SUBCHAPTER D—AIRMEN

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

§ 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.

§ 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.

\section*{§ 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.

\section*{§ 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.

\section*{§ 60.5 Quality management system.}

(a) After October 30, 2009, 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 stay’s 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.


\section*{§ 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 October 30, 2007, 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 October 30, 2007, 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 October 30, 2007 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.

§ 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 § 60.23.

§ 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
§ 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.

(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 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.
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(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 October 30, 2007 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 October 30, 2007, no sponsor may use or allow the use of or offer the use of such an FSTD after October 30, 2013 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 October 30, 2007 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.


§ 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
§ 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.

(c) 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, and the care that had been taken of the device since the loss of qualification.

§ 60.33 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 Full Flight Simulator (FFS) evaluation and qualification. The Flight Standards Service, National Simulator Program Manager (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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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. 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.
(11) AC 120–29, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
(13) AC 120–41, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.
(14) AC 120–57A, Surface Movement Guidance and Control System (SMGS).
(15) AC 150/5300–13, Airport Design.
(16) AC 150/5390–16, Standards for Airport Markings.
(17) AC 150/5340–4C, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.
(18) AC 150/5340–19, Taxiway Centerline Lighting System.
(19) AC 150/5340–24, Runway and Taxiway Edge Lighting System.
(20) AC 150/5345–28D, Precision Approach Path Indicator (PAPI) Systems.
(21) International Air Transport Association document, ‘‘Flight Simulator Design and Performance Data Requirements,’’ as amended.

END INFORMATION

2. APPLICABILITY (§§ 60.1 & 60.2)
There is no additional regulatory or informational material that 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.

3. DEFINITIONS (§ 60.3)

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

4. QUALIFICATION PERFORMANCE STANDARDS (§ 60.4)

There is no additional regulatory or informational material that applies to §60.4, Qualification Performance Standards.

5. QUALITY MANAGEMENT SYSTEM (§ 60.5)

See appendix E for additional regulatory and informational material regarding Quality Management Systems.

6. SPONSOR QUALIFICATION REQUIREMENTS (§ 60.7)

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 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 airplane simulated. This 12-month period is established according to the following schedule:
(i) If the FFS was qualified prior to October 30, 2007 the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with §60.19 after October 30, 2007 and continues for each subsequent 12-month period;
(ii) A device qualified on or after October 30, 2007 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 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 FFSs 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 FFS use required.
(3) Example Three.
(a) A sponsor in New York (in this example, a Part 142 certificate holder) establishes
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“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)).

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 FSTD.

END INFORMATION

8. SIMULATOR USE (§ 60.11)

BEGIN INFORMATION

There is no additional regulatory or informational material that applies to §60.11, Simulator Use.

END INFORMATION

9. SIMULATOR 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 airplane configuration, including weight and center of gravity.

(v) The data to be gathered.

(b) The initial flight conditions.

(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 A2D.

(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.

(5) Without alteration, adjustments, or bias; however the data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation.

(6) 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 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 certificate was issued. This notification must be made within 10 working days.

**End QPS Requirements**

**Begin Information**

e. 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).

f. 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 (a validation data roadmap) 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.

g. 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.

h. 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, Attachment 2 requires the sponsor or other data provider to ensure that a steady state condition exists at the instant of time captured by the “snapshot.” This is often verified by showing that a steady state condition existed from some period of time during which the snapshot is taken. The time period most frequently used is 5 seconds prior through 2 seconds following the instant of time captured by the snapshot. This paragraph is primarily addressing the source data and the method by which the data provider ensures that the steady state condition for the snapshot is representative.

i. The NSPM will consider, on a case-by-case basis, whether or not 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 Simulator (§60.14)

**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 FFS that raise questions regarding the continued qualification or use of the FFS.

**End Information**

11. Initial (and Upgrade) Qualification Requirements (§60.15)

**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;

(2) Meet the objective testing requirements listed in Attachment 2; and
(3) Satisfactorily accomplish the subjective tests listed in Attachment 3.

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 qualification test guide (QTG), acceptable to the NSPM, that includes all of the following:

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

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

(iii) The result of FFS subjective tests prescribed in the applicable QPS.

(iv) 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 qualification and the continuing qualification evaluations.

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, 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, for a sample Continuing Qualification Evaluation Requirements page.

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

(4) The sponsor’s FFS identification number or code.

(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. SOCs must provide references to the sources of information that show the capability of the FFS to comply with the requirements. SOCs must also provide a rationale explaining how the referenced material is used, the mathematical equations and parameter values used, and the conclusions reached. Refer to the “Additional Details” column in Attachment 1, Table A1A, “Simulator Standards,” or in the “Test Details” column in Attachment 2, Table A2A, “Simulator Objective Tests,” to see when SOCs are required.

(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, 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 supplemented QTG for each 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.

(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 facility. If the tests are conducted at the sponsor’s training facility, the sponsor must repeat at least one-third of the tests at the manufacturer’s facility, or at the sponsor’s training facility.

