdrawn for use for international operations or for new entrants.

(d) The following withdrawal priority rule shall be used to permit application

of the one-for-one trade provisions for international and essential air service slots and the slot withdrawal provisions where the slots are needed for other than international or essential air service operations. If an operator has more than one slot in a specific time period in which it also has a slot being used for international or essential air service operations, the international and essential air service slots will be considered to be those with the lowest withdrawal priority.

(e) The operator(s) using each slot to be withdrawn shall be notified by the FAA of the withdrawal and shall cease operations using that slot on the date indicated in the notice. Generally, the FAA will provide at least 30 days after notification for the operator to cease operations unless exigencies require a shorter time period.

(f) For 24 months following a lottery held after June 1, 1991, a slot acquired in that lottery shall be withdrawn by the FAA upon the sale, merger, or acquisition of more than 50 percent ownership or control of the carrier using that slot or one acquired by trade of that slot, if the resulting total of slots held or operated at the airport by the surviving entity would exceed 12 slots.

[Doc. No. 24105, 50 FR 52195, Dec. 20, 1985, as amended by Amdt. 93–52, 51 FR 21718, June 13, 1986; Amdt. 93–57, 54 FR 34906, Aug. 22, 1989; Amdt. 93–65, 57 FR 37314, Aug. 18, 1992; Amdt. 93–78, 64 FR 53565, Oct. 1, 1999]

### § 93.224 Return of slots.

(a) Whenever a slot is required to be returned under this subpart, the holder must notify the office specified in § 93.221(a)(1) in writing of the date after which the slot will not be used.

(b) Slots may be voluntarily returned for use by other operators by notifying the office specified in § 93.221(a)(1) in writing.

### § 93.225 Lottery of available slots.

(a) Whenever the FAA determines that sufficient slots have become available for distribution for purposes other than international or essential air service operations, but generally not more than twice a year, they shall be allocated in accordance with the provisions of this section.

(b) A random lottery shall be held to determine the order of slot selection.

(c) Slot allocation lotteries shall be held on an airport-by-airport basis with separate lotteries for air carrier and commuter operator slots. The slots to be allocated in each lottery will be each unallocated slot not necessary for international or Essential Air Service Program operations, including any slot created by an increase in the operating limits set forth in § 93.123(a).

(d) The FAA shall publish a notice in the FEDERAL REGISTER announcing any lottery dates. The notice may include special procedures to be in effect for the lotteries.

(e) Participation in a lottery is open to each U.S. air carrier or commuter operator operating at the airport and providing scheduled passenger service at the airport, as well as where provided for by bilateral agreement. Any U.S. carrier, or foreign air carrier where provided for by bilateral agreement, that is not operating scheduled service at the airport and has not failed to operate slots obtained in the previous lottery, or slots traded for those obtained by lottery, but wishes to initiate scheduled passenger service at the airport, shall be included in the lottery if that operator notifies, in writing, the Slot Administration Office, AGC–230, Office of the Chief Counsel, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591. The notification must be received 15 days prior to the lottery date and state whether there is any common ownership or control of, by, or with any other air carrier or commuter operator as defined in § 93.213(c). New entrant and limited incumbent carriers will be permitted to complete their selections before participation by other incumbent carriers is initiated.

(f) At the lottery, each operator must make its selection within 5 minutes after being called or it shall lose its turn. If capacity still remains after each operator has had an opportunity to select slots, the allocation sequence will be repeated in the same order. An operator may select any two slots available at the airport during each sequence, except that new entrant carriers may select four slots, if available, in the first sequence.

(g) To select slots during a slot lottery session, a carrier must have appropriate economic authority for scheduled passenger service under Title IV of the Federal Aviation Act of 1958, as amended (49 U.S.C. App. 1371 *et seq.*), and must hold FAA operating authority under part 121 or part 135 of this chapter as appropriate for the slots the operator seeks to select.

(h) During the first selection sequence, 25 percent of the slots available but no less than two slots shall be reserved for selection by new entrant carriers. If new entrant carriers do not select all of the slots set aside for new entrant carriers, limited incumbent carriers may select the remaining slots. If every participating new entrant carrier and limited incumbent carrier has ceased selection of available slots or has obtained 12 slots at that airport, other incumbent carriers may participate in selecting the remaining slots; however, slots selected by non-limited incumbent carriers will be allocated only until the date of the next lottery.

(i) Slots obtained under this section shall retain their withdrawal priority as established under § 93.223. If the slot is newly created, a withdrawal priority shall be assigned. That priority number shall be higher than any other slot assigned a withdrawal number previously.

[Doc. No. 24105, 50 FR 52195, Dec. 20, 1985, as amended by Amdt. 93–52, 51 FR 21718, June 13, 1986; Amdt. 93–58, 54 FR 39293, Sept. 25, 1989; Amdt. 93–65, 57 FR 37314, Aug. 18, 1992; 57 FR 47993, Oct. 21, 1992; Amdt. 93–78, 64 FR 53565, Oct. 1, 1999]

### § 93.226 Allocation of slots in low-demand periods.

(a) If there are available slots in the following time periods and there are no pending requests for international or EAS operations at these times, FAA will allocate slots upon request on a first-come, first-served basis, as set forth in this section:

(1) Any period for which a slot is available less than 5 days per week.

(2) Any time period for which a slot is available for less than a full season.

(3) For LaGuardia and Washington National Airports:

(i) 6:00 a.m.–6:59 a.m.

(ii) 10:00 p.m.–midnight.

(b) Slots will be allocated only to operators with the economic and operating authority and aircraft required to use the slots.

(c) Requests for allocations under this section shall be submitted in writing to the address listed in § 93.221(a)(1) and shall identify the request as made under this section.

(d) The FAA may deny requests made under this section after a determination that all remaining slots in a particular category should be distributed by lottery.

(e) Slots may be allocated on a seasonal or temporary basis under this provision.

[Doc. No. 24105, 51 FR 21718, June 13, 1986]

### § 93.227 Slot use and loss.

(a) Except as provided in paragraphs (b), (c), (d), (g), and (l) of this section, any slot not utilized 80 percent of the time over a 2-month period shall be recalled by the FAA.

(b) Paragraph (a) of this section does not apply to slots obtained under § 93.225 of this part during:

(1) The first 90 days after they are allocated to a new entrant carrier; or

(2) The first 60 days after they are allocated to a limited incumbent or other incumbent carrier.

(c) Paragraph (a) of this section does not apply to slots of an operator forced by a strike to cease operations using those slots.

(d) In the case of a carrier that files for protection under the Federal bankruptcy laws and has not received a Notice of Withdrawal from the FAA for the subject slot or slots, paragraph (a) of this section does not apply:

(1) During a period after the initial petition in bankruptcy, to any slot held or operated by that carrier, for:

(i) 60 days after the carrier files the initial petition in bankruptcy; and

(ii) 30 days after the carrier, in anticipation of transferring slots, submits information to a Federal government agency in connection with a statutory antitrust, economic impact, or similar review of the transfer, provided that the information is submitted more than 30 days after filing the initial petition in bankruptcy, and provided further that any slot to be transferred has

not become subject to withdrawal under any other provision of this § 93.227; and

(2) During a period after a carrier ceases operations at an airport, to any slot held or operated by that carrier at that airport, for:

(i) 30 days after the carrier ceases operations at that airport, provided that the slot has not become subject to withdrawal under any other provision of this § 93.227; and

(ii) 30 days after the parties to a proposed transfer of any such slot comply with requests for additional information by a Federal government agency in connection with an antitrust, economic impact, or similar investigation of the transfer, provided that—

(A) The original notice of the transfer is filed with the Federal agency within 30 days after the carrier ceases operation at the airport;

(B) The request for additional information is made within 10 days of the filing of the notice by the carrier;

(C) The carrier submits the additional information to the Federal agency within 15 days of the request by such agency; and

(D) Any slot to be transferred has not become subject to withdrawal under any other provision of this § 93.227.

(e) Persons having slots withdrawn pursuant to paragraph (a) of this section must cease all use of those slots upon receipt of notice from the FAA.

(f) Persons holding slots but not using them pursuant to the provisions of paragraphs (b), (c) and (d) may lease those slots for use by others. A slot obtained in a lottery may not be leased after the expiration of the applicable time period specified in paragraph (b) of this section unless it has been operated for a 2-month period at least 65 percent of the time by the operator which obtained it in the lottery.

(g) This section does not apply to slots used for the operations described in § 93.217(a)(1) except that a U.S. air carrier or commuter operator required to file a report under paragraph (i) of this section shall include all slots operated at the airport, including slots described in § 93.217(a)(1).

(h) Within 30 days after an operator files for protection under the Federal bankruptcy laws, the FAA shall recall any slots of that operator, if—(1) the slots were formerly used for essential air service and (2) the Office of the Secretary of Transportation determines those slots are required to provide substitute essential air service to or from the same points.

(i) Every air carrier and commuter operator or other person holding a slot at a high density airport shall, within 14 days after the last day of the 2-month period beginning January 1, 1986, and every 2 months thereafter, forward, in writing, to the address identified in § 93.221(a)(1), a list of all slots held by the air carrier, commuter operator or other person along with a listing of which air carrier or commuter operator actually operated the slot for each day of the 2-month period. The report shall identify the flight number for which the slot was used and the equipment used, and shall identify the flight as an arrival or departure. The report shall identify any common ownership or control of, by, or with any other carrier as defined in § 93.213(c) of this subpart. The report shall be signed by a senior official of the air carrier or commuter operator. If the slot is held by an ''other person,'' the report must be signed by an official representative.

(j) The Chief Counsel of the FAA may waive the requirements of paragraph (a) of this section in the event of a highly unusual and unpredictable condition which is beyond the control of the slot-holder and which exists for a period of 9 or more days. Examples of conditions which could justify waiver under this paragraph are weather conditions which result in the restricted operation of an airport for an extended period of time or the grounding of an aircraft type.

(k) The Chief Counsel of the FAA may, upon request, grant a waiver from the requirements of paragraph (a) of this section for a slot used for the domestic segment of an intercontinental all-cargo flight. To qualify for a waiver, a carrier must operate the slot a substantial percentage of the time and must return the slot to the FAA in advance for the time periods it will not be used.

(l) The FAA will treat as used any slot held by a carrier at a High Density

Traffic Airport on Thanksgiving Day, the Friday following Thanksgiving Day, and the period from December 24 through the first Saturday in January.

[Doc. No. 24105, 50 FR 52195, Dec. 20, 1985, as amended by Amdt. 93–52, 51 FR 21718, June 13, 1986; Amdt. 93–65, 57 FR 37315, Aug. 18, 1992; Amdt. 93–71, 59 FR 58771, Nov. 15, 1994]

## Subpart T—Ronald Reagan Washington National Airport Traffic Rules

SOURCE: Docket No. 25143, 51 FR 43587, Dec. 3, 1986; Amdt. 93–82, 68 FR 9795, Feb. 28, 2003, unless otherwise noted.

### § 93.251 Applicability.

This subpart prescribes rules applicable to the operation of aircraft to or from Ronald Reagan Washington National Airport.

### § 93.253 Nonstop operations.

No person may operate an aircraft nonstop in air transportation between Ronald Reagan Washington National Airport and another airport that is more than 1,250 miles away from Ronald Reagan Washington National Airport.

## Subpart U—Special Flight Rules in the Vicinity of Grand Canyon National Park, AZ

SOURCE: Docket No. 28537, 61 FR 69330, Dec. 31, 1996, unless otherwise noted.

### § 93.301 Applicability.

This subpart prescribes special operating rules for all persons operating aircraft in the following airspace, designated as the Grand Canyon National Park Special Flight Rules Area: That airspace extending from the surface up to but not including 18,000 feet MSL within an area bounded by a line beginning at Lat. 35°55′12″ N., Long. 112°04′05″ W.; east to Lat. 35°55′30″ N., Long. 111°45′00″ W.; to Lat. 35°59′02″ N., Long. 111°36′03″ W.; north to Lat. 36°15′30″ N., Long. 111°36′06″ W.; to Lat. 36°24′49″ N., Long. 111°47′45″ W.; to Lat. 36°52′23″ N., Long. 111°33′10″ W.; west-northwest to Lat. 36°53′37″ N., Long. 111°38′29″ W.; southwest to Lat. 36°35′02″ N., Long. 111°53′28″ W.; to Lat. 36°21′30″ N., Long. 112°00′03″ W.; west-northwest to Lat. 36°30′30″ N., Long. 112°35′59″ W.; southwest to Lat. 36°24′46″ N., Long. 112°51′10″ W., thence west along the boundary of Grand Canyon National Park (GCNP) to Lat. 36°14′08″ N., Long. 113°10′07″ W.; west-southwest to Lat. 36°09′30″ N., Long. 114°03′03″ W.; southeast to Lat. 36°05′11″ N., Long. 113°58′46″ W.; thence south along the boundary of GCNP to Lat. 35°58′23″ N., Long. 113°54′14″ W.; north to Lat. 36°00′10″ N., Long. 113°53′48″ W.; northeast to Lat. 36°02′14″ N., Long. 113°50′16″ W.; to Lat. 36°02′17″ N., Long. 113°53′48″ W.; northeast to Lat. 36°02′14″ N., Long. 113°50′16″ W.; to Lat. 36°02′17″ N., Long. 113°49′11″ W.; southeast to Lat. 36°01′22″ N., Long. 113°48′21″ W.; to Lat. 35°59′15″ N., Long. 113°47′13″ W.; to Lat. 35°57′51″ N., Long. 113°46′01″ W.; to Lat. 35°57′45″ N., Long. 113°45′23″ W.; southwest to Lat. 35°54′48″ N., Long. 113°50′24″ W.; southeast to Lat. 35°41′01″ N., Long. 113°35′27″ W.; thence clockwise via the 4.2-nautical mile radius of the Peach Springs VORTAC to Lat. 36°38′53″ N., Long. 113°27′49″ W.; northeast to Lat. 35°42′58″ N., Long. 113°10′57″ W.; north to Lat. 35°57′51″ N., Long. 113°11′06″ W.; east to Lat. 35°57′44″ N., Long. 112°14′04″ W.; thence clockwise via the 4.3-nautical mile radius of the Grand Canyon National Park Airport reference point (Lat. 35°57′08″ N., Long. 112°08′49″ W.) to the point of origin.

[Doc. No. 5926, 65 FR 17742, Apr. 4, 2000]

### § 93.303 Definitions.

For the purposes of this subpart:

*Allocation* means authorization to conduct a commercial air tour in the Grand Canyon National Park (GCNP) Special Flight Rules Area (SFRA).

*Commercial air tour* means any flight conducted for compensation or hire in a powered aircraft where a purpose of the flight is sightseeing. If the operator of a flight asserts that the flight is not a commercial air tour, factors that can be considered by the Administrator in making a determination of whether the flight is a commercial air tour include, but are not limited to—

(1) Whether there was a holding out to the public of willingness to conduct a sightseeing flight for compensation or hire;

(2) Whether a narrative was provided that referred to areas or points of interest on the surface;
(3) The area of operation;
(4) The frequency of flights;
(5) The route of flight;
(6) The inclusion of sightseeing flights as part of any travel arrangement package; or
(7) Whether the flight in question would or would not have been canceled based on poor visibility of the surface.

*Commercial Special Flight Rules Area Operation* means any portion of any flight within the Grand Canyon National Park Special Flight Rules Area that is conducted by a certificate holder that has operations specifications authorizing flights within the Grand Canyon National Park Special Flight Rules Area. This term does not include operations conducted under an FAA Form 7711–1, Certificate of Waiver or Authorization. The types of flights covered by this definition are set forth in the ''Las Vegas Flight Standards District Office Grand Canyon National Park Special Flight Rules Area Procedures Manual'' which is available from the Las Vegas Flight Standards District Office.

*Flight Standards District Office* means the FAA Flight Standards District Office with jurisdiction for the geographical area containing the Grand Canyon.

*GCNP quiet aircraft technology designation* means an aircraft that is subject to § 93.301 and has been shown to comply with the noise limit specified in appendix A of this part.

*Number of passenger seats* means the number of passenger seats for which an individual aircraft is configured.

*Park* means Grand Canyon National Park.

*Special Flight Rules Area* means the Grand Canyon National Park Special Flight Rules Area.

[65 FR 17732, Apr. 4, 2000, as amended at 70 FR 16092, Mar. 29, 2005]

### § 93.305 Flight-free zones and flight corridors.

Except in an emergency or if otherwise necessary for safety of flight, or unless otherwise authorized by the Flight Standards District Office for a purpose listed in 93.309, no person may operate an aircraft in the Special Flight Rules Area within the following flight-free zones:

(a) *Desert View Flight-free Zone*. That airspace extending from the surface up to but not including 14,500 feet MSL within an area bounded by a line beginning at Lat. 35°59′58″ N., Long. 111°52′47″ W.; thence east to Lat. 36°00′00″ N., Long. 111°51′04″ W.; thence north to 36°00′24″ N., Long. 111°51′04″ W.; thence east to 36°00′24″ N., Long. 111°45′44″ W.; thence north along the GCNP boundary to Lat. 36°14′05″ N., Long. 111°48′34″ W.; thence southwest to Lat. 36°12′06″ N., Long. 111°51′14″ W.; to the point of origin; but not including the airspace at and above 10,500 feet MSL within 1 nautical mile of the western boundary of the zone. The corridor to the west between the Desert View and Bright Angel Flight-free Zones, is designated the ''Zuni Point Corridor.'' This corridor is 2 nautical miles wide for commercial air tour flights and 4 nautical miles wide for transient and general aviation operations.

(b) *Bright Angel Flight-free Zone*. That airspace extending from the surface up to but not including 14,500 feet MSL within an area bounded by a line beginning at Lat. 35°58′39″ N., Long. 111°55′43″ W.; north to Lat. 36°12′41″ N., Long. 111°53′54″ W.; northwest to Lat. 36°18′18″ N., Long. 111°58′15″ W.; thence west along the GCNP boundary to Lat. 36°20′11″ N., Long. 112°06′25″ W.; south-southwest to Lat. 36°09′31″ N., Long. 112°11′15″ W.; to Lat. 36°04′16″ N., Long. 112°17′20″ W.; thence southeast along the GCNP boundary to Lat. 36°01′54″ N., Long. 112°11′24″ W.; thence clockwise via the 4.3-nautical mile radius of the Grand Canyon National Park Airport reference point (Lat. 35°57′08″ N., Long. 112°08′49″ W.) to Lat. 35°59′37″ N., Long. 112°04′29″ W.; thence east along the GCNP boundary to the point of origin; but not including the airspace at and above 10,500 feet MSL within 1 nautical mile of the eastern boundary or the airspace at and above 10,500 feet MSL within 2 nautical miles of the northwestern boundary. The corridor to the east, between this flight-free zone and the Desert View Flight-free Zone, is designated the ''Zuni Point Corridor.'' The corridor to the west, between the Bright Angel and Toroweap/Shinumo

Flight-free Zones, is designated the ''Dragon Corridor.'' This corridor is 2 nautical miles wide for commercial air tour flights and 4 nautical miles wide for transient and general aviation operations. The Bright Angel Flight-free Zone does not include the following airspace designated as the Bright Angel Corridor: That airspace one-half nautical mile on either side of a line extending from Lat. 36°14′57″ N., Long. 112°08′45″ W. and Lat. 36°15′01″ N., Long. 111°55′39″ W.