(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 October 30, 2013 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 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 evaluations 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 October 30, 2013. A copy of the eMQTG 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.

END QPS REQUIREMENTS

BEGIN INFORMATION

1. Only those FFSs that are sponsored by a certificate holder as defined in appendix F 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.

m. 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, the objective tests listed in Attachment 2, 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) Cockpit 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.

b. 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.

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 data was gathered and applied) data presentations, and the applicable tolerances for each test.

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 conducted 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 an 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.

q. 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.
r. 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.

s. 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 A4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation.
t. 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 A2A.
u. 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).
v. 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.
12. ADDITIONAL QUALIFICATIONS FOR A CURRENTLY QUALIFIED SIMULATOR (§60.16)

There is no additional regulatory or informational material that applies to §60.16. Additional Qualifications for a Currently Qualified FFS.

13. PREVIOUSLY QUALIFIED SIMULATORS (§60.17)

BEGIN QPS REQUIREMENTS

a. In instances where a sponsor plans to remove a 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 October 30, 2007, are not required to meet the general simulation requirements, the objective test requirements, and the subjective test requirements of attachments 1, 2, and 3, respectively, of this appendix.

c. [Reserved]

END QPS REQUIREMENTS

BEGIN INFORMATION

d. 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.

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

f. The intent of the requirement listed in §60.17(b), for each FFS to have a Statement of Qualification 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.

g. Downgrading of an FFS is a permanent change in qualification level and will necessitate the issuance of a revised Statement of Qualification 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 on-going 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.

h. It is not the intent of the NSPM to discourage the improvement of existing simulation (e.g., the “updating” of a visual system to a newer model, 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.

i. The NSPM will determine the evaluation criteria for an FSTD 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
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 pre-flight inspection 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.

END QPS REQUIREMENTS

BEGIN INFORMATION

d. 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.

e. 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.

f. 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 airplane systems. This examination is normally accomplished simultaneously with the subjective evaluation requirements.

g. The requirement established in §60.19(b)(4) regarding the frequency of NSPM-conducted continuing qualification evaluations for each FFS 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

15. LOGGING SIMULATOR DISCREPANCIES (§60.20)

There is no additional regulatory or informational material that applies to §60.20, Logging FFS Discrepancies.

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

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

17. MODIFICATIONS TO SIMULATORS (§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
FSTD Directives are considered modifications of an FFS. See Attachment 4 for a sample index of effective FSTD Directives.

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

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. 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.
c. 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.

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

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.

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

There are no additional QPS requirements or informational material that apply to § 60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

21. RECORDKEEPING AND REPORTING (§ 60.31)

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

There are no additional QPS requirements or informational material that apply to § 60.35, Specific FFS Compliance Requirements.

23. SPECIFIC FULL FLIGHT SIMULATOR COMPLIANCE REQUIREMENTS (§ 60.35)

There are no additional QPS requirements or informational material that apply to § 60.37, FSTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).
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 a Statement of Compliance and Capability (SOC), which may include objective and subjective tests. The SOC will confirm that the requirement was satisfied, and describe how the requirement was met, such as gear modeling approach or coefficient of friction sources. The requirements for SOCs and tests 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

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 and the examination of functions and subjective tests listed in attachment 3 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 cockpit configuration.
   2. Simulator programming.
   3. Equipment operation.
   4. Equipment and facilities for instructor/evaluator functions.
   5. Motion system.
   7. Sound system.

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

END INFORMATION

---

**TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS**

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1.a</td>
<td>The simulator must have a cockpit that is a replica of the airplane simulated with controls,</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>equipment, observable cockpit indicators, circuit breakers, and bulkheads properly located,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>functionally accurate and replicating the airplane. The direction of movement of controls and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>switches must be identical to the airplane. Pilot seats must allow the occupant to achieve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the design &quot;eye position&quot; established for the airplane being simulated. Equipment for the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>operation of the cockpit windows must be included, but the actual windows need not be</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>operable. Additional equipment such as fire axes, extinguishers, and spare light bulbs must</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>be available in the FFS but may be relocated to a suitable location as near as practical to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the original position. Fire axes, landing gear pins, and any similar purpose instruments</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>need only be represented in silhouette. An SOC is required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.b</td>
<td>Those circuit breakers that affect procedures or result in observable cockpit indications</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>must be properly located and functionally accurate. An SOC is required.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**1. General Cockpit Configuration**