(c) *Toroweap/Shinumo Flight-free Zone.* That airspace extending from the surface up to but not including 14,500 feet MSL within an area bounded by a line beginning at Lat. 36°05′44″ N., Long. 112°19′27″ W.; north-northeast to Lat. 36°10′49″ N., Long. 112°13′19″ W.; to Lat. 36°21′02″ N., Long. 112°08′47″ W.; thence west and south along the GCNP boundary to Lat 36°10′58″ N., Long. 113°08′35″ W.; south to Lat. 36°10′12″ N., Long. 113°08′34″ W.; thence in an easterly direction along the park boundary to the point of origin; but not including the following airspace designated as the ''Tuckup Corridor'': at or above 10,500 feet MSL within 2 nautical miles either side of a line extending between Lat. 36°24′42″ N., Long. 112°48′47″ W. and Lat. 36°14′17″ N., Long. 112°48′31″ W. The airspace designated as the ''Fossil Canyon Corridor'' is also excluded from the Toroweap/Shinumo Flight-free Zone at or above 10,500 feet MSL within 2 nautical miles either side of a line extending between Lat. 36°16′26″ N., Long. 112°34′35″ W. and Lat. 36°22′51″ N., Long. 112°18′18″ W. The Fossil Canyon Corridor is to be used for transient and general aviation operations only.

(d) *Sanup Flight-free Zone.* That airspace extending from the surface up to but not including 8,000 feet MSL within an area bounded by a line beginning at Lat. 35°59′32″ N., Long. 113°20′28″ W.; west to Lat. 36°00′55″ N., Long. 113°42′09″ W.; southeast to Lat. 35°59′57″ N., Long. 113°41′09″ W.; to Lat. 35°59′09″ N., Long. 113°40′53″ W.; to Lat. 35°58′45″ N., Long. 113°40′15″ W.; to Lat. 35°57′52″ N., Long. 113°39′34″ W.; to Lat. 35°56′44″ N., Long. 113°39′07″ W.; to Lat. 35°56′04″ N., Long. 113°39′20″ W.; to Lat. 35°55′02″ N., Long. 113°40′43″ W.; to Lat. 35°54′47″ N., Long. 113°40′51″ W.; southeast to Lat. 35°50′16″ N., Long. 113°37′13″ W.; thence along the park boundary to the point of origin.

[Doc. No. 28537, 61 FR 69330, Dec. 31, 1996, as amended by Amdt. 93–80, 65 FR 17742, Apr. 4, 2000]

### § 93.307 Minimum flight altitudes.

Except in an emergency, or if otherwise necessary for safety of flight, or unless otherwise authorized by the Flight Standards District Office for a purpose listed in 93.309, no person may operate an aircraft in the Special Flight Rules Area at an altitude lower than the following:

(a) *Minimum sector altitudes*—(1) *Commercial air tours*—(i) *Marble Canyon Sector.* Lees Ferry to Boundary Ridge: 6,000 feet MSL.

(ii) *Supai Sector.* Boundary Ridge to Supai Point: 7,500 feet MSL.

(iii) *Diamond Creek Sector.* Supai Point to Diamond Creek: 6,500 feet MSL.

(iv) *Pearce Ferry Sector.* Diamond Creek to the Grand Wash Cliffs: 5,000 feet MSL.

(2) *Transient and general aviation operations*—(i) *Marble Canyon Sector.* Lees Ferry to Boundary Ridge: 8,000 feet MSL.

(ii) *Supai Sector.* Boundary Ridge to Supai Point: 10,000 feet MSL.

(iii) *Diamond Creek Sector.* Supai Point to Diamond Creek: 9,000 feet MSL.

(iv) *Pearce Ferry Sector.* Diamond Creek to the Grand Wash Cliffs: 8,000 feet MSL.

(b) *Minimum corridor altitudes*—(1) *Commercial air tours*—(i) *Zuni Point Corridors.* 7,500 feet MSL.

(ii) *Dragon Corridor.* 7,500 feet MSL.

(2) *Transient and general aviation operations*—(i) *Zuni Point Corridor.* 10,500 feet MSL.

(ii) *Dragon Corridor.* 10,500 feet MSL.

(iii) *Tuckup Corridor.* 10,500 feet MSL.

(iv) Fossil Canyon Corridor. 10,500 feet

[Doc. No. 28537, 61 FR 69330, Dec. 31, 1996, as amended by Amdt. 93–80, 65 FR 17742, 17743, Apr. 4, 2000]

### § 93.309 General operating procedures.

Except in an emergency, no person may operate an aircraft in the Special Flight Rules Area unless the operation is conducted in accordance with the

following procedures. (NOTE: The following procedures do not relieve the pilot from see-and-avoid responsibility or compliance with the minimum safe altitude requirements specified in § 91.119 of this chapter.):

(a) Unless necessary to maintain a safe distance from other aircraft or terrain remain clear of the flight-free zones described in § 93.305;

(b) Unless necessary to maintain a safe distance from other aircraft or terrain, proceed through the Zuni Point, Dragon, Tuckup, and Fossil Canyon Flight Corridors described in § 93.305 at the following altitudes unless otherwise authorized in writing by the Flight Standards District Office:

(1) *Northbound.* 11,500 or 13,500 feet MSL.

(2) *Southbound.* 10,500 or 12,500 feet MSL.

(c) For operation in the flight-free zones described in § 93.305, or flight below the altitudes listed in § 93.307, is authorized in writing by the Flight Standards District Office and is conducted in compliance with the conditions contained in that authorization. Normally authorization will be granted for operation in the areas described in § 93.305 or below the altitudes listed in § 93.307 only for operations of aircraft necessary for law enforcement, firefighting, emergency medical treatment/evacuation of persons in the vicinity of the Park; for support of Park maintenance or activities; or for aerial access to and maintenance of other property located within the Special Flight Rules Area. Authorization may be issued on a continuing basis;

(d) Is conducted in accordance with a specific authorization to operate in that airspace incorporated in the operator's operations specifications and approved by the Flight Standards District Office in accordance with the provisions of this subpart;

(e) Is a search and rescue mission directed by the U.S. Air Force Rescue Coordination Center;

(f) Is conducted within 3 nautical miles of Grand Canyon Bar Ten Airstrip, Pearce Ferry Airstrip, Cliff Dwellers Airstrip, Marble Canyon Airstrip, or Tuweep Airstrip at an altitude less than 3,000 feet above airport elevation, for the purpose of landing at or taking off from that facility; or

(g) Is conducted under an instrument flight rules (IFR) clearance and the pilot is acting in accordance with ATC instructions. An IFR flight plan may not be filed on a route or at an altitude that would require operation in an area described in § 93.305.

[Doc. No. 28537, 61 FR 69330, Dec. 31, 1996, as amended by Amdt. 93–80, 65 FR 17742, 17743, Apr. 4, 2000]

### § 93.311 Minimum terrain clearance.

Except in an emergency, when necessary for takeoff or landing, or unless otherwise authorized by the Flight Standards District Office for a purpose listed in § 93.309(c), no person may operate an aircraft within 500 feet of any terrain or structure located between the north and south rims of the Grand Canyon.

### § 93.313 Communications.

Except when in contact with the Grand Canyon National Park Airport Traffic Control Tower during arrival or departure or on a search and rescue mission directed by the U.S. Air Force Rescue Coordination Center, no person may operate an aircraft in the Special Flight Rules Area unless he monitors the appropriate frequency continuously while in that airspace.

### § 93.315 Requirements for commercial Special Flight Rules Area operations.

Each person conducting commercial Special Flight Rules Area operations must be certificated in accordance with Part 119 for Part 135 or 121 operations and hold appropriate Grand Canyon National Park Special Flight Rules Area operations specifications.

[65 FR 17732, Apr. 4, 2000]

### § 93.316 [Reserved]

### § 93.317 Commercial Special Flight Rules Area operation curfew.

Unless otherwise authorized by the Flight Standards District Office, no person may conduct a commercial Special Flight Rules Area operation in the Dragon and Zuni Point corridors during the following flight-free periods:

(a) Summer season (May 1–September 30)–6 p.m. to 8 a.m. daily; and

(b) Winter season (October 1–April 30)–5 p.m. to 9 a.m. daily.

[65 FR 17732, Apr. 4, 2000]

### § 93.319 Commercial air tour limitations.

(a) Unless excepted under paragraph (f) or (g) of this section, no certificate holder certificated in accordance with part 119 for part 121 or 135 operations may conduct more commercial air tours in the Grand Canyon National Park in any calendar year than the number of allocations specified on the certificate holder's operations specifications.

(b) The Administrator determines the number of initial allocations for each certificate holder based on the total number of commercial air tours conducted by the certificate holder and reported to the FAA during the period beginning on May 1, 1997 and ending on April 30, 1998, unless excepted under paragraph (g).

(c) Certificate holders who conducted commercial air tours during the base year and reported them to the FAA receive an initial allocation.

(d) A certificate holder must use one allocation for each flight that is a commercial air tour, unless excepted under paragraph (f) or (g) of this section.

(e) Each certificate holder's operation specifications will identify the following information, as applicable:

(1) Total SFRA allocations; and

(2) Dragon corridor and Zuni Point corridor allocations.

(f) Certificate holders satisfying the requirements of § 93.315 of this subpart are not required to use a commercial air tour allocation for each commercial air tour flight in the GCNP SFRA provided the following conditions are satisfied:

(1) The certificate holder conducts its operations in conformance with the routes and airspace authorizations as specified in its Grand Canyon National Park Special Flight Rules Area operations specifications;

(2) The certificate holder must have executed a written contract with the Hualapai Indian Nation which grants the certificate holder a trespass permit and specifies the maximum number of flights to be permitted to land at Grand Canyon West Airport and at other sites located in the vicinity of that airport and operates in compliance with that contract; and

(3) The certificate holder must have a valid operations specification that authorizes the certificate holder to conduct the operations specified in the contract with the Hualapai Indian Nation and specifically approves the number of operations that may transit the Grand Canyon National Park Special Flight Rules Area under this exception.

(g) Certificate holders conducting commercial air tours at or above 14,500 feet MSL but below 18,000 feet MSL who did not receive initial allocations in 1999 because they were not required to report during the base year may operate without an allocation when conducting air tours at those altitudes. Certificate holders conducting commercial air tours in the area affected by the eastward shift of the SFRA who did not receive initial allocations in 1999 because they were not required to report during the base year may continue to operate on the specified routes without an allocation in the area bounded by longitude line 111 degrees 42 minutes east and longitude line 111 degrees 36 minutes east. This exception does not include operation in the Zuni Point corridor.

[65 FR 17732, Apr. 4, 2000]

### § 93.321 Transfer and termination of allocations.

(a) Allocations are not a property interest; they are an operating privilege subject to absolute FAA control.

(b) Allocations are subject to the following conditions:

(1) The Administrator will re-authorize and re-distribute allocations no earlier than two years from the effective date of this rule.

(2) Allocations that are held by the FAA at the time of reallocation may be distributed among remaining certificate holders, proportionate to the size of each certificate holder's allocation.

(3) The aggregate SFRA allocations will not exceed the number of operations reported to the FAA for the base year beginning on May 1, 1997 and ending on April 30, 1998, except as adjusted to incorporate operations occurring for

the base year of April 1, 2000 and ending on March 31, 2001, that operate at or above 14,500 feet MSL and below 18,000 feet MSL and operations in the area affected by the eastward shift of the SFRA bounded by longitude line 111 degrees 42 minutes east to longitude 111 degrees 36 minutes east.

(4) Allocations may be transferred among Part 135 or Part 121 certificate holders, subject to all of the following:

(i) Such transactions are subject to all other applicable requirements of this chapter.

(ii) Allocations authorizing commercial air tours outside the Dragon and Zuni Point corridors may not be transferred into the Dragon and Zuni Point corridors. Allocations authorizing commercial air tours within the Dragon and Zuni Point corridors may be transferred outside of the Dragon and Zuni Point corridors.

(iii) A certificate holder must notify in writing the Las Vegas Flight Standards District Office within 10 calendar days of a transfer of allocations. This notification must identify the parties involved, the type of transfer (permanent or temporary) and the number of allocations transferred. Permanent transfers are not effective until the Flight Standards District Office reissues the operations specifications reflecting the transfer. Temporary transfers are effective upon notification.

(5) An allocation will revert to the FAA upon voluntary cessation of commercial air tours within the SFRA for any consecutive 180-day period unless the certificate holder notifies the FSDO in writing, prior to the expiration of the 180-day time period, of the following: the reason why the certificate holder has not conducted any commercial air tours during the consecutive 180-day period; and the date the certificate holder intends on resuming commercial air tours operations. The FSDO will notify the certificate holder of any extension to the consecutive 180-days. A certificate holder may be granted one extension.

(6) The FAA retains the right to redistribute, reduce, or revoke allocations based on:

(i) Efficiency of airspace;

(ii) Voluntary surrender of allocations;

(iii) Involuntary cessation of operations; and

(iv) Aviation safety.

[65 FR 17733, Apr. 4, 2000]

### § 93.323 Flight plans.

Each certificate holder conducting a commercial SFRA operation must file a visual flight rules (VFR) flight plan in accordance with § 91.153. This section does not apply to operations conducted in accordance with § 93.309(g). The flight plan must be on file with a FAA Flight Service Station prior to each flight. Each VFR flight plan must identify the purpose of the flight in the ''remarks'' section according to one of the types set forth in the ''Las Vegas Flight Standards District Office Grand Canyon National Park Special Flight Rules Area Procedures Manual'' which is available from the Las Vegas Flight Standards District Office.

[65 FR 17733, Apr. 4, 2000]

### § 93.325 Quarterly reporting.

(a) Each certificate holder must submit in writing, within 30 days of the end of each calendar quarter, the total number of commercial SFRA operations conducted for that quarter. Quarterly reports must be filed with the Las Vegas Flight Standards District Office.

(b) Each quarterly report must contain the following information.

(1) Make and model of aircraft;

(2) Identification number (registration number) for each aircraft;

(3) Departure airport for each segment flown;

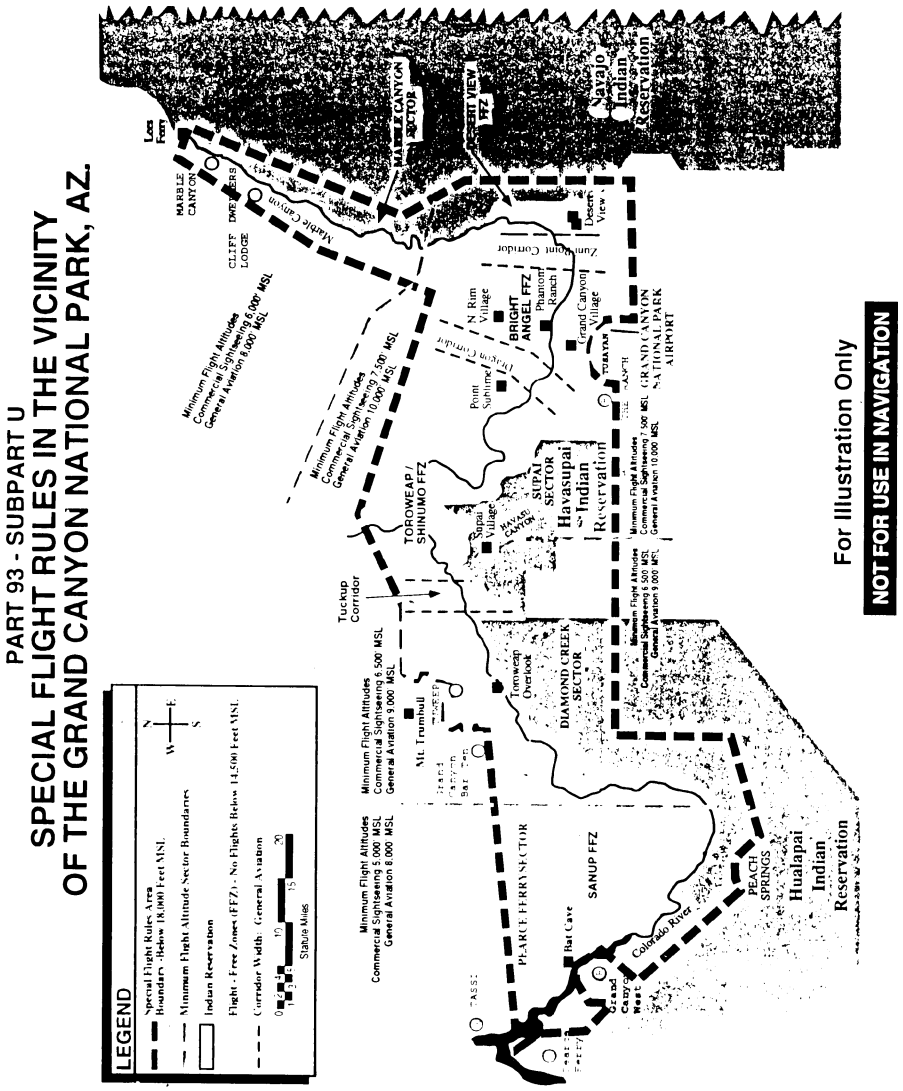
(4) Departure date and actual Universal Coordinated Time, as applicable for each segment flown;

(5) Type of operation; and

(6) Route(s) flown.

[65 FR 17733, Apr. 4, 2000]

APPENDIX TO SUBPART U OF PART 93—SPECIAL FLIGHT RULES IN THE VICINITY OF THE GRAND CANYON NATIONAL PARK, AZ




APPENDIX A TO SUBPART U OF PART 93—GCNP QUIET AIRCRAFT TECHNOLOGY DESIGNATION

This appendix contains procedures for determining the GCNP quiet aircraft technology designation status for each aircraft subject to §93.301 determined during the noise certification process as prescribed under part 36 of this chapter. Where no certificated noise level is available, the Administrator may approve an alternative measurement procedure.

*Aircraft Noise Limit for GCNP Quiet Aircraft Technology Designation*

A. For helicopters with a flyover noise level obtained in accordance with the measurement procedures prescribed in Appendix H of 14 CFR part 36, the limit is 80 dB for helicopters having a seating configuration of two or fewer passenger seats, increasing at 3 dB per doubling of the number of passenger seats for helicopters having a seating configuration of three or more passenger seats. The noise limit for helicopters with three or more passenger seats can be calculated by the formula:

EPNL(H) = 80 + 10log(# PAX seats/2) dB

B. For helicopters with a flyover noise level obtained in accordance with the measurement procedures prescribed in Appendix J of 14 CFR part 36, the limit is 77 dB for helicopters having a seating configuration of two or fewer passenger seats, increasing at 3 dB per doubling of the number of passenger seats for helicopters having a seating configuration of three or more passenger seats. The noise limit for helicopters with three or more passenger seats can be calculated by the formula:

SEL(J) = 77 + 10log(# PAX seats/2) dB

C. For propeller-driven airplanes with a measured flyover noise level obtained in accordance with the measurement procedures prescribed in Appendix F of 14 CFR part 36 without the performance correction defined in Sec. F35.201(c), the limit is 69 dB for airplanes having a seating configuration of two or fewer passenger seats, increasing at 3 dB per doubling of the number of passenger seats for airplanes having a seating configuration of three or more passenger seats. The noise limit for propeller-driven airplanes with three or more passenger seats can be calculated by the formula:

LAmax(F) = 69 + 10log(# PAX seats/2) dB

D. In the event that a flyover noise level is not available in accordance with Appendix F of 14 CFR part 36, the noise limit for propeller-driven airplanes with a takeoff noise level obtained in accordance with the measurement procedures prescribed in Appendix G is 74 dB or 77 dB, depending on 14 CFR part 36 amendment level, for airplanes having a seating configuration of two or fewer passenger seats, increasing at 3 dB per doubling of the number of passenger seats for airplanes having a seating configuration of three or more passenger seats. The noise limit for propeller-driven airplanes with three or more passenger seats can be calculated by the formula:

LAmax(G) = 74 + 10log(# PAX seats/2) dB for certifications obtained under 14 CFR part 36, Amendment 21 or earlier;

LAmax(G) = 77 + 10log(# PAX seats/2) dB for certifications obtained under 14 CFR part 36, Amendment 22 or later.

[Doc. No. FAA–2003–14715, 70 FR 16092, Mar. 29, 2005]

## Subpart V—Washington, DC Metropolitan Area Special Flight Rules Area

SOURCE: Docket No. FAA–2004–17005, 73 FR 76213, Dec. 16, 2008, unless otherwise noted.

### § 93.331 Purpose and applicability of this subpart.

This subpart prescribes special air traffic rules for aircraft operating in the Washington, DC Metropolitan Area. Because identification and control of aircraft is required for reasons of national security, the areas described in this subpart constitute national defense airspace. The purpose of establishing this area is to facilitate the tracking of, and communication with, aircraft to deter persons who would use an aircraft as a weapon, or as a means of delivering weapons, to conduct an attack on persons, property, or buildings in the area. This subpart applies to pilots conducting any type of flight operations in the airspace designated as the Washington, DC Metropolitan Area Special Flight Rules Area (DC SFRA) (as defined in § 93.335), which includes the airspace designated as the Washington, DC Metropolitan Area Flight Restricted Zone (DC FRZ) (as defined in § 93.335).

### § 93.333 Failure to comply with this subpart.

(a) *Any violation.* The FAA may take civil enforcement action against a pilot for violations, whether inadvertent or intentional, including imposition of civil penalties and suspension or revocation of airmen's certificates.

(b) *Knowing or willful violations.* The DC FRZ and DC SFRA were established for reasons of national security under the provisions of 49 U.S.C. 40103(b)(3). Areas established by the FAA under that authority constitute ''national defense airspace'' as that term is used in 49 U.S.C. 46307. In addition to being subject to the provisions of paragraph

(a) of this section, persons who knowingly or willfully violate national defense airspace established pursuant to 49 U.S.C. 40103(b)(3) may be subject to criminal prosecution.

### § 93.335 Definitions.

For purposes of this subpart—

*DC FRZ flight plan* is a flight plan filed for the sole purpose of complying with the requirements for VFR operations into, out of, and through the DC FRZ. This flight plan is separate and distinct from a standard VFR flight plan, and does not include search and rescue services.

*DC SFRA flight plan* is a flight plan filed for the sole purpose of complying with the requirements for VFR operations into, out of, and through the DC SFRA. This flight plan is separate and distinct from a standard VFR flight plan, and does not include search and rescue services.

*Fringe airports* are the following airports located near the outer boundary of the Washington, DC Metropolitan Area Special Flight Rules Area: Barnes (MD47), Flying M Farms (MD77), Mountain Road (MD43), Robinson (MD14), and Skyview (51VA).

*Washington, DC Metropolitan Area Flight Restricted Zone (DC FRZ)* is an area bounded by a line beginning at the Washington VOR/DME (DCA) 311° radial at 15 nautical miles (NM) (Lat. 38°59′31″ N., Long. 077°18′30″ W.); then clockwise along the DCA 15 nautical mile arc to the DCA 002° radial at 15 NM (Lat. 39°06′28″ N., Long 077°04′32″ W.); then southeast via a line drawn to the DCA 049° radial at 14 NM (Lat. 39°02′18″ N., Long. 076°50′38″ W.); thence south via a line drawn to the DCA 064° radial at 13 NM (Lat. 38°59′01″ N., Long. 076°48′32″ W.); thence clockwise along the 13 NM arc to the DCA 276° radial at 13 NM (Lat.38°50′53″ N., Long 077°18′48″ W.); thence north to the point of beginning, excluding the airspace within a one nautical mile radius of the Freeway Airport, W00, Mitchellville, MD from the surface up to but not including flight level (FL) 180. The DC FRZ is within and part of the Washington, DC Metropolitan Area SFRA.

*Washington, DC Metropolitan Area Special Flight Rules Area (DC SFRA)* is an area of airspace over the surface of the earth where the ready identification, location, and control of aircraft is required in the interests of national security. Specifically, the DC SFRA is that airspace, from the surface to, but not including, FL 180, within a 30-mile radius of Lat. 38°51′34″ N., Long. 077°02′11″ W., or the DCA VOR/DME. The DC SFRA includes the DC FRZ.

[Doc. No. FAA–2004–17005, 73 FR 76213, Dec. 16, 2008; Amdt. 93–91, 73 FR 79314, Dec. 29, 2008]

### § 93.337 Requirements for operating in the DC SFRA.

A pilot conducting any type of flight operation in the DC SFRA must comply with the restrictions listed in this subpart and all special instructions issued by the FAA in the interest of national security. Those special instructions may be issued in any manner the FAA considers appropriate, including a NOTAM. Additionally, a pilot must comply with all of the applicable requirements of this chapter.

### § 93.339 Requirements for operating in the DC SFRA, including the DC FRZ.

(a) Except as provided in paragraphs (b) and (c) of this section and in § 93.345, or unless authorized by Air Traffic Control, no pilot may operate an aircraft, including an ultralight vehicle or any civil aircraft or public aircraft, in the DC SFRA, including the DC FRZ, unless—

(1) The aircraft is equipped with an operable two-way radio capable of communicating with Air Traffic Control on appropriate radio frequencies;

(2) Before operating an aircraft in the DC SFRA, including the DC FRZ, the pilot establishes two-way radio communications with the appropriate Air Traffic Control facility and maintains such communications while operating the aircraft in the DC SFRA, including the DC FRZ;

(3) The aircraft is equipped with an operating automatic altitude reporting transponder;

(4) Before operating an aircraft in the DC SFRA, including the DC FRZ, the pilot obtains and transmits a discrete transponder code from Air Traffic Control, and the aircraft's transponder continues to transmit the assigned

code while operating within the DC SFRA;

(5) For VFR operations, the pilot must file and activate a DC FRZ or DC SFRA flight plan by obtaining a discrete transponder code. The flight plan is closed upon landing at an airport within the DC SFRA or when the aircraft exits the DC SFRA;

(6) Before operating the aircraft into, out of, or through the Washington, DC Tri-Area Class B Airspace Area, the pilot receives a specific Air Traffic Control clearance to operate in the Class B airspace area; and

(7) Before operating the aircraft into, out of, or through Class D airspace area that is within the DC SFRA, the pilot complies with §91.129 of this chapter.

(b) Paragraph (a)(5) of this section does not apply to operators of Department of Defense aircraft, law enforcement operations, or lifeguard or air ambulance operations under an FAA/TSA airspace authorization, if the flight crew is in contact with Air Traffic Control and is transmitting an Air Traffic Control-assigned discrete transponder code.

(c) When operating an aircraft in the VFR traffic pattern at an airport within the DC SFRA (but not within the DC FRZ) that does not have an airport traffic control tower, a pilot must—

(1) File a DC SFRA flight plan for traffic pattern work;

(2) Communicate traffic pattern position via the published Common Traffic Advisory Frequency (CTAF);

(3) Monitor VHF frequency 121.5 or UHF frequency 243.0, if the aircraft is suitably equipped;

(4) Obtain and transmit the Air Traffic Control-assigned discrete transponder code; and

(5) When exiting the VFR traffic pattern, comply with paragraphs (a)(1) through (a)(7) of this section.

(d) When operating an aircraft in the VFR traffic pattern at an airport within the DC SFRA (but not within the DC FRZ) that has an operating airport traffic control tower, a pilot must—

(1) Before departure or before entering the traffic pattern, request to remain in the traffic pattern;

(2) Remain in two-way radio communications with the tower. If the aircraft is suitably equipped, the pilot must also monitor VHF frequency 121.5 or UHF frequency 243.0;

(3) Continuously operate the aircraft transponder on code 1234 unless Air Traffic Control assigns a different code; and

(4) Before exiting the traffic pattern, comply with paragraphs (a)(1) through (a)(7) of this section.

(e) Pilots must transmit the assigned transponder code. No pilot may use transponder code 1200 while in the DC SFRA.

### § 93.341 Aircraft operations in the DC FRZ.

(a) Except as provided in paragraph (b) of this section, no pilot may conduct any flight operation under part 91, 101, 103, 105, 125, 133, 135, or 137 of this chapter in the DC FRZ, unless the specific flight is operating under an FAA/TSA authorization.

(b) Department of Defense (DOD) operations, law enforcement operations, and lifeguard or air ambulance operations under an FAA/TSA airspace authorization are excepted from the prohibition in paragraph (a) of this section if the pilot is in contact with Air Traffic Control and operates the aircraft transponder on an Air Traffic Control-assigned beacon code.

(c) The following aircraft operations are permitted in the DC FRZ:

(1) Aircraft operations under the DCA Access Standard Security Program (DASSP) (49 CFR part 1562) with a Transportation Security Administration (TSA) flight authorization.

(2) Law enforcement and other U.S. Federal aircraft operations with prior FAA approval.

(3) Foreign-operated military and state aircraft operations with a State Department-authorized diplomatic clearance, with State Department notification to the FAA and TSA.

(4) Federal, State, Federal DOD contract, local government agency aircraft operations and part 121, 129 or 135 air carrier flights with TSA-approved full aircraft operator standard security programs/procedures, if operating with DOD permission and notification to the FAA and the National Capital Regional Coordination Center (NCRCC). These flights may land and depart Andrews

Air Force Base, MD, with prior permission, if required.

(5) Aircraft operations maintaining radio contact with Air Traffic Control and continuously transmitting an Air Traffic Control-assigned discrete transponder code. The pilot must monitor VHF frequency 121.5 or UHF frequency 243.0.

(d) Before departing from an airport within the DC FRZ, or before entering the DC FRZ, all aircraft, except DOD, law enforcement, and lifeguard or air ambulance aircraft operating under an FAA/TSA airspace authorization must file and activate an IFR or a DC FRZ or a DC SFRA flight plan and transmit a discrete transponder code assigned by an Air Traffic Control facility. Aircraft must transmit the discrete transponder code at all times while in the DC FRZ or DC SFRA.

### § 93.343 Requirements for aircraft operations to or from College Park Airport, Potomac Airfield, or Washington Executive/Hyde Field Airport.

(a) A pilot may not operate an aircraft to or from College Park Airport, MD, Potomac Airfield, MD, or Washington Executive/Hyde Field Airport, MD unless—

(1) The aircraft and its crew and passengers comply with security rules issued by the TSA in 49 CFR part 1562, subpart A;

(2) Before departing, the pilot files an IFR or DC FRZ or DC SFRA flight plan with the Washington Hub Flight Service Station (FSS) for each departure and arrival from/to College Park, Potomac Airfield, and Washington Executive/Hyde Field airports, whether or not the aircraft makes an intermediate stop;

(3) When filing a flight plan with the Washington Hub FSS, the pilot identifies himself or herself by providing the assigned pilot identification code. The Washington Hub FSS will accept the flight plan only after verifying the code; and

(4) The pilot complies with the applicable IFR or VFR egress procedures in paragraph (b), (c) or (d) of this section.

(b) If using IFR procedures, a pilot must—

(1) Obtain an Air Traffic Control clearance from the Potomac TRACON; and

(2) Comply with Air Traffic Control departure instructions from Washington Executive/Hyde Field, Potomac Airport, or College Park Airport. The pilot must then proceed on the Air Traffic Control-assigned course and remain clear of the DC FRZ.

(c) If using VFR egress procedures, a pilot must—

(1) Depart as instructed by Air Traffic Control and expect a heading directly out of the DC FRZ until the pilot establishes two-way radio communication with Potomac Approach; and

(2) Operate as assigned by Air Traffic Control until clear of the DC FRZ, the DC SFRA, and the Class B or Class D airspace area.

(d) If using VFR ingress procedures, the aircraft must remain outside the DC SFRA until the pilot establishes communications with Air Traffic Control and receives authorization for the aircraft to enter the DC SFRA.

(e) VFR arrivals:

(1) If landing at College Park Airport a pilot may receive routing via the vicinity of Freeway Airport; or

(2) If landing at Washington Executive/Hyde Field or Potomac Airport, the pilot may receive routing via the vicinity of Maryland Airport or the Nottingham VORTAC.

### § 93.345 VFR outbound procedures for fringe airports.

(a) A pilot may depart from a fringe airport as defined in § 93.335 without filing a flight plan or communicating with Air Traffic Control, unless requested, provided:

(1) The aircraft's transponder transmits code 1205;

(2) The pilot exits the DC SFRA by the most direct route before proceeding on course; and

(3) The pilot monitors VHF frequency 121.5 or UHF frequency 243.0.

(b) No pilot may operate an aircraft arriving at a fringe airport or transit the DC SFRA unless that pilot complies with the DC SFRA operating procedures in this subpart.

## Subpart W—New York Class B Airspace Hudson River and East River Exclusion Special Flight Rules Area

SOURCE: 74 FR 59910, Nov. 19, 2009, unless otherwise noted.

### § 93.350 Definitions.

For the purposes of this subpart only the following definitions apply:

(a) *Local operation.* Any aircraft within the Hudson River Exclusion that is conducting an operation other than as described in paragraph (b) of this section. Local operations include but are not limited to operations for sightseeing, electronic news gathering, and law enforcement.

(b) *Transient operation.* Aircraft transiting the entire length of the Hudson River Class B Exclusion, as defined in paragraph (d) of this section, from one end to the other.

(c) *New York Class B airspace East River Exclusion* is that airspace below 1,500 feet MSL between the east and west banks of, and overlying, the East River beginning at lat. 40°38′39″ N., long. 74°02′03″ W., thence north along a line drawn direct to the southwestern tip of Governors Island, thence north along a line direct to the southwest tip of Manhattan Island, thence north along the west bank of the East River to the LGA VOR/DME 6-mile arc, thence counterclockwise along the 6-mile arc to the east bank of the East River, thence south along the east bank of the East River to the point of beginning at lat. 40°38′39″ N., long 74°02′03″ W.; and that airspace 1,100 feet MSL and below between the east and west banks of, and overlying the East River, from the LGA VOR/DME 6-mile arc to the north tip of Roosevelt Island.

(d) *New York Class B airspace Hudson River Exclusion* is that area from the surface up to but not including the overlying floor of the New York Class B airspace area, between the east and west banks of, and overlying, the Hudson River within the area beginning north of LaGuardia Airport on the west bank of the Hudson River at lat. 40°57′45″ N., long. 73°54′48″ W. (near Alpine Tower), thence south along the west bank of the Hudson River to intersect the Colts Neck VOR/DME 012° radial, thence southwest along the Colts Neck 012° radial to the Hudson River shoreline, thence south along the shoreline to the Verrazano-Narrows Bridge, thence east along the Bridge to the east bank of the Hudson River, thence north along the east bank of the Hudson River to lat. 40°38′39″ N., long. 74°02′03″ W., thence north along a line drawn direct to the southwesternmost point of Governors Island, thence north along a line drawn direct to the southwest tip of Manhattan Island, thence north along the east bank of the Hudson River to the LGA VOR/DME 11-mile arc, north of LaGuardia Airport, thence counterclockwise along the 11-mile arc to lat. 40°57′54″ N., long. 73°54′23″ W., thence to the point of beginning.

### § 93.351 General requirements for operating in the East River and/or Hudson River Exclusions.

Pilots must adhere to the following requirements:

(a) Maintain an indicated airspeed not to exceed 140 knots.

(b) Anti-collision lights and aircraft position/navigation lights shall be on, if equipped. Use of landing lights is recommended.

(c) Self announce position on the appropriate radio frequency for the East River or Hudson River as depicted on the New York VFR Terminal Area Chart (TAC) and/or New York Helicopter Route Chart.

(d) Have a current New York TAC chart and/or New York Helicopter Route Chart in the aircraft and be familiar with the information contained therein.

### § 93.352 Hudson River Exclusion specific operating procedures.

In addition to the requirements in § 93.351, the following procedures apply:

(a) Pilots must self announce, at the charted mandatory reporting points, the following information: aircraft type, current position, direction of flight, and altitude.

(b) Pilots must fly along the west shoreline of the Hudson River when

southbound, and along the east shoreline of the Hudson River when northbound; while remaining within the boundaries of the Hudson River Exclusion as defined in § 93.350(d).

(c) Aircraft transiting the area within the Hudson River Exclusion in accordance with § 93.350(b) must transit the Hudson River Exclusion at or above an altitude of 1,000 feet MSL up to, but not including, the floor of the overlying Class B airspace.

### § 93.353 East River Exclusion specific operating procedures.

No person may operate an airplane in the East River Exclusion extending from the southwestern tip of Governors Island to the north tip of Roosevelt Island except:

(a) Seaplanes landing on or taking off from the river; or

(b) Airplanes authorized by ATC. Pilots must contact LaGuardia Airport Traffic Control Tower prior to Governors Island for authorization.

# PART 95—IFR ALTITUDES

SPECIAL FEDERAL AVIATION REGULATION NO. 97 [NOTE]

### Subpart A—General

Sec.
95.1 Applicability.
95.3 Symbols.

### Subpart B—Designated Mountainous Areas

95.11 General.
95.13 Eastern United States Mountainous Area.
95.15 Western United States Mountainous Area.
95.17 Alaska Mountainous Area.
95.19 Hawaii Mountainous Area.
95.21 Puerto Rico Mountainous Area.

### Subpart C—En Route IFR Altitudes Over Particular Routes and Intersections

95.31 General.

### Subpart D—Changeover Points

95.8001 General.

AUTHORITY: 49 U.S.C. 106(g), 40103, 40113, and 14 CFR 11.49(b)(2).

SPECIAL FEDERAL AVIATION REGULATION NO. 97

EDITORIAL NOTE: For the text of SFAR No. 97, see part 91 of this chapter.

## Subpart A—General

### § 95.1 Applicability.

(a) This part prescribes altitudes governing the operation of aircraft under IFR on ATS routes, or other direct routes for which an MEA is designated in this part. In addition, it designates mountainous areas and changeover points.

(b) The MAA is the highest altitude on an ATS route, or other direct route for which an MEA is designated, at which adequate reception of VOR signals is assured.

(c) The MCA applies to the operation of an aircraft proceeding to a higher minimum en route altitude when crossing specified fixes.

(d) The MEA is the minimum en route IFR altitude on an ATS route, ATS route segment, or other direct route. The MEA applies to the entire width of the ATS route, ATS route segment, or other direct route between fixes defining that route. Unless otherwise specified, an MEA prescribed for an off airway route or route segment applies to the airspace 4 nautical miles on each side of a direct course between the navigation fixes defining that route or route segment.

(e) The MOCA assures obstruction clearance on an ATS route, ATS route segment, or other direct route, and adequate reception of VOR navigation signals within 22 nautical miles of a VOR station used to define the route.

(f) The MRA applies to the operation of an aircraft over an intersection defined by ground-based navigation aids. The MRA is the lowest altitude at which the intersection can be determined using the ground-based navigation aids.

(g) The changeover point (COP) applies to operation of an aircraft along a Federal airway, jet route, or other direct route; for which an MEA is designated in this part. It is the point for transfer of the airborne navigation reference from the ground-based navigation aid behind the aircraft to the next

appropriate ground-based navigation aid to ensure continuous reception of signals.

[Doc. No. FAA–2003–14698, 68 FR 16947, Apr. 8, 2003]

### § 95.3 Symbols.

For the purposes of this part—

(a) *COP* means changeover point.

(b) *L* means compass locator;

(c) *LF/MF* means low frequency, medium frequency;

(d) *LFR* means low frequency radio range;

(e) *VOR-E* means VOR and distance measuring equipment; and

(f) *Z* means a very high frequency location marker.

[Doc. No. 1580, 28 FR 6718, June 29, 1963, as amended by Amdt. 95–118, 29 FR 13166, Sept. 23, 1964]

## Subpart B—Designated Mountainous Areas

### § 95.11 General.

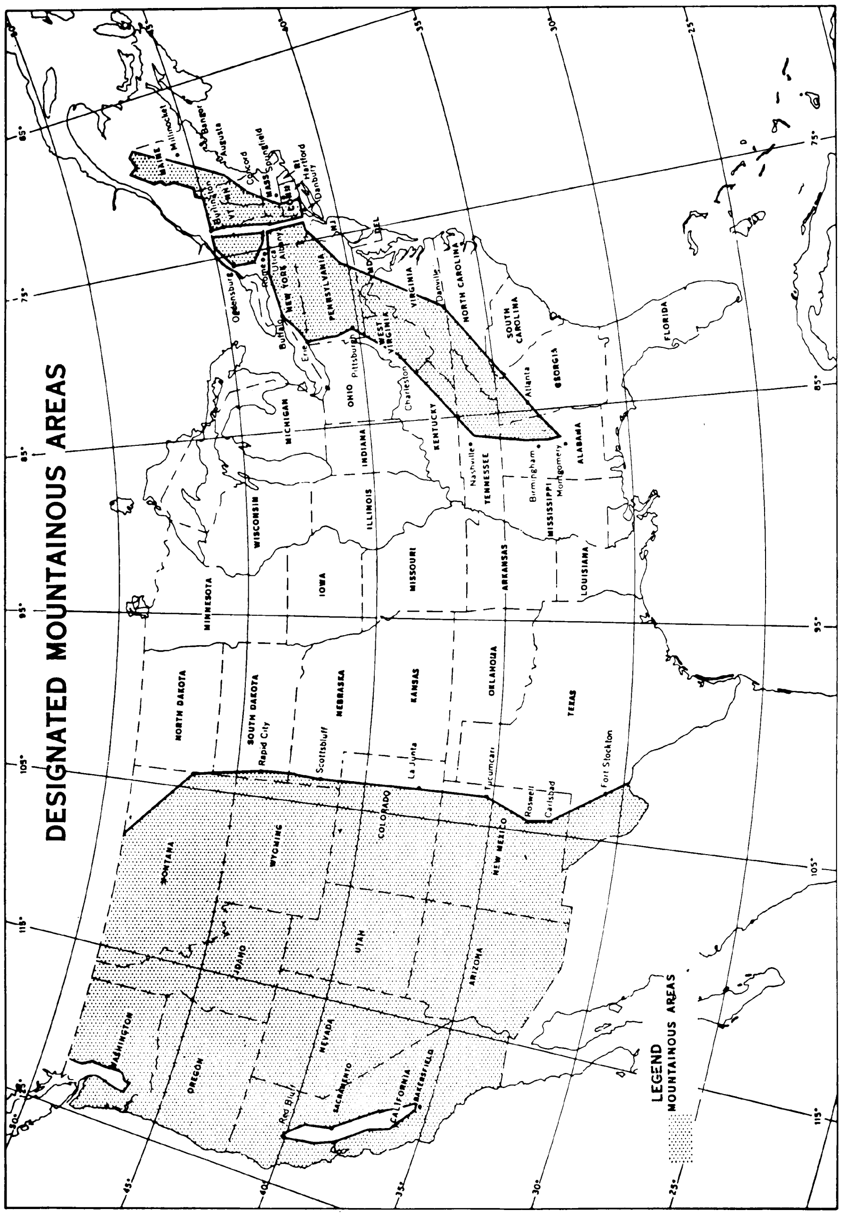
The areas described in this subpart are designated mountainous areas.

[Doc. No. 1580, 28 FR 6718, June 29, 1963]

### § 95.13 Eastern United States Mountainous Area.

All of the following area excluding those portions specified in the exceptions.

(a) *Area.*




[Doc. No. 13284, Amdt. 95–255, 40 FR 2578, Jan. 14, 1975]

Beginning at latitude 47°10′ N., longitude 67°55′ W.; thence west and south along the Canadian Border to latitude 45°00′ N., longitude 74°15′ W.; thence to latitude 44°20′ N., longitude 75°30′ W.; thence to latitude 43°05′ N., longitude 75°30′ W.; thence to latitude 42°57′ N., longitude 77°30′ W.; thence to latitude 42°52′ N., longitude 78°42′ W.; thence to

latitude 42°26′ N., longitude 79°13′ W.; thence to latitude 42°05′ N., longitude 80°00′ W.; thence to latitude 40°50′ N., longitude 80°00′ W.; thence to latitude 40°26′ N., longitude 79°54′ W.; thence to latitude 38°25′ N., longitude 81°46′ W.; thence to latitude 36°00′ N., longitude 86°00′ W.; thence to latitude 33°37′ N., longitude 86°45′ W.; thence to latitude 32°30′ N., longitude 86°25′ W.; thence to latitude 33°22′ N., longitude 85°00′ W.; thence to latitude 36°35′ N., longitude 79°20′ W.; thence to latitude 40°11′ N., longitude 76°24′ W.; thence to latitude 41°24′ N., longitude 74°30′ W.; thence to latitude 41°43′ N., longitude 72°40′ W.; thence to latitude 42°13′ N., longitude 72°44′ W.; thence to latitude 43°12′ N., longitude 71°30′ W.; thence to latitude 43°45′ N., longitude 70°30′ W.; thence to latitude 45°00′ N., longitude 69°30′ W.; thence to latitude 47°10′ N., longitude 67°55′ W., point of beginning.

(b) *Exceptions.* The area bounded by the following coordinates:

Beginning at latitude 45°00′ N., longitude 73°26′ W.; thence to latitude 44°32′ N., longitude 73°04′ W.; thence to latitude 42°51′ N., longitude 73°41′ W.; thence to latitude 41°38′ N., longitude 73°46′ W.; thence to latitude 41°16′ N., longitude 73°50′ W.; thence to latitude 41°17′ N., longitude 74°00′ W.; thence to latitude 41°25′ N., longitude 73°58′ W.; thence to latitude 41°26′ N., longitude 74°01′ W.; thence to latitude 41°37′ N., longitude 73°58′ W.; thence to latitude 42°41′ N., longitude 73°55′ W.; thence to latitude 43°02′ N., longitude 76°15′ W.; thence to latitude 43°17′ N., longitude 75°21′ W.; thence to latitude 42°59′ N., longitude 74°43′ W.; thence to latitude 42°52′ N., longitude 73°53′ W.; thence to latitude 44°30′ N., longitude 73°18′ W.; thence to latitude 45°00′ N., longitude 73°39′ W.; thence to latitude 45°00′ N., longitude 73°26′ W., point of beginning.

[21 FR 2750, Apr. 28, 1956. Redesignated by Amdt. 1–1, 28 FR 6718, June 29, 1963, as amended at 73 FR 63885, Oct. 28, 2008]

### § 95.15 Western United States Mountainous Area.

All of the following area excluding that portion specified in the exceptions:

(a) *Area.* From the Pacific coastline of the United States, eastward along the Canadian and Mexican borders, to the following coordinates:

Beginning at latitude 49°00′ N., longitude 108°00′ W.; thence to latitude 46°45′ N., longitude 104°00′ W.; thence to latitude 44°06′ N., longitude 103°15′ W.; thence to latitude 43°00′ N., longitude 103°15′ W.; thence to latitude 41°52′ N., longitude 103°39′ W.; thence to latitude 35°11′ N., longitude 103°39′ W.; thence to latitude 33°17′ N., longitude 104°27′ W.; thence to latitude 32°17′ N., longitude 104°14′ W.; thence to latitude 29°48′ N., longitude 102°00′ W.

(b) *Exceptions.*

(1) Beginning at latitude 35°25′ N., longitude 119°09′ W.; thence to latitude 35°29′ N., longitude 118°58′ W.; thence to latitude 36°49′ N., longitude 119°37′ W.; thence to latitude 38°30′ N., longitude 121°24′ W.; thence to latitude 39°30′ N., longitude 121°32′ W.; thence to latitude 40°08′ N., longitude 122°08′ W.; thence to latitude 40°06′ N., longitude 122°20′ W.; thence to latitude 39°05′ N., longitude 122°12′ W.; thence to latitude 38°01′ N., longitude 121°51′ W.; thence to latitude 37°37′ N., longitude 121°12′ W.; thence to latitude 37°00′ N., longitude 120°58′ W.; thence to latitude 36°14′ N., longitude 120°11′ W., point of beginning.

(2) Beginning at latitude 49°00′ N., longitude 122°21′ W.; thence to latitude 48°34′ N., longitude 122°21′ W.; thence to latitude 48°08′ N., longitude 122°00′ W.; thence to latitude 47°12′ N., longitude 122°00′ W.; thence to latitude 46°59′ N., longitude 122°13′ W.; thence to latitude 46°52′ N., longitude 122°16′ W.; thence to latitude 46°50′ N., longitude 122°40′ W.; thence to latitude 46°35′ N., longitude 122°48′ W.; thence to latitude 46°35′ N., longitude 123°17′ W.; thence to latitude 47°15′ N., longitude 123°17′ W.; thence to latitude 47°41′ N., longitude 122°54′ W.; thence to latitude 48°03′ N., longitude 122°48′ W.; thence to latitude 48°17′ N., longitude 123°15′ W.; thence North and East along the United States and Canada Boundary to latitude 49°00′ N., longitude 122°21′ W., point of beginning.

[21 FR 2750, Apr. 28, 1956. Redesignated by Amdt. 1–1, 28 FR 6718, June 29, 1963, and amended by Amdt. 95–255, 40 FR 2579, Jan. 14, 1975]

### § 95.17 Alaska Mountainous Area.

All of the following area excluding those portions specified in the exceptions:

(a) *Area.* The State of Alaska.

(b) *Exceptions;*

(1) *Fairbanks—Nenana Area.* Beginning at latitude 64°54′ N, longitude 147°00′ W; thence to latitude 64°50′ N, longitude 151°22′ W, thence to latitude 63°50′ N, longitude 152°50′ W; thence to latitude 63°30′ N, longitude 152°30′ W; thence to latitude 63°30′ N, longitude 151°30′ W; thence to latitude 64°05′ N, longitude 150°30′ W; thence to latitude 64°20′ N, longitude 149°00′ W; thence to latitude 64°07′ N, longitude 146°30′ W; thence to latitude 63°53′ N, longitude 146°00′ W; thence to latitude 63°53′ N, longitude 145°00′ W; thence to latitude

64°09′ N, longitude 145°16′ W; thence to latitude 64°12′ N, longitude 146°00′ W; thence to latitude 64°25′ N, longitude 146°37′ W; thence to latitude 64°54′ N, longitude 147°00′ W, point of beginning.

(2) *Anchorage—Homer Area.* Beginning at latitude 61°50′ N, longitude 151°12′ W; thence to latitude 61°24′ N, longitude 150°28′ W; thence to latitude 61°08′ N, longitude 151°47′ W; thence to latitude 59°49′ N, longitude 152°40′ W; thence to latitude 59°25′ N, longitude 153°10′ W; thence to latitude 59°00′ N, longitude 153°10′ W; thence to latitude 59°33′ N, longitude 151°28′ W; thence to latitude 60°31′ N, longitude 150°43′ W; thence to latitude 61°13′ N, longitude 149°39′ W; thence to latitude 61°37′ N, longitude 149°15′ W; thence to latitude 61°44′ N, longitude 149°48′ W; thence to latitude 62°23′ N, longitude 149°54′ W; thence to latitude 62°23′ N, longitude 150°14′ W; thence to latitude 61°50′ N, longitude 151°12′ W, point of beginning.

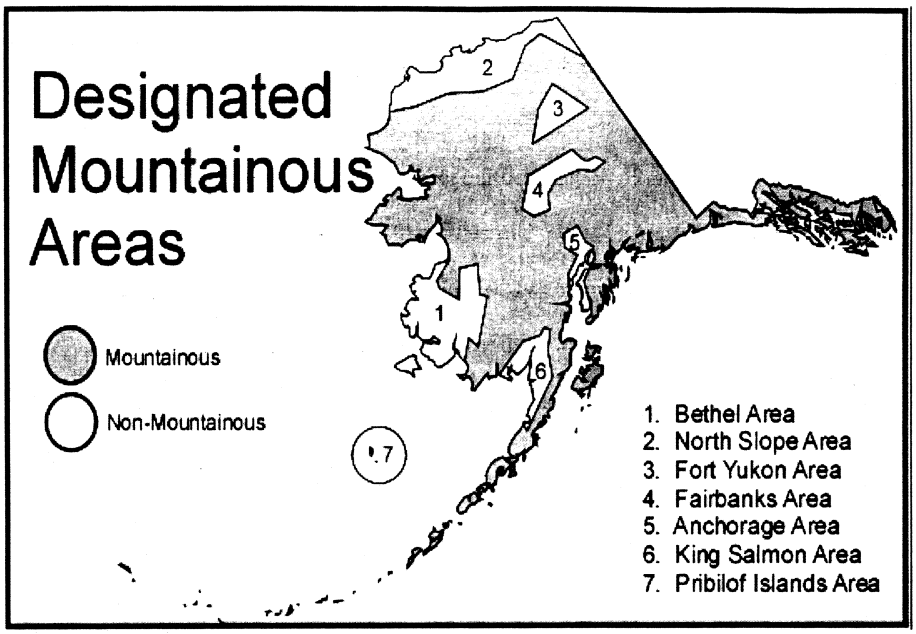
(3) *King Salmon—Port Heiden Area.* Beginning at latitude 58°49′ N, longitude 159°30′ W; thence to latitude 59°40′ N, longitude 157°00′ W; thence to latitude 59°40′ N, longitude 155°30′ W; thence to latitude 59°50′ N, longitude 154°50′ W; thence to latitude 59°35′ N, longitude 154°40′ W; thence to latitude 58°57′ N, longitude 156°05′ W; thence to latitude 58°00′ N, longitude 156°20′ W; thence to latitude 57°00′ N, longitude 158°20′ W; thence to latitude 56°43′ N, longitude 158°39′ W; thence to latitude 56°27′ N, longitude 160°00′ W; thence along the shoreline to latitude 58°49′ N, longitude 159°30′ W, point of beginning.

(4) *Bethel—Aniak Area.* Beginning at latitude 63°28′ N, longitude 161°30′ W; thence to latitude 62°40′ N, longitude 163°03′ W; thence to latitude 62°05′ N, longitude 162°38′ W; thence to latitude 61°51′ N, longitude 160°43′ W; thence to latitude 62°55′ N, longitude 160°30′ W; thence to latitude 63°00′ N, longitude 158°00′ W; thence to latitude 61°45′ N, longitude 159°30′ W; thence to latitude 61°34′ N, longitude 159°15′ W; thence to latitude 61°07′ N, longitude 160°20′ W; thence to latitude 60°25′ N, longitude 160°40′ W; thence to latitude 59°36′ N, longitude 161°49′ W; thence along the shoreline to latitude 63°28′ N, longitude 161°30′ W; point of beginning; and Nunivak Island.

(5) *North Slope Area.* Beginning at a point where latitude 69°30′ N intersects the northwest coast of Alaska and eastward along the 69°30′ parallel to latitude 69°30′ N, longitude 156°00′ W; thence to latitude 69°10′ N, longitude 153°00′ W; thence eastward along the 69°10′ N parallel to latitude 69°10′ N, longitude 149°00′ W; thence to latitude 69°50′ N, longitude 146°00′ W; thence eastward along the 69°50′ N parallel to latitude 69°50′ N, longitude 145°00′ W; thence to latitude 69°35′ N, longitude 141°00′ W; thence northward along the 141°00′ W Meridian to a point where the 141°00′ W Meridian intersects the northeast coastline of Alaska; thence westward along the northern coastline of Alaska to the intersection of latitude 69°30′ N; point of beginning .

(6) *Fort Yukon Area.* Beginning at latitude 67°20′ N, longitude 144°00′ W; thence to latitude 66°00′ N, longitude 143°00′ W; thence to latitude 66°05′ N, longitude 149°00′ W; thence to latitude 66°45′ N, longitude 148°00′ W; thence to latitude 67°00′ N, longitude 147°00′ W; thence to latitude 67°20′ N, longitude 144°00′ W; point of beginning.

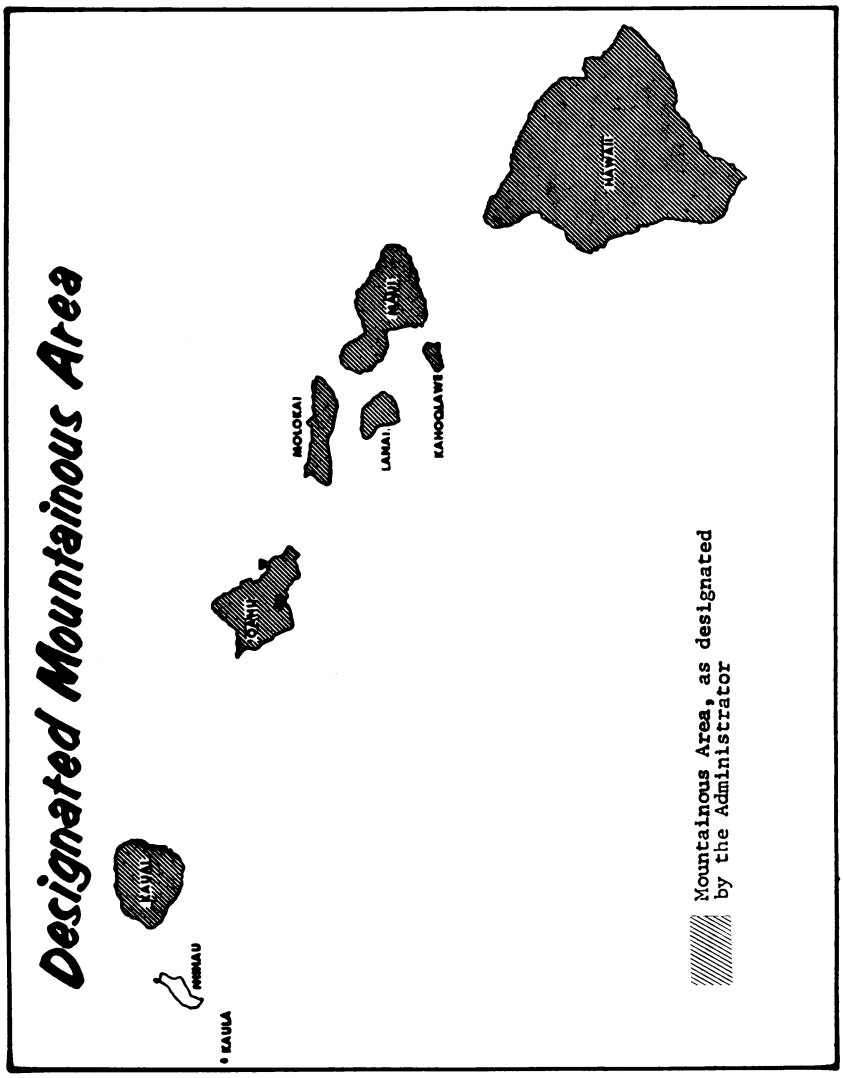
(7) The islands of Saint Paul and Saint George, together known as the Pribilof Islands, in the Bering Sea.




[Doc. No. FAA–2004–19352, 70 FR 7360, Feb. 11, 2005]

**§ 95.19 Hawaii Mountainous Area.**

The following islands of the State of Hawaii: Kauai, Oahu, Molokai, Lanai, Kehoolawe, Maui, and Hawaii.

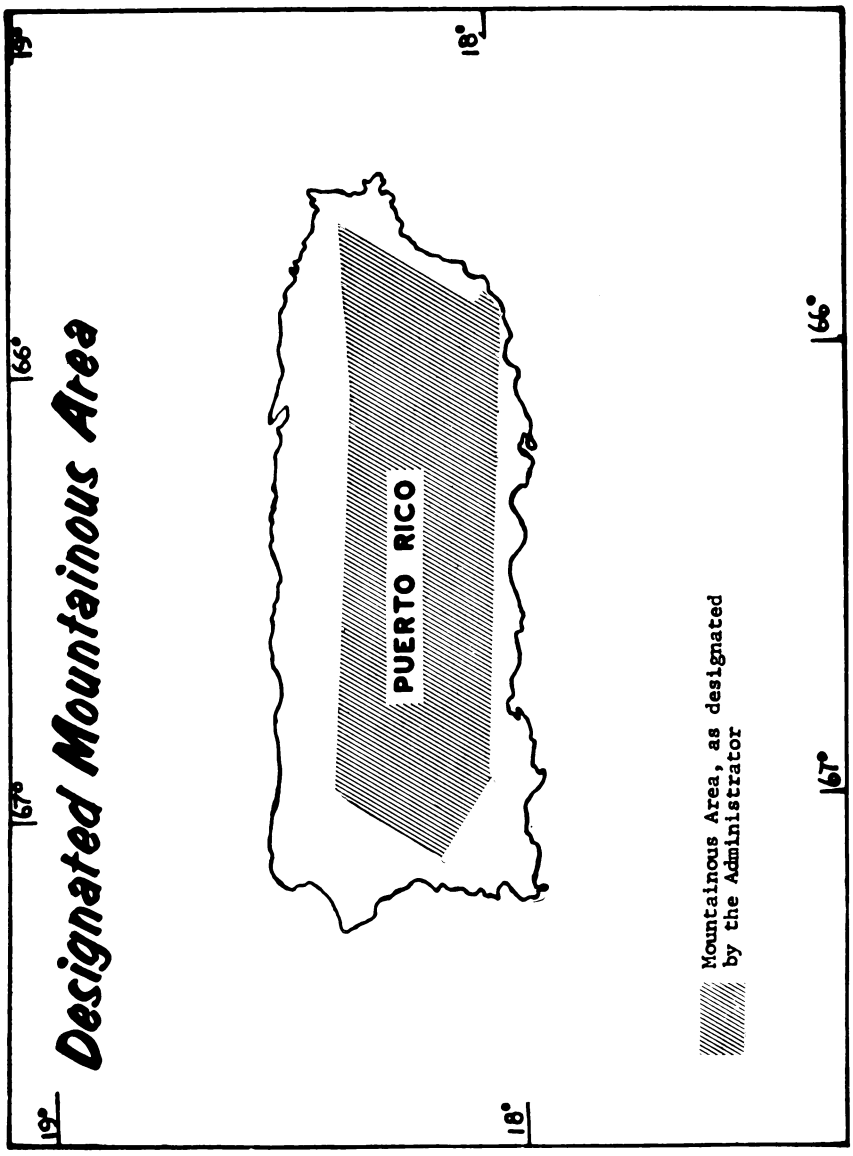



[Amdt. 88, 27 FR 4536, May 8, 1962. Redesignated by Amdt. 1–1, 28 FR 6719, June 29, 1963]

### § 95.21 Puerto Rico Mountainous Area.

The area bounded by the following coordinates:

Beginning at latitude 18°22′ N., longitude 66°58′ W., thence to latitude 18°19′ N., longitude 66°06′ W.; thence to latitude 18°20′ N., longitude 65°50′ W.; thence to latitude 18°20′ N., longitude 65°42′ W.; thence to latitude 18°03′ N., longitude 65°52′ W.; thence to latitude 18°02′ N., longitude 65°51′ W.; thence to latitude 17°59′ N., longitude 65°55′ W.; thence to latitude 18°05′ N., longitude 66°57′ W.; thence to latitude 18°11′ N., longitude 67°07′ W.; thence to latitude 18°22′ N., longitude 66°58′ W.; the point of beginning.




[Amdt. 88, 27 FR 4536, May 8, 1962; 27 FR 5603, June 13, 1962. Redesignated by Amdt. 1–1, 28 FR 6719, June 29, 1963]

## Subpart C—En Route IFR Altitudes Over Particular Routes and Intersections

EDITORIAL NOTE: The prescribed IFR altitudes for flights over particular routes and intersections in this subpart were formerly carried as §§ 610.11 through 610.6887 of this title and were transferred to part 95 as §§ 95.41 through 95.6887, respectively, but are not carried in the Code of Federal Regulations. For FEDERAL REGISTER citations affecting these routes, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

### § 95.31 General.

This subpart prescribes IFR altitudes for flights along particular routes or route segments and over additional intersections not listed as a part of a route or route segment.

[Doc. No. 1580, 28 FR 6719, June 29, 1963]

## Subpart D—Changeover Points

EDITORIAL NOTE: The prescribed COP's for Federal airways, jet routes, or other direct routes for which an MEA is designated in this part are not carried in the Code of Federal Regulations. For FEDERAL REGISTER citations affecting these routes see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

### § 95.8001 General.

This subpart prescribes COP's for Federal airways, jet routes, area navigation routes, or other direct routes for which an MEA is designated in this part. Unless otherwise specified the COP is midway between the navigation facilities or way points for straight route segments, or at the intersection of radials or courses forming a dogleg in the case of dogleg route segments.

[Doc. No. 10580, 35 FR 14610, Sept. 18, 1970]

# PART 97—STANDARD INSTRUMENT PROCEDURES

### Subpart A—General

Sec.
97.1 Applicability.
97.3 Symbols and terms used in procedures.
97.5 Bearings, courses, tracks, headings, radials, miles.

### Subpart B—Procedures

97.10 [Reserved]

### Subpart C—TERPS Procedures

97.20 General.

AUTHORITY: 49 U.S.C. 106(g), 40103, 40106, 40113, 40114, 40120, 44502, 44514, 44701, 44719, and 44721–44722.

SOURCE: Docket No. 1580, 28 FR 6719, June 29, 1963, unless otherwise noted.

## Subpart A—General

### § 97.1 Applicability.

(a) This part prescribes standard instrument approach procedures to civil airports in the United States and the weather minimums that apply to landings under IFR at those airports.

(b) This part also prescribes obstacle departure procedures (ODPs) for certain civil airports in the United States and the weather minimums that apply to takeoffs under IFR at civil airports in the United States.

[Doc. No. FAA–2002–14002, 72 FR 31679, June 7, 2007]

### § 97.3 Symbols and terms used in procedures.

As used in the standard instrument procedures prescribed in this part—

*Aircraft approach category* means a grouping of aircraft based on a speed of VREF, if specified, or if VREF is not specified, 1.3 $V_{so}$ at the maximum certificated landing weight. VREF, $V_{so}$, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry. The categories are as follows—

(1) Category A: Speed less than 91 knots.

(2) Category B: Speed 91 knots or more but less than 121 knots.

(3) Category C: Speed 121 knots or more but less than 141 knots.

(4) Category D: Speed 141 knots or more but less than 166 knots.

(5) Category E: Speed 166 knots or more.

*Approach procedure segments* for which altitudes (minimum altitudes, unless otherwise specified) and paths are prescribed in procedures, are as follows—

(1) Initial approach is the segment between the initial approach fix and the intermediate fix or the point where the aircraft is established on the intermediate course or final approach course.

(2) Initial approach altitude is the altitude (or altitudes, in high altitude procedure) prescribed for the initial approach segment of an instrument approach.

(3) Intermediate approach is the segment between the intermediate fix or point and the final approach fix.

(4) Final approach is the segment between the final approach fix or point and the runway, airport, or missed approach point.

(5) Missed approach is the segment between the missed approach point, or point of arrival at decision altitude or decision height (DA/DH), and the missed approach fix at the prescribed altitude.

*Ceiling* means the minimum ceiling, expressed in feet above the airport elevation, required for takeoff or required for designating an airport as an alternate airport.

*Copter procedures* means helicopter procedures, with applicable minimums as prescribed in § 97.35. Helicopters may also use other procedures prescribed in subpart C of this part and may use the Category A minimum descent altitude (MDA), or decision altitude or decision height (DA/DH). For other than ''copter-only'' approaches, the required visibility minimum for Category I approaches may be reduced to one-half the published visibility minimum for Category A aircraft, but in no case may it be reduced to less than one-quarter mile prevailing visibility, or, if reported, 1,200 feet RVR. Reduction of visibility minima on Category II instrument approach procedures is prohibited.

*FAF* means final approach fix.

*HAA* means height above airport and is expressed in feet.

*HAL* means height above landing and is the height of the DA/MDA above a designated helicopter landing area elevation used for helicopter instrument approach procedures and is expressed in feet.

*HAS* means height above the surface and is the height of the DA/MDA above the highest terrain/surface within a 5,200-foot radius of the missed approach point used in helicopter instrument approach procedures and is expressed in feet above ground level (AGL).

*HAT* means height above touchdown.

*HCH* means helipoint crossing height and is the computed height of the vertical guidance path above the helipoint elevation at the helipoint expressed in feet.

*Helipoint* means the aiming point for the final approach course. It is normally the center point of the touchdown and lift-off area (TLOF).

*Hold in lieu of PT* means a holding pattern established under applicable FAA criteria, and used in lieu of a procedure turn to execute a course reversal.

*MAP* means missed approach point.

*More than 65 knots* means an aircraft that has a stalling speed of more than 65 knots (as established in an approved flight manual) at maximum certificated landing weight with full flaps, landing gear extended, and power off.

*MSA* means minimum safe altitude, expressed in feet above mean sea level, depicted on an approach chart that provides at least 1,000 feet of obstacle clearance for emergency use within a certain distance from the specified navigation facility or fix.

*NA* means not authorized.

*NOPT* means no procedure turn required. Altitude prescribed applies only if procedure turn is not executed.

*Procedure turn* means the maneuver prescribed when it is necessary to reverse direction to establish the aircraft on an intermediate or final approach course. The outbound course, direction of turn, distance within which the turn must be completed, and minimum altitude are specified in the procedure. However, the point at which the turn may be begun, and the type and rate of turn, is left to the discretion of the pilot.

*RA* means radio altimeter setting height.

*RVV* means runway visibility value.

*SIAP* means standard instrument approach procedure.

*65 knots or less* means an aircraft that has a stalling speed of 65 knots or less (as established in an approved flight

manual) at maximum certificated landing weight with full flaps, landing gear extended, and power off.

*T* means nonstandard takeoff minimums or specified departure routes/procedures or both.

*TDZ* means touchdown zone.

*Visibility minimum* means the minimum visibility specified for approach, landing, or takeoff, expressed in statute miles, or in feet where RVR is reported.

[Doc. No. FAA–2002–14002, 72 FR 31679, June 7, 2007]

### § 97.5 Bearings, courses, tracks, headings, radials, miles.

(a) All bearings, courses, tracks, headings, and radials in this part are magnetic, unless otherwise designated.

(b) RVR values are stated in feet. Other visibility values are stated in statute miles. All other mileages are stated in nautical miles.

[Doc. No. 561, 32 FR 13912, Oct. 6, 1967, as amended by Amdt. 97–1336, 72 FR 31680, June 7, 2007]

## Subpart B—Procedures

EDITORIAL NOTE: The procedures set forth in this subpart were formerly carried as §§609.100 through 609.500 of this title and were transferred to part 97 as §§97.11 through 97.19, respectively, but are not carried in the Code of Federal Regulations. For FEDERAL REGISTER citations affecting these procedures, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

### § 97.10 [Reserved]

## Subpart C—TERPS Procedures

SOURCE: Docket No. 8130, 32 FR 13912, Oct. 6, 1967, unless otherwise noted.

EDITORIAL NOTE: The procedures for §§97.21 through 97.35, respectively, are not carried in the Code of Federal Regulations. For FEDERAL REGISTER citations affecting these procedures, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

### § 97.20 General.

(a) This subpart prescribes standard instrument approach procedures and takeoff minimums and obstacle departure procedures (ODPs) based on the criteria contained in FAA Order 8260.3, U.S. Standard for Terminal Instrument Procedures (TERPs), and other related Orders in the 8260 series that also address instrument procedure design criteria.

(b) Standard instrument approach procedures and associated supporting data adopted by the FAA are documented on FAA Forms 8260–3, 8260–4, 8260–5. Takeoff minimums and obstacle departure procedures (ODPs) are documented on FAA Form 8260–15A. These forms are incorporated by reference. The Director of the Federal Register approved this incorporation by reference pursuant to 5 U.S.C. 552(a) and 1 CFR part 51. The standard instrument approach procedures and takeoff minimums and obstacle departure procedures (ODPs) are available for examination at the FAA's Rules Docket (AGC–200) and at the National Flight Data Center, 800 Independence Avenue, SW., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*.

(c) Standard instrument approach procedures and takeoff minimums and obstacle departure procedures (ODPs) are depicted on aeronautical charts published by the FAA National Aeronautical Charting Office. These charts are available for purchase from the FAA's National Aeronautical Charting Office, Distribution Division, 6303 Ivy Lane, Suite 400, Greenbelt, MD 20770.

[Doc. No. FAA–2002–14002, 72 FR 31680, June 7, 2007]

# PART 99—SECURITY CONTROL OF AIR TRAFFIC

## Subpart A—General

Sec.

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99.5 Emergency situations.
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### Subpart B—Designated Air Defense Identification Zones

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99.49 Hawaii ADIZ.

AUTHORITY: 49 U.S.C. 106(g), 40101, 40103, 40106, 40113, 40120, 44502, 44721.

SOURCE: Docket No. 25113, 53 FR 18217, May 20, 1988, unless otherwise noted.

## Subpart A—General

### § 99.1 Applicability.

(a) This subpart prescribes rules for operating all aircraft (except for Department of Defense and law enforcement aircraft) in a defense area, or into, within, or out of the United States through an Air Defense Identification Zone (ADIZ) designated in subpart B.

(b) Except for §§ 99.7, 99.13, and 99.15 this subpart does not apply to the operation of any aircraft-

(1) Within the 48 contiguous States and the District of Columbia, or within the State of Alaska, on a flight which remains within 10 nautical miles of the point of departure;

(2) Operating at true airspeed of less than 180 knots in the Hawaii ADIZ or over any island, or within 12 nautical miles of the coastline of any island, in the Hawaii ADIZ;

(3) Operating at true airspeed of less than 180 knots in the Alaska ADIZ while the pilot maintains a continuous listening watch on the appropriate frequency; or

(4) Operating at true airspeed of less than 180 knots in the Guam ADIZ.

(c) An FAA ATC center may exempt the following operations from this subpart (except § 99.7) on a local basis only, with the concurrence of the U.S. military commanders concerned, or pursuant to an agreement with a U.S. Federal security or intelligence agency:

(1) Aircraft operations that are conducted wholly within the boundaries of an ADIZ and are not currently significant to the air defense system.

(2) Aircraft operations conducted in accordance with special procedures prescribed by a U.S. military authority, or a U.S. Federal security or intelligence agency concerned.

[Doc. No. 25113, 53 FR 18217, May 20, 1988, as amended by Amdt. 99–14, 53 FR 44182, Nov. 2, 1988; 66 FR 49822, Sept. 28, 2001; 69 FR 16755, Mar. 30, 2004]

### § 99.3 Definitions.

*Aeronautical facility* means, for the purposes of this subpart, a communications facility where flight plans or position reports are normally filed during flight operations.

*Air defense identification zone* (ADIZ) means an area of airspace over land or water in which the ready identification, location, and control of all aircraft (except for Department of Defense and law enforcement aircraft) is required in the interest of national security.

*Defense area* means any airspace of the contiguous United States that is not an ADIZ in which the control of aircraft is required for reasons of national security.

*Defense visual flight rules* (DVFR) means, for the purposes of this subpart, a flight within an ADIZ conducted by any aircraft (except for Department of Defense and law enforcement aircraft) in accordance with visual flight rules in part 91 of this title.

[Doc. No. FAA–2001–10693, 66 FR 49822, Sept. 28, 2001, as amended at 69 FR 16755, Mar. 30, 2004]

### § 99.5 Emergency situations.

In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from the rules in this part to the extent required by that emergency. He shall report the reasons for the deviation to the communications facility where flight plans or position reports are normally filed (referred to in this part as ''an appropriate aeronautical facility'') as soon as possible.

### § 99.7 Special security instructions.

Each person operating an aircraft in an ADIZ or Defense Area must, in addition to the applicable rules of this part, comply with special security instructions issued by the Administrator in the interest of national security, pursuant to agreement between the FAA and the Department of Defense, or between the FAA and a U.S. Federal security or intelligence agency.

[69 FR 16756, Mar. 30, 2004]

### § 99.9 Radio requirements.

(a) A person who operates a civil aircraft into an ADIZ must have a functioning two-way radio, and the pilot must maintain a continuous listening watch on the appropriate aeronautical facility's frequency.

(b) No person may operate an aircraft into, within, or whose departure point is within an ADIZ unless—

(1) The person files a DVFR flight plan containing the time and point of ADIZ penetration, and

(2) The aircraft departs within five minutes of the estimated departure time contained in the flight plan.

(c) If the pilot operating an aircraft under DVFR in an ADIZ cannot maintain two-way radio communications, the pilot may proceed, in accordance with original DVFR flight plan, or land as soon as practicable. The pilot must report the radio failure to an appropriate aeronautical facility as soon as possible.

(d) If a pilot operating an aircraft under IFR in an ADIZ cannot maintain two-way radio communications, the pilot must proceed in accordance with § 91.185 of this chapter.

[Doc. No. FAA–2001–10693, 66 FR 49822, Sept. 28, 2001, as amended at 69 FR 16756, Mar. 30, 2004]

### § 99.11 ADIZ flight plan requirements.

(a) No person may operate an aircraft into, within, or from a departure point within an ADIZ, unless the person files, activates, and closes a flight plan with the appropriate aeronautical facility, or is otherwise authorized by air traffic control.

(b) Unless ATC authorizes an abbreviated flight plan—

(1) A flight plan for IFR flight must contain the information specified in § 91.169; and

(2) A flight plan for VFR flight must contain the information specified in § 91.153(a) (1) through (6).

(3) If airport of departure is within the Alaskan ADIZ and there is no facility for filing a flight plan then:

(i) Immediately after takeoff or when within range of an appropriate aeronautical facility, comply with provisions of paragraph (b)(1) or (b)(2) as appropriate.

(ii) Proceed according to the instructions issued by the appropriate aeronautical facility.

(c) The pilot shall designate a flight plan for VFR flight as a DVFR flight plan.

(d) The pilot in command of an aircraft for which a flight plan has been filed must file an arrival or completion notice with an appropriate aeronautical facility.

[Doc. No. 25113, 53 FR 18217, May 20, 1988; 53 FR 44182, Nov. 2, 1988, as amended by Amdt. 99–15, 54 FR 34331, Aug. 18, 1989; 66 FR 49822, Sept. 28, 2001; 69 FR 16756, Mar. 30, 2004]

### § 99.12 [Reserved]

### § 99.13 Transponder-on requirements.

(a) *Aircraft transponder-on operation.* Each person operating an aircraft into or out of the United States into, within, or across an ADIZ designated in subpart B of this part, if that aircraft is equipped with an operable radar beacon transponder, shall operate the transponder, including altitude encoding equipment if installed, and shall reply on the appropriate code or as assigned by ATC.

(b) *ATC transponder equipment and use.* Effective September 7, 1990, unless otherwise authorized by ATC, no person may operate a civil aircraft into or out of the United States into, within, or across the contiguous U.S. ADIZ designated in subpart B of this part unless that aircraft is equipped with a coded radar beacon transponder.

(c) *ATC transponder and altitude reporting equipment and use.* Effective December 30, 1990, unless otherwise authorized by ATC, no person may operate a civil aircraft into or out of the United States into, within, or across

the contiguous U.S. ADIZ unless that aircraft is equipped with a coded radar beacon transponder and automatic pressure altitude reporting equipment having altitude reporting capability that automatically replies to interrogations by transmitting pressure altitude information in 100-foot increments.

(d) Paragraphs (b) and (c) of this section do not apply to the operation of an aircraft which was not originally certificated with an engine-driven electrical system and which has not subsequently been certified with such a system installed, a balloon, or a glider.

[Doc. No. 24903, 55 FR 8395, Mar. 7, 1990. Redesignated at 69 FR 16756, Mar. 30, 2004]

### § 99.15 Position reports.

(a) The pilot of an aircraft operating in or penetrating an ADIZ under IFR—

(1) In controlled airspace, must make the position reports required in § 91.183; and

(2) In uncontrolled airspace, must make the position reports required in this section.

(b) No pilot may operate an aircraft penetrating an ADIZ under DVFR unless—

(1) The pilot reports to an appropriate aeronautical facility before penetration: the time, position, and altitude at which the aircraft passed the last reporting point before penetration and the estimated time of arrival over the next appropriate reporting point along the flight route;

(2) If there is no appropriate reporting point along the flight route, the pilot reports at least 15 minutes before penetration: The estimated time, position, and altitude at which the pilot will penetrate; or

(3) If the departure airport is within an ADIZ or so close to the ADIZ boundary that it prevents the pilot from complying with paragraphs (b)(1) or (2) of this section, the pilot must report immediately after departure: the time of departure, the altitude, and the estimated time of arrival over the first reporting point along the flight route.

(c) In addition to any other reports as ATC may require, no pilot in command of a foreign civil aircraft may enter the United States through an ADIZ unless that pilot makes the reports required in this section or reports the position of the aircraft when it is not less that one hour and not more that 2 hours average direct cruising distance from the United States.

[69 FR 16756, Mar. 30, 2004]

### § 99.17 Deviation from flight plans and ATC clearances and instructions.

(a) No pilot may deviate from the provisions of an ATC clearance or ATC instruction except in accordance with § 91.123 of this chapter.

(b) No pilot may deviate from the filed IFR flight plan when operating an aircraft in uncontrolled airspace unless that pilot notifies an appropriate aeronautical facility before deviating.

(c) No pilot may deviate from the filed DVFR flight plan unless that pilot notifies an appropriate aeronautical facility before deviating.

[69 FR 16756, Mar. 30, 2004]

### §§ 99.19–99.31 [Reserved]

## Subpart B—Designated Air Defense Identification Zones

### § 99.41 General.

The airspace above the areas described in this subpart is established as an ADIZ. The lines between points described in this subpart are great circles except that the lines joining adjacent points on the same parallel of latitude are rhumb lines.

[69 FR 16756, Mar. 30, 2004]

### § 99.43 Contiguous U.S. ADIZ.

The area bounded by a line from 43°15′ N, 65°55′W; 44°21′ N; 67°16′W; 43°10′ N; 69°40′W; 41°05′ N; 69°40′W; 40°32′ N; 72°15′W; 39°55′ N; 73°00′W; 39°38′ N; 73°00′W; 39°36′ N; 73°40′W; 37°00′ N; 75°30′W; 36°10′ N; 75°10′W; 35°10′ N; 75°10′W; 32°00′ N; 80°30′W; 30°30′ N; 81°00′W; 26°40′ N; 79°40′W; 25°00′ N; 80°05′W; 24°25′ N; 81°15′W; 24°20′ N; 81°45′W; 24°30′ N; 82°06′W; 24°41′ N; 82°06′W; 24°43′ N; 82°00′W; 25°00′ N; 81°30′W; 25°10′ N; 81°23′W; 25°35′ N; 81°30′W; 26°15′ N 82°20′W; 27°50′ N; 83°05′W; 28°55′ N; 83°30′W; 29°42′ N; 84°00′W; 29°20′ N; 85°00′W; 30°00′ N; 87°10′W; 30°00′ N; 88°30′W; 28°45′ N; 88°55′W; 28°45′ N; 90°00′W; 29°25′ N; 94°00′W; 28°20′ N; 96°00′W; 27°30′ N;

97°00′W; 26°00′ N; 97°00′W; 25°58′ N; 97°07′W; westward along the U.S./Mexico border to 32°32′03″ N, 117°07′25″ W; 32°30′ N; 117°25′W; 32°35′ N; 118°30′W; 33°05′ N; 119°45′W; 33°55′ N; 120°40′W; 34°50′ N; 121°10′W; 38°50′ N; 124°00′W; 40°00′ N; 124°35′W; 40°25′ N; 124°40′W; 42°50′ N; 124°50′W; 46°15′ N; 124°30′W; 48°30′ N; 125°00′W; 48°20′ N; 128°00′W; 48°20′ N; 132°00′W; 37°42′ N; 130°40′W; 29°00′ N; 124°00′W; 30°45′ N; 120°50′W; 32°00′ N; 118°24′W; 32°30′ N; 117°20′W; 32°32′03″ N; 117°07′25″ W; eastward along the U.S./Mexico border to 25°58′ N, 97°07′W; 26°00′ N; 97°00′W; 26°00′ N; 95°00′W; 26°30′ N; 95°00′W; then via 26°30′ N; parallel to 26°30′ N; 84°00′W; 24°00′ N; 83°00′W; then Via 24°00′ N; parallel to 24°00′ N; 79°25′W; 25°40′ N; 79°25′W; 27°30′ N; 78°50′W; 30°45′ N; 74°00′W; 39°30′ N; 63°45′W; 43°00′ N; 65°48′W; to point of beginning.

[Doc. No. FAA–2001–10693, 66 FR 49822, Sept. 28, 2001. Redesignated at 69 FR 16756, Mar. 30, 2004]

### § 99.45 Alaska ADIZ.

The area is bounded by a line from 54°00′ N; 136°00′W; 56°57′ N; 144°00′W; 57°00′ N; 145°00′W; 53°00′ N; 158°00′W; 50°00′ N; 169°00′W; 50°00′ N; 180°00′; 50°00′ N; 170°00′E; 53°00′ N; 170°00′E; 60°00′00″ N; 180°00′; 65°00′ N; 169°00′W; then along 169°00′W; to 75°00′ N; 169°00′W; then along the 75°00′ N; parallel to 75°00′ N, 141°00′W; 69°50′ N; 141°00′W 71°18′ N; 156°44′W; 68°40′ N; 167°10′W; 67°00′ N; 165°00′W; 65°40′ N; 168°15′W; 63°45′ N; 165°30′W; 61°20′ N; 166°40′W; 59°00′ N; 163°00′W; then south along 163°00′W to 54°00′ N, 163°00′W; 56°30′ N; 154°00′W; 59°20′ N; 146°00′W; 59°30′ N; 140°00′W; 57°00′ N; 136°00′W; 54°35′ N, 133°00′W; to point of beginning.

[Doc. No. FAA–2001–10693, 66 FR 49822, Sept. 28, 2001. Redesignated at 69 FR 16756, Mar. 30, 2004]

### § 99.47 Guam ADIZ.

(a) *Inner boundary.* From a point 13°52′07″ N, 143°59′16″ E, counterclockwise along the 50-nautical-mile radius arc of the NIMITZ VORTAC (located at 13°27′11″ N, 144°43′51″ E); to a point 13°02′08″ N, 145°28′17″ E; then to a point 14°49′07″ N, 146°13′58″ E; counterclockwise along the 35-nautical-mile radius arc of the SAIPAN NDB (located at 15°06′46″ N, 145°42′42″ E); to a point 15°24′21″ N, 145°11′21″ E; then to the point of origin.

(b) *Outer boundary.* The area bounded by a circle with a radius of 250 NM centered at latitude 13°32′41″ N, longitude 144°50′30″ E.

[Doc. No. 25113, 53 FR 18217, May 20, 1988. Redesignated at 69 FR 16756, Mar. 30, 2004]

### § 99.49 Hawaii ADIZ.

(a) *Outer boundary.* The area included in the irregular octagonal figure formed by a line connecting 26°30′ N, 156°00′ W; 26°30′ N, 161°00′ W; 24°00′ N, 164°00′ W; 20°00′ N, 164°00′ W; 17°00′ N, 160°00′ W; 17°00′ N, 156°00′ W; 20°00′ N, 153°00′ W; 22°00′ N, 153°00′ W; to point of beginning.

(b) *Inner boundary.* The inner boundary to follow a line connecting 22°30′ N, 157°00′ W; 22°30′ N, 160°00′ W; 22°00′ N, 161°00′ W; 21°00′ N, 161°00′ W; 20°00′ N, 160°00′ W; 20°00′ N, 156°30′ W; 21°00′ N, 155°30′ W; to point of beginning.

[Doc. No. 25113, 53 FR 18217, May 20, 1988. Redesignated at 69 FR 16756, Mar. 30, 2004]

# PART 101—MOORED BALLOONS, KITES, AMATEUR ROCKETS AND UNMANNED FREE BALLOONS

## Subpart A—General

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101.39 Balloon position reports.

AUTHORITY: 49 U.S.C. 106(g), 40103, 40113–40114, 45302, 44502, 44514, 44701–44702, 44721, 46308.

## Subpart A—General

### § 101.1 Applicability.

(a) This part prescribes rules governing the operation in the United States, of the following:

(1) Except as provided for in § 101.7, any balloon that is moored to the surface of the earth or an object thereon and that has a diameter of more than 6 feet or a gas capacity of more than 115 cubic feet.

(2) Except as provided for in § 101.7, any kite that weighs more than 5 pounds and is intended to be flown at the end of a rope or cable.

(3) Any amateur rocket except aerial firework displays.

(4) Except as provided for in § 101.7, any unmanned free balloon that—

(i) Carries a payload package that weighs more than four pounds and has a weight/size ratio of more than three ounces per square inch on any surface of the package, determined by dividing the total weight in ounces of the payload package by the area in square inches of its smallest surface;

(ii) Carries a payload package that weighs more than six pounds;

(iii) Carries a payload, of two or more packages, that weighs more than 12 pounds; or

(iv) Uses a rope or other device for suspension of the payload that requires an impact force of more than 50 pounds to separate the suspended payload from the balloon.

(b) For the purposes of this part, a *gyroglider* attached to a vehicle on the surface of the earth is considered to be a kite.

[Doc. No. 1580, 28 FR 6721, June 29, 1963, as amended by Amdt. 101–1, 29 FR 46, Jan. 3, 1964; Amdt. 101–3, 35 FR 8213, May 26, 1970; Amdt. 101–8, 73 FR 73781, Dec. 4, 2008; 74 FR 38092, July 31, 2009]

### § 101.3 Waivers.

No person may conduct operations that require a deviation from this part except under a certificate of waiver issued by the Administrator.

[Doc. No. 1580, 28 FR 6721, June 29, 1963]

### § 101.5 Operations in prohibited or restricted areas.

No person may operate a moored balloon, kite, amateur rocket, or unmanned free balloon in a prohibited or restricted area unless he has permission from the using or controlling agency, as appropriate.

[Doc. No. 1457, 29 FR 46, Jan. 3, 1964, as amended at 74 FR 38092, July 31, 2009]

### § 101.7 Hazardous operations.

(a) No person may operate any moored balloon, kite, amateur rocket, or unmanned free balloon in a manner that creates a hazard to other persons, or their property.

(b) No person operating any moored balloon, kite, amateur rocket, or unmanned free balloon may allow an object to be dropped therefrom, if such action creates a hazard to other persons or their property.

(Sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 12800, 39 FR 22252, June 21, 1974, as amended at 74 FR 38092, July 31, 2009]

## Subpart B—Moored Balloons and Kites

SOURCE: Docket No. 1580, 28 FR 6722, June 29, 1963, unless otherwise noted.

### § 101.11 Applicability.

This subpart applies to the operation of moored balloons and kites. However, a person operating a moored balloon or kite within a restricted area must comply only with § 101.19 and with additional limitations imposed by the using or controlling agency, as appropriate.

### § 101.13 Operating limitations.

(a) Except as provided in paragraph (b) of this section, no person may operate a moored balloon or kite—

(1) Less than 500 feet from the base of any cloud;

(2) More than 500 feet above the surface of the earth;

(3) From an area where the ground visibility is less than three miles; or

(4) Within five miles of the boundary of any airport.

(b) Paragraph (a) of this section does not apply to the operation of a balloon or kite below the top of any structure and within 250 feet of it, if that shielded operation does not obscure any lighting on the structure.

### § 101.15 Notice requirements.

No person may operate an unshielded moored balloon or kite more than 150 feet above the surface of the earth unless, at least 24 hours before beginning the operation, he gives the following information to the FAA ATC facility that is nearest to the place of intended operation:

(a) The names and addresses of the owners and operators.

(b) The size of the balloon or the size and weight of the kite.

(c) The location of the operation.

(d) The height above the surface of the earth at which the balloon or kite is to be operated.

(e) The date, time, and duration of the operation.

### § 101.17 Lighting and marking requirements.

(a) No person may operate a moored balloon or kite, between sunset and sunrise unless the balloon or kite, and its mooring lines, are lighted so as to give a visual warning equal to that required for obstructions to air navigation in the FAA publication ''Obstruction Marking and Lighting''.

(b) No person may operate a moored balloon or kite between sunrise and sunset unless its mooring lines have colored pennants or streamers attached at not more than 50 foot intervals beginning at 150 feet above the surface of the earth and visible for at least one mile.

(Sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 1580, 28 FR 6722, June 29, 1963, as amended by Amdt. 101–4, 39 FR 22252, June 21, 1974]

### § 101.19 Rapid deflation device.

No person may operate a moored balloon unless it has a device that will automatically and rapidly deflate the balloon if it escapes from its moorings. If the device does not function properly, the operator shall immediately notify the nearest ATC facility of the location and time of the escape and the estimated flight path of the balloon.

## Subpart C— Amateur Rockets

### § 101.21 Applicability.

(a) This subpart applies to operating unmanned rockets. However, a person operating an unmanned rocket within a restricted area must comply with § 101.25(b)(7)(ii) and with any additional limitations imposed by the using or controlling agency.

(b) A person operating an unmanned rocket other than an amateur rocket as defined in § 1.1 of this chapter must comply with 14 CFR Chapter III.

[Doc. No. FAA–2007–27390, 73 FR 73781, Dec. 4, 2008]

### § 101.22 Definitions.

The following definitions apply to this subpart:

(a) *Class 1—Model Rocket* means an amateur rocket that:

(1) Uses no more than 125 grams (4.4 ounces) of propellant;

(2) Uses a slow-burning propellant;

(3) Is made of paper, wood, or breakable plastic;

(4) Contains no substantial metal parts; and

(5) Weighs no more than 1,500 grams (53 ounces), including the propellant.

(b) *Class 2—High-Power Rocket* means an amateur rocket other than a model rocket that is propelled by a motor or motors having a combined total impulse of 40,960 Newton-seconds (9,208 pound-seconds) or less.

(c) *Class 3—Advanced High-Power Rocket* means an amateur rocket other than a model rocket or high-power rocket.

[Doc. No. FAA–2007–27390, 73 FR 73781, Dec. 4, 2008]

### § 101.23 General operating limitations.

(a) You must operate an amateur rocket in such a manner that it:

(1) Is launched on a suborbital trajectory;

(2) When launched, must not cross into the territory of a foreign country unless an agreement is in place between the United States and the country of concern;

(3) Is unmanned; and

(4) Does not create a hazard to persons, property, or other aircraft.

(b) The FAA may specify additional operating limitations necessary to ensure that air traffic is not adversely affected, and public safety is not jeopardized.

[Doc. No. FAA–2007–27390, 73 FR 73781, Dec. 4, 2008]

### § 101.25 Operating limitations for Class 2-High Power Rockets and Class 3-Advanced High Power Rockets.

When operating *Class 2-High Power Rockets* or *Class 3-Advanced High Power* Rockets, you must comply with the General Operating Limitations of § 101.23. In addition, you must not operate *Class 2-High Power Rockets* or *Class 3-Advanced High Power* Rockets—

(a) At any altitude where clouds or obscuring phenomena of more than five-tenths coverage prevails;

(b) At any altitude where the horizontal visibility is less than five miles;

(c) Into any cloud;

(d) Between sunset and sunrise without prior authorization from the FAA;

(e) Within 9.26 kilometers (5 nautical miles) of any airport boundary without prior authorization from the FAA;

(f) In controlled airspace without prior authorization from the FAA;

(g) Unless you observe the greater of the following separation distances from any person or property that is not associated with the operations:

(1) Not less than one-quarter the maximum expected altitude;

(2) 457 meters (1,500 ft.);

(h) Unless a person at least eighteen years old is present, is charged with ensuring the safety of the operation, and has final approval authority for initiating high-power rocket flight; and

(i) Unless reasonable precautions are provided to report and control a fire caused by rocket activities.

[74 FR 38092, July 31, 2009, as amended by Amdt. 101–8, 74 FR 47435, Sept. 16, 2009]

### § 101.27 ATC notification for all launches.

No person may operate an unmanned rocket other than a Class 1—Model Rocket unless that person gives the following information to the FAA ATC facility nearest to the place of intended operation no less than 24 hours before and no more than three days before beginning the operation:

(a) The name and address of the operator; except when there are multiple participants at a single event, the name and address of the person so designated as the event launch coordinator, whose duties include coordination of the required launch data estimates and coordinating the launch event;

(b) Date and time the activity will begin;

(c) Radius of the affected area on the ground in nautical miles;

(d) Location of the center of the affected area in latitude and longitude coordinates;

(e) Highest affected altitude;

(f) Duration of the activity;

(g) Any other pertinent information requested by the ATC facility.

[Doc. No. FAA–2007–27390, 73 FR 73781, Dec. 4, 2008, as amended at Doc. No. FAA–2007–27390, 74 FR 31843, July 6, 2009]

### § 101.29 Information requirements.

(a) *Class 2—High-Power Rockets.* When a Class 2—High-Power Rocket requires a certificate of waiver or authorization, the person planning the operation must provide the information below on each type of rocket to the FAA at least 45 days before the proposed operation. The FAA may request additional information if necessary to ensure the proposed operations can be safely conducted. The information shall include for each type of Class 2 rocket expected to be flown:

(1) Estimated number of rockets,

(2) Type of propulsion (liquid or solid), fuel(s) and oxidizer(s),

(3) Description of the launcher(s) planned to be used, including any airborne platform(s),

(4) Description of recovery system,

(5) Highest altitude, above ground level, expected to be reached,

(6) Launch site latitude, longitude, and elevation, and

(7) Any additional safety procedures that will be followed.

(b) *Class 3—Advanced High-Power Rockets.* When a Class 3—Advanced High-Power Rocket requires a certificate of waiver or authorization the person planning the operation must provide the information below for each type of rocket to the FAA at least 45 days before the proposed operation. The FAA may request additional information if necessary to ensure the proposed operations can be safely conducted. The information shall include for each type of Class 3 rocket expected to be flown:

(1) The information requirements of paragraph (a) of this section,

(2) Maximum possible range,

(3) The dynamic stability characteristics for the entire flight profile,

(4) A description of all major rocket systems, including structural, pneumatic, propellant, propulsion, ignition, electrical, avionics, recovery, wind-weighting, flight control, and tracking,

(5) A description of other support equipment necessary for a safe operation,

(6) The planned flight profile and sequence of events,

(7) All nominal impact areas, including those for any spent motors and other discarded hardware, within three standard deviations of the mean impact point,

(8) Launch commit criteria,

(9) Countdown procedures, and

(10) Mishap procedures.

[Doc. No. FAA–2007–27390, 73 FR 73781, Dec. 4, 2008, as amended at Doc. No. FAA–2007–27390, 74 FR 31843, July 6, 2009]

## Subpart D—Unmanned Free Balloons

SOURCE: Docket No. 1457, 29 FR 47, Jan. 3, 1964, unless otherwise noted.

### § 101.31 Applicability.

This subpart applies to the operation of unmanned free balloons. However, a person operating an unmanned free balloon within a restricted area must comply only with § 101.33 (d) and (e) and with any additional limitations that are imposed by the using or controlling agency, as appropriate.

### § 101.33 Operating limitations.

No person may operate an unmanned free balloon—

(a) Unless otherwise authorized by ATC, below 2,000 feet above the surface within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport;

(b) At any altitude where there are clouds or obscuring phenomena of more than five-tenths coverage;

(c) At any altitude below 60,000 feet standard pressure altitude where the horizontal visibility is less than five miles;

(d) During the first 1,000 feet of ascent, over a congested area of a city, town, or settlement or an open-air assembly of persons not associated with the operation; or

(e) In such a manner that impact of the balloon, or part thereof including its payload, with the surface creates a hazard to persons or property not associated with the operation.

[Doc. No. 1457, 29 FR 47, Jan. 3, 1964, as amended by Amdt. 101–5, 56 FR 65662, Dec. 17, 1991]

### § 101.35 Equipment and marking requirements.

(a) No person may operate an unmanned free balloon unless—

(1) It is equipped with at least two payload cut-down systems or devices that operate independently of each other;

(2) At least two methods, systems, devices, or combinations thereof, that function independently of each other, are employed for terminating the flight of the balloon envelope; and

(3) The balloon envelope is equipped with a radar reflective device(s) or material that will present an echo to surface radar operating in the 200 MHz to 2700 MHz frequency range.

The operator shall activate the appropriate devices required by paragraphs (a) (1) and (2) of this section when weather conditions are less than those prescribed for operation under this subpart, or if a malfunction or any other reason makes the further operation hazardous to other air traffic or to persons and property on the surface.

(b) No person may operate an unmanned free balloon below 60,000 feet standard pressure altitude between sunset and sunrise (as corrected to the altitude of operation) unless the balloon and its attachments and payload, whether or not they become separated during the operation, are equipped with lights that are visible for at least 5 miles and have a flash frequency of at least 40, and not more than 100, cycles per minute.

(c) No person may operate an unmanned free balloon that is equipped with a trailing antenna that requires an impact force of more than 50 pounds to break it at any point, unless the antenna has colored pennants or streamers that are attached at not more than 50 foot intervals and that are visible for at least one mile.

(d) No person may operate between sunrise and sunset an unmanned free balloon that is equipped with a suspension device (other than a highly conspicuously colored open parachute) more than 50 feet along, unless the suspension device is colored in alternate bands of high conspicuity colors or has colored pennants or streamers attached which are visible for at least one mile.

(Sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 1457, 29 FR 47, Jan. 3, 1964, as amended by Amdt. 101–2, 32 FR 5254, Mar. 29, 1967; Amdt. 101–4, 39 FR 22252, June 21, 1974]

### § 101.37 Notice requirements.

(a) *Prelaunch notice:* Except as provided in paragraph (b) of this section, no person may operate an unmanned free balloon unless, within 6 to 24 hours before beginning the operation, he gives the following information to the FAA ATC facility that is nearest to the place of intended operation:

(1) The balloon identification.

(2) The estimated date and time of launching, amended as necessary to remain within plus or minus 30 minutes.

(3) The location of the launching site.

(4) The cruising altitude.

(5) The forecast trajectory and estimated time to cruising altitude or 60,000 feet standard pressure altitude, whichever is lower.

(6) The length and diameter of the balloon, length of the suspension device, weight of the payload, and length of the trailing antenna.

(7) The duration of flight.

(8) The forecast time and location of impact with the surface of the earth.

(b) For solar or cosmic disturbance investigations involving a critical time element, the information in paragraph (a) of this section shall be given within 30 minutes to 24 hours before beginning the operation.

(c) *Cancellation notice:* If the operation is canceled, the person who intended to conduct the operation shall immediately notify the nearest FAA ATC facility.

(d) *Launch notice:* Each person operating an unmanned free balloon shall notify the nearest FAA or military ATC facility of the launch time immediately after the balloon is launched.

### § 101.39 Balloon position reports.

(a) Each person operating an unmanned free balloon shall:

(1) Unless ATC requires otherwise, monitor the course of the balloon and record its position at least every two hours; and

(2) Forward any balloon position reports requested by ATC.

(b) One hour before beginning descent, each person operating an unmanned free balloon shall forward to the nearest FAA ATC facility the following information regarding the balloon:

(1) The current geographical position.

(2) The altitude.

(3) The forecast time of penetration of 60,000 feet standard pressure altitude (if applicable).

(4) The forecast trajectory for the balance of the flight.

(5) The forecast time and location of impact with the surface of the earth.

(c) If a balloon position report is not recorded for any two-hour period of flight, the person operating an unmanned free balloon shall immediately notify the nearest FAA ATC facility. The notice shall include the last recorded position and any revision of the forecast trajectory. The nearest FAA ATC facility shall be notified immediately when tracking of the balloon is re-established.

(d) Each person operating an unmanned free balloon shall notify the

nearest FAA ATC facility when the operation is ended.

# PART 103—ULTRALIGHT VEHICLES

## Subpart A—General

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103.1 Applicability.
103.3 Inspection requirements.
103.5 Waivers.
103.7 Certification and registration.

## Subpart B—Operating Rules

103.9 Hazardous operations.
103.11 Daylight operations.
103.13 Operation near aircraft; right-of-way rules.
103.15 Operations over congested areas.
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103.19 Operations in prohibited or restricted areas.
103.20 Flight restrictions in the proximity of certain areas designated by notice to airmen.
103.21 Visual reference with the surface.
103.23 Flight visibility and cloud clearance requirements.

AUTHORITY: 49 U.S.C. 106(g), 40103–40104, 40113, 44701.

SOURCE: Docket No. 21631, 47 FR 38776, Sept. 2, 1982, unless otherwise noted.

## Subpart A—General

### § 103.1 Applicability.

This part prescribes rules governing the operation of ultralight vehicles in the United States. For the purposes of this part, an ultralight vehicle is a vehicle that:

(a) Is used or intended to be used for manned operation in the air by a single occupant;

(b) Is used or intended to be used for recreation or sport purposes only;

(c) Does not have any U.S. or foreign airworthiness certificate; and

(d) If unpowered, weighs less than 155 pounds; or

(e) If powered:

(1) Weighs less than 254 pounds empty weight, excluding floats and safety devices which are intended for deployment in a potentially catastrophic situation;

(2) Has a fuel capacity not exceeding 5 U.S. gallons;

(3) Is not capable of more than 55 knots calibrated airspeed at full power in level flight; and

(4) Has a power-off stall speed which does not exceed 24 knots calibrated airspeed.

### § 103.3 Inspection requirements.

(a) Any person operating an ultralight vehicle under this part shall, upon request, allow the Administrator, or his designee, to inspect the vehicle to determine the applicability of this part.

(b) The pilot or operator of an ultralight vehicle must, upon request of the Administrator, furnish satisfactory evidence that the vehicle is subject only to the provisions of this part.

### § 103.5 Waivers.

No person may conduct operations that require a deviation from this part except under a written waiver issued by the Administrator.

### § 103.7 Certification and registration.

(a) Notwithstanding any other section pertaining to certification of aircraft or their parts or equipment, ultralight vehicles and their component parts and equipment are not required to meet the airworthiness certification standards specified for aircraft or to have certificates of airworthiness.

(b) Notwithstanding any other section pertaining to airman certification, operators of ultralight vehicles are not required to meet any aeronautical knowledge, age, or experience requirements to operate those vehicles or to have airman or medical certificates.

(c) Notwithstanding any other section pertaining to registration and marking of aircraft, ultralight vehicles are not required to be registered or to bear markings of any type.

## Subpart B—Operating Rules

### § 103.9 Hazardous operations.

(a) No person may operate any ultralight vehicle in a manner that creates a hazard to other persons or property.

(b) No person may allow an object to be dropped from an ultralight vehicle if such action creates a hazard to other persons or property.

### § 103.11 Daylight operations.

(a) No person may operate an ultralight vehicle except between the hours of sunrise and sunset.

(b) Notwithstanding paragraph (a) of this section, ultralight vehicles may be operated during the twilight periods 30 minutes before official sunrise and 30 minutes after official sunset or, in Alaska, during the period of civil twilight as defined in the Air Almanac, if:

(1) The vehicle is equipped with an operating anticollision light visible for at least 3 statute miles; and

(2) All operations are conducted in uncontrolled airspace.

### § 103.13 Operation near aircraft; right-of-way rules.

(a) Each person operating an ultralight vehicle shall maintain vigilance so as to see and avoid aircraft and shall yield the right-of-way to all aircraft.

(b) No person may operate an ultralight vehicle in a manner that creates a collision hazard with respect to any aircraft.

(c) Powered ultralights shall yield the right-of-way to unpowered ultralights.

### § 103.15 Operations over congested areas.

No person may operate an ultralight vehicle over any congested area of a city, town, or settlement, or over any open air assembly of persons.

### § 103.17 Operations in certain airspace.

No person may operate an ultralight vehicle within Class A, Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from the ATC facility having jurisdiction over that airspace.

[Amdt. 103–17, 56 FR 65662, Dec. 17, 1991]

### § 103.19 Operations in prohibited or restricted areas.

No person may operate an ultralight vehicle in prohibited or restricted areas unless that person has permission from the using or controlling agency, as appropriate.

### § 103.20 Flight restrictions in the proximity of certain areas designated by notice to airmen.

No person may operate an ultralight vehicle in areas designated in a Notice to Airmen under § 91.137, § 91.138, § 91.141, § 91.143 or § 91.145 of this chapter, unless authorized by:

(a) Air Traffic Control (ATC); or

(b) A Flight Standards Certificate of Waiver or Authorization issued for the demonstration or event.

[Doc. No. FAA–2000–8274, 66 FR 47378, Sept. 11, 2001]

### § 103.21 Visual reference with the surface.

No person may operate an ultralight vehicle except by visual reference with the surface.

### § 103.23 Flight visibility and cloud clearance requirements.

No person may operate an ultralight vehicle when the flight visibility or distance from clouds is less than that in the table found below. All operations in Class A, Class B, Class C, and Class D airspace or Class E airspace designated for an airport must receive prior ATC authorization as required in § 103.17 of this part.

| Airspace | Flight visibility | Distance from clouds |
|---|---|---|
| Class A | Not applicable | Not Applicable. |
| Class B | 3 statute miles | Clear of Clouds. |
| Class C | 3 statute miles | 500 feet below.<br>1,000 feet above.<br>2,000 feet horizontal. |
| Class D | 3 statute miles | 500 feet below.<br>1,000 feet above.<br>2,000 feet horizontal. |
| Class E: | | |
| Less than 10,000 feet MSL. | 3 statute miles | 500 feet below.<br>1,000 feet above.<br>2,000 feet horizontal. |
| At or above 10,000 feet MSL. | 5 statute miles | 1,000 feet below.<br>1,000 feet above.<br>1 statute mile horizontal. |
| Class G: | | |
| 1,200 feet or less above the surface (regardless of MSL altitude). | 1 statute mile | Clear of clouds. |
| More than 1,200 feet above the surface but less than 10,000 feet MSL. | 1 statute mile | 500 feet below.<br>1,000 feet above.<br>2,000 feet horizontal. |

| Airspace | Flight visibility | Distance from clouds |
|---|---|---|
| More than 1,200 feet above the surface and at or above 10,000 feet MSL. | 5 statute miles ..... | 1,000 feet below.<br>1,000 feet above.<br>1 statute mile horizontal. |

[Amdt. 103–17, 56 FR 65662, Dec. 17, 1991]

# PART 105—PARACHUTE OPERATIONS

## Subpart A—General

Sec.
105.1 Applicability.
105.3 Definitions.
105.5 General.
105.7 use of alcohol and drugs.
105.9 Inspections.

## Subpart B—Operating Rules

105.13 Radio equipment and use requirements.
105.15 Information required and notice of cancellation or postponement of a parachute operation.
105.17 Flight visibility and clearance from cloud requirements.
105.19 Parachute operations between sunset and sunrise.
105.21 Parachute operations over or into a congested area or an open-air assembly of persons.
105.23 Parachute operations over or onto airports.
105.25 Parachute operations in designated airspace.

## Subpart C—Parachute Equipment and Packing

105.41 Applicability.
105.43 Use of single-harness, dual-parachute systems.
105.45 Use of tandem parachute systems.
105.47 Use of static lines.
105.49 Foreign parachutists and equipment.

AUTHORITY: 49 U.S.C. 106(g), 40113–40114, 44701–44702, 44721.

SOURCE: Docket No. FAA–1999–5483, 66 FR 23553, May 9, 2001, unless otherwise noted.

### § 105.1 Applicability.

(a) Except as provided in paragraphs (b) and (c) of this section, this part prescribes rules governing parachute operations conducted in the United States.

(b) This part does not apply to a parachute operation conducted—

(1) In response to an in-flight emergency, or

(2) To meet an emergency on the surface when it is conducted at the direction or with the approval of an agency of the United States, or of a State, Puerto Rico, the District of Columbia, or a possession of the United States, or an agency or political subdivision thereof.

(c) Sections 105.5, 105.9, 105.13, 105.15, 105.17, 105.19 through 105.23, 105.25(a)(1) and 105.27 of this part do not apply to a parachute operation conducted by a member of an Armed Force—

(1) Over or within a restricted area when that area is under the control of an Armed Force.

(2) During military operations in uncontrolled airspace.

### § 105.3 Definitions.

For the purposes of this part—

*Approved parachute* means a parachute manufactured under a type certificate or a Technical Standard Order (C–23 series), or a personnel-carrying U.S. military parachute (other than a high altitude, high speed, or ejection type) identified by a Navy Air Facility, an Army Air Field, and Air Force-Navy drawing number, an Army Air Field order number, or any other military designation or specification number.

*Automatic Activation Device* means a self-contained mechanical or electromechanical device that is attached to the interior of the reserve parachute container, which automatically initiates parachute deployment of the reserve parachute at a pre-set altitude, time, percentage of terminal velocity, or combination thereof.

*Direct Supervision* means that a certificated rigger personally observes a non-certificated person packing a main parachute to the extent necessary to ensure that it is being done properly, and takes responsibility for that packing.

*Drop Zone* means any pre-determined area upon which parachutists or objects land after making an intentional parachute jump or drop. The centerpoint target of a drop zone is expressed in nautical miles from the nearest VOR facility when 30 nautical miles or less; or from the nearest airport, town, or city depicted on the appropriate Coast

and Geodetic Survey World Aeronautical Chart or Sectional Aeronautical Chart, when the nearest VOR facility is more than 30 nautical miles from the drop zone.

*Foreign parachutist* means a parachutist who is neither a U.S. citizen or a resident alien and is participating in parachute operations within the United States using parachute equipment not manufctured in the United States.

*Freefall* means the portion of a parachute jump or drop between aircraft exit and parachute deployment in which the parachute is activated manually by the parachutist at the parachutist's discretion or automatically, or, in the case of an object, is activated automatically.

*Main parachute* means a parachute worn as the primary parachute used or intended to be used in conjunction with a reserve parachute.

*Object* means any item other than a person that descends to the surface from an aircraft in flight when a parachute is used or is intended to be used during all or part of the descent.

*Parachute drop* means the descent of an object to the surface from an aircraft in flight when a parachute is used or intended to be used during all or part of that descent.

*Parachute jump* means a parachute operation that involves the descent of one or more persons to the surface from an aircraft in flight when an aircraft is used or intended to be used during all or part of that descent.

*Parachute operation* means the performance of all activity for the purpose of, or in support of, a parachute jump or a parachute drop. This parachute operation can involve, but is not limited to, the following persons: parachutist, parachutist in command and passenger in tandem parachute operations, drop zone or owner or operator, jump master, certificated parachute rigger, or pilot.

*Parachutist* means a person who intends to exit an aircraft while in flight using a single-harness, dual parachute system to descend to the surface.

*Parachutist in command* means the person responsible for the operation and safety of a tandem parachute operation.

*Passenger parachutist* means a person who boards an aircraft, acting as other than the parachutist in command of a tandem parachute operation, with the intent of exiting the aircraft while in-flight using the forward harness of a dual harness tandem parachute system to descend to the surface.

*Pilot chute* means a small parachute used to initiate and/or accelerate deployment of a main or reserve parachute.

*Ram-air parachute* means a parachute with a canopy consisting of an upper and lower surface that is inflated by ram air entering through specially designed openings in the front of the canopy to form a gliding airfoil.

*Reserve parachute* means an approved parachute worn for emergency use to be activated only upon failure of the main parachute or in any other emergency where use of the main parachute is impractical or use of the main parachute would increase risk.

*Single-harness, dual parachute system:* means the combination of a main parachute, approved reserve parachute, and approved single person harness and dual-parachute container. This parachute system may have an operational automatic activation device installed.

*Tandem parachute operation:* means a parachute operation in which more than one person simultaneously uses the same tandem parachute system while descending to the surface from an aircraft in flight.

*Tandem parachute system:* means the combination of a main parachute, approved reserve parachute, and approved harness and dual parachute container, and a separate approved forward harness for a passenger parachutist. This parachute system must have an operational automatic activation device installed.

### § 105.5 General.

No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from an aircraft, if that operation creates a hazard to air traffic or to persons or property on the surface.

### § 105.7 Use of alcohol and drugs.

No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a person to conduct a parachute operation from that aircraft, if that person is or appears to be under the influence of—

(a) Alcohol, or

(b) Any drug that affects that person's faculties in any way contrary to safety.

### § 105.9 Inspections.

The Administrator may inspect any parachute operation to which this part applies (including inspections at the site where the parachute operation is being conducted) to determine compliance with the regulations of this part.

## Subpart B—Operating Rules

### § 105.13 Radio equipment and use requirements.

(a) Except when otherwise authorized by air traffic control—

(1) No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft, in or into controlled airspace unless, during that flight—

(i) The aircraft is equipped with a functioning two-way radio communication system appropriate to the air traffic control facilities being used; and

(ii) Radio communications have been established between the aircraft and the air traffic control facility having jurisdiction over the affected airspace of the first intended exit altitude at least 5 minutes before the parachute operation begins. The pilot in command must establish radio communications to receive information regarding air traffic activity in the vicinity of the parachute operation.

(2) The pilot in command of an aircraft used for any parachute operation in or into controlled airspace must, during each flight—

(i) Continuously monitor the appropriate frequency of the aircraft's radio communications system from the time radio communications are first established between the aircraft and air traffic control, until the pilot advises air traffic control that the parachute operation has ended for that flight.

(ii) Advise air traffic control when the last parachutist or object leaves the aircraft.

(b) Parachute operations must be aborted if, prior to receipt of a required air traffic control authorization, or during any parachute operation in or into controlled airspace, the required radio communications system is or becomes inoperative.

### § 105.15 Information required and notice of cancellation or postponement of a parachute operation.

(a) Each person requesting an authorization under §§ 105.21(b) and 105.25(a)(2) of this part and each person submitting a notification under § 105.25(a)(3) of this part must provide the following information (on an individual or group basis):

(1) The date and time the parachute operation will begin.

(2) The radius of the drop zone around the target expressed in nautical miles.

(3) The location of the center of the drop zone in relation to—

(i) The nearest VOR facility in terms of the VOR radial on which it is located and its distance in nautical miles from the VOR facility when that facility is 30 nautical miles or less from the drop zone target; or

(ii) the nearest airport, town, or city depicted on the appropriate Coast and Geodetic Survey World Aeronautical Chart or Sectional Aeronautical Chart, when the nearest VOR facility is more than 30 nautical miles from the drop zone target.

(4) Each altitude above mean sea level at which the aircraft will be operated when parachutists or objects exist the aircraft.

(5) The duration of the intended parachute operation.

(6) The name, address, and telephone number of the person who requests the authorization or gives notice of the parachute operation.

(7) The registration number of the aircraft to be used.

(8) The name of the air traffic control facility with jurisdiction of the airspace at the first intended exit altitude to be used for the parachute operation.

(b) Each holder of a certificate of authorization issued under §§ 105.21(b) and 105.25(b) of this part must present that certificate for inspection upon the request of the Administrator or any Federal, State, or local official.

(c) Each person requesting an authorization under §§ 105.21(b) and 105.25(a)(2) of this part and each person submitting a notice under § 105.25(a)(3) of this part must promptly notify the air traffic control facility having jurisdiction over the affected airspace if the proposed or scheduled parachute operation is canceled or postponed.

### § 105.17 Flight visibility and clearance from cloud requirements.

No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft—

(a) Into or through a cloud, or

(b) When the flight visibility or the distance from any cloud is less than that prescribed in the following table:

| Altitude | Flight visibility (statute miles) | Distance from clouds |
|---|---|---|
| 1,200 feet or less above the surface regardless of the MSL altitude. | 3 | 500 feet below, 1,000 feet above, 2,000 feet horizontal. |
| More than 1,200 feet above the surface but less than 10,000 feet MSL. | 3 | 500 feet below, 1,000 feet above, 2,000 feet horizontal. |
| More than 1,200 feet above the surface and at or above 10,000 feet MSL. | 5 | 1,000 feet below, 1,000 feet above, 1 mile horizontal. |

### § 105.19 Parachute operations between sunset and sunrise.

(a) No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a person to conduct a parachute operation from an aircraft between sunset and sunrise, unless the person or object descending from the aircraft displays a light that is visible for at least 3 statute miles.

(b) The light required by paragraph (a) of this section must be displayed from the time that the person or object is under a properly functioning open parachute until that person or object reaches the surface.

### § 105.21 Parachute operations over or into a congested area or an open-air assembly of persons.

(a) No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft, over or into a congested area of a city, town, or settlement, or an open-air assembly of persons unless a certificate of authorization for that parachute operation has been issued under this section. However, a parachutist may drift over a congested area or an open-air assembly of persons with a fully deployed and properly functioning parachute if that parachutist is at a sufficient altitude to avoid creating a hazard to persons or property on the surface.

(b) An application for a certificate of authorization issued under this section must—

(1) Be made in the form and manner prescribed by the Administrator, and

(2) Contain the information required in § 105.15(a) of this part.

(c) Each holder of, and each person named as a participant in a certificate of authorization issued under this section must comply with all requirements contained in the certificate of authorization.

(d) Each holder of a certificate of authorization issued under this section must present that certificate for inspection upon the request of the Administrator, or any Federal, State, or local official.

### § 105.23 Parachute operations over or onto airports.

No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft, over or onto any airport unless—

(a) For airports with an operating control tower:

(1) Prior approval has been obtained from the management of the airport to conduct parachute operations over or on that airport.

(2) Approval has been obtained from the control tower to conduct parachute operations over or onto that airport.

(3) Two-way radio communications are maintained between the pilot of the

aircraft involved in the parachute operation and the control tower of the airport over or onto which the parachute operation is being conducted.

(b) For airports without an operating control tower, prior approval has been obtained from the management of the airport to conduct parachute operations over or on that airport.

(c) A parachutist may drift over that airport with a fully deployed and properly functioning parachute if the parachutist is at least 2,000 feet above that airport's traffic pattern, and avoids creating a hazard to air traffic or to persons and property on the ground.

### § 105.25 Parachute operations in designated airspace.

(a) No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft—

(1) Over or within a restricted area or prohibited area unless the controlling agency of the area concerned has authorized that parachute operation;

(2) Within or into a Class A, B, C, D airspace area without, or in violation of the requirements of, an air traffic control authorization issued under this section;

(3) Except as provided in paragraph (c) and (d) of this section, within or into Class E or G airspace area unless the air traffic control facility having jurisdiction over the airspace at the first intended exit altitude is notified of the parachute operation no earlier than 24 hours before or no later than 1 hour before the parachute operation begins.

(b) Each request for a parachute operation authorization or notification required under this section must be submitted to the air traffic control facility having jurisdiction over the airspace at the first intended exit altitude and must include the information prescribed by §105.15(a) of this part.

(c) For the purposes of paragraph (a)(3) of this section, air traffic control facilities may accept a written notification from an organization that conducts parachute operations and lists the scheduled series of parachute operations to be conducted over a stated period of time not longer than 12 calendar months. The notification must contain the information prescribed by §105.15(a) of this part, identify the responsible persons associated with that parachute operation, and be submitted at least 15 days, but not more than 30 days, before the parachute operation begins. The FAA may revoke the acceptance of the notification for any failure of the organization conducting the parachute operations to comply with its requirements.

(d) Paragraph (a)(3) of this section does not apply to a parachute operation conducted by a member of an Armed Force within a restricted area that extends upward from the surface when that area is under the control of an Armed Force.

## Subpart C—Parachute Equipment and Packing

### § 105.41 Applicability.

This subpart prescribed rules governing parachute equipment used in civil parachute operations.

### § 105.43 Use of single-harness, dual-parachute systems.

No person may conduct a parachute operation using a single-harness, dual-parachute system, and no pilot in command of an aircraft may allow any person to conduct a parachute operation from that aircraft using a single-harness, dual-parachute system, unless that system has at least one main parachute, one approved reserve parachute, and one approved single person harness and container that are packed as follows:

(a) The main parachute must have been packed within 180 days before the date of its use by a certificated parachute rigger, the person making the next jump with that parachute, or a non-certificated person under the direct supervision of a certificated parachute rigger.

(b) The reserve parachute must have been packed by a certificated parachute rigger—

(1) Within 180 days before the date of its use, if its canopy, shroud, and harness are composed exclusively of nylon, rayon, or similar synthetic fiber or material that is substantially resistant to damage from mold, mildew, and other

fungi, and other rotting agents propagated in a moist environment; or

(2) Within 60 days before the date of its use, if it is composed of any amount of silk, pongee, or other natural fiber, or material not specified in paragraph (b)(1) of this section.

(c) If installed, the automatic activation device must be maintained in accordance with manufacturer instructions for that automatic activation device.

[Doc. No. FAA–1999–5483, 66 FR 23553, May 9, 2001, as amended by Amdt. 105–13, 73 FR 69531, Nov. 19, 2008]

### § 105.45 Use of tandem parachute systems.

(a) No person may conduct a parachute operation using a tandem parachute system, and no pilot in command of an aircraft may allow any person to conduct a parachute operation from that aircraft using a tandem parachute system, unless—

(1) One of the parachutists using the tandem parachute system is the parachutist in command, and meets the following requirements:

(i) Has a minimum of 3 years of experience in parachuting, and must provide documentation that the parachutist—

(ii) Has completed a minimum of 500 freefall parachute jumps using a ram-air parachute, and

(iii) Holds a master parachute license issued by an organization recognized by the FAA, and

(iv) Has successfully completed a tandem instructor course given by the manufacturer of the tandem parachute system used in the parachute operation or a course acceptable to the Administrator.

(v) Has been certified by the appropriate parachute manufacturer or tandem course provider as being properly trained on the use of the specific tandem parachute system to be used.

(2) The person acting as parachutist in command:

(i) Has briefed the passenger parachutist before boarding the aircraft. The briefing must include the procedures to be used in case of an emergency with the aircraft or after exiting the aircraft, while preparing to exit and exiting the aircraft, freefall, operating the parachute after freefall, landing approach, and landing.

(ii) Uses the harness position prescribed by the manufacturer of the tandem parachute equipment.

(b) No person may make a parachute jump with a tandem parachute system unless—

(1) The main parachute has been packed by a certificated parachute rigger, the parachutist in command making the next jump with that parachute, or a person under the direct supervision of a certificated parachute rigger.

(2) The reserve parachute has been packed by a certificated parachute rigger in accordance with § 105.43(b) of this part.

(3) The tandem parachute system contains an operational automatic activation device for the reserve parachute, approved by the manufacturer of that tandem parachute system. The device must—

(i) Have been maintained in accordance with manufacturer instructions, and

(ii) Be armed during each tandem parachute operation.

(4) The passenger parachutist is provided with a manual main parachute activation device and instructed on the use of that device, if required by the owner/operator.

(5) The main parachute is equipped with a single-point release system.

(6) The reserve parachute meets Technical Standard Order C23 specifications.

### § 105.47 Use of static lines.

(a) Except as provided in paragraph (c) of this section, no person may conduct a parachute operation using a static line attached to the aircraft and the main parachute unless an assist device, described and attached as follows, is used to aid the pilot chute in performing its function, or, if no pilot chute is used, to aid in the direct deployment of the main parachute canopy. The assist device must—

(1) Be long enough to allow the main parachute container to open before a load is placed on the device.

(2) Have a static load strength of—

(i) At least 28 pounds but not more than 160 pounds if it is used to aid the

pilot chute in performing its function; or

(ii) At least 56 pounds but not more than 320 pounds if it is used to aid in the direct deployment of the main parachute canopy; and

(3) Be attached as follows:

(i) At one end, to the static line above the static-line pins or, if static-line pins are not used, above the static-line ties to the parachute cone.

(ii) At the other end, to the pilot chute apex, bridle cord, or bridle loop, or, if no pilot chute is used, to the main parachute canopy.

(b) No person may attach an assist device required by paragraph (a) of this section to any main parachute unless that person is a certificated parachute rigger or that person makes the next parachute jump with that parachute.

(c) An assist device is not required for parachute operations using direct-deployed, ram-air parachutes.

### § 105.49 Foreign parachutists and equipment.

(a) No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft with an unapproved foreign parachute system unless—

(1) The parachute system is worn by a foreign parachutist who is the owner of that system.

(2) The parachute system is of a single-harness dual parachute type.

(3) The parachute system meets the civil aviation authority requirements of the foreign parachutist's country.

(4) All foreign non-approved parachutes deployed by a foreign parachutist during a parachute operation conducted under this section shall be packed as follows—

(i) The main parachute must be packed by the foreign parachutist making the next parachute jump with that parachute, a certificated parachute rigger, or any other person acceptable to the Administrator.

(ii) The reserve parachute must be packed in accordance with the foreign parachutist's civil aviation authority requirements, by a certificated parachute rigger, or any other person acceptable to the Administrator.

## PARTS 106–109 [RESERVED]