---

2. Programming
<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2.a</td>
<td>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.</td>
<td>X X X</td>
<td>notes</td>
</tr>
<tr>
<td>2.b</td>
<td>The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought. An SOC is required.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>2.c</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.d</td>
<td>Ground handling and aerodynamic programming must include the following: An SOC is required. Ground effect includes modeling that accounts for roundout, flare, touchdown, lift, drag, pitching moment, trim, and power while in ground effect. 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.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.d.1</td>
<td>Ground effect ...................................................</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>2.d.2</td>
<td>Ground reaction ...............................................</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>2.d.3</td>
<td>Ground handling characteristics, including aerodynamic and ground reaction modeling including steering inputs, operations with crosswind, braking, thrust reversing, deceleration, and turning radius.</td>
<td>X X X</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.e</td>
<td>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: (1) Prior to takeoff rotation. (2) At liftoff. (3) During initial climb. (4) On final approach, below 500 ft AGL. 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 Windshear Training 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. Objective tests are required for qualification; see Attachment 2 and Attachment 5 of this appendix. 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.</td>
<td>X X</td>
<td>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.</td>
</tr>
<tr>
<td>2.f</td>
<td>The simulator must provide for automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests as prescribed in Attachment 2. An SOC is required.</td>
<td>X X</td>
<td>Automatic “flagging” of out-of-tolerance situations is encouraged.</td>
</tr>
<tr>
<td>2.g</td>
<td>Relative responses of the motion system, visual system, and cockpit 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.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.g.1</td>
<td>300 milliseconds of the airplane response</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.g.2</td>
<td>150 milliseconds of the airplane response</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.h</td>
<td>The simulator must accurately reproduce the following runway conditions: (1) Dry. (2) Wet. (3) Icy. (4) Patchy Wet. (5) Patchy Icy. (6) Wet on Rubber Residue in Touchdown Zone. An SOC is required. Objective tests are required only for dry, wet, and icy runway conditions; see Attachment 2.</td>
<td>X X</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>&lt;Information&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.i</td>
<td>The simulator must simulate:</td>
<td>X X</td>
<td>Simulator pitch, side loading, and directional control characteristics should be representative of the airplane.</td>
</tr>
<tr>
<td></td>
<td>(1) brake and tire failure dynamics, including antiskid failure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) decreased brake efficiency due to high brake temperatures, if applicable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>An SOC is required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.j</td>
<td>The simulator must replicate the effects of airframe icing.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.k</td>
<td>The aerodynamic modeling in the simulator must include:</td>
<td>X</td>
<td>See Attachment 2, paragraph 4, for further information on ground effect.</td>
</tr>
<tr>
<td></td>
<td>(1) Low-altitude level-flight ground effect;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) Mach effect at high altitude;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Normal and reverse dynamic thrust effect on control surfaces;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) Aeroelastic representations; and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5) Nonlinearities due to sideslip.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>An SOC is required and must include references to computations of aeroelastic representations and nonlinearities due to sideslip.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.l</td>
<td>The simulator must have aerodynamic and ground reaction modeling for the effects of reverse thrust on directional control, if applicable.</td>
<td>X X X</td>
<td>An SOC is required.</td>
</tr>
</tbody>
</table>

#### 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. A subjective test is required. | X X X X            |                                                                                                 |
| 3.b | Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the airplane. A subjective test is required. | X X X X            | See Attachment 3 for further information regarding long-range navigation equipment. |
| 3.c | Simulator systems must operate as the airplane systems operate under normal, abnormal, and emergency operating conditions on the ground and in flight. A subjective test is required. | 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. A objective test is required. | X X X X            |                                                                                                 |

#### 4. Instructor or Evaluator Facilities
### TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.a</td>
<td>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. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.b</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.c</td>
<td>The simulator must have instructor controls for environmental conditions including wind speed and direction. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.d</td>
<td>The simulator must provide the instructor or evaluator the ability to present ground and air hazards. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

#### 5. Motion System

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.a</td>
<td>The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in an airplane. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.b</td>
<td>The simulator must have a motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave). An SOC is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.c</td>
<td>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). An SOC is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.d</td>
<td>The simulator must provide for the recording of the motion system response time. An SOC is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.e</td>
<td>The simulator must provide motion effects programming to include: (1) Thrust effect with brakes set. (2) Runway rumble, oleo deflections, effects of ground speed, uneven runway, centerline lights, and taxiway characteristics. (3) Buffets on the ground due to spoiler/speedbrake extension and thrust reversal. (4) Bumps associated with the landing gear. (5) Buffet during extension and retraction of landing gear. (6) Buffet in the air due to flap and spoiler/speedbrake extension. (7) Approach-to-Stall buffet.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.f</td>
<td>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 cockpit. A subjective test is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to airplane data.</td>
</tr>
</tbody>
</table>

### 6. Visual System

| 6.a | The simulator must have a visual system providing an out-of-the-cockpit view. A subjective test is required. | X | X | X | X |

| 6.b | The simulator must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights. A subjective test is required. | X | X | X | X |

| 6.c | The simulator must have instructor controls for the following: (1) Cloudbase. (2) Visibility in statute miles (km) and runway visual range (RVR) in ft. (m). (3) Airport selection. (4) Airport lighting. A subjective test is required. | X | X | X | X |

| 6.d | Each airport scene displayed must include the following: (1) Airport runways and taxiways. (2) Runway definition. (i) Runway surface and markings. (ii) Lighting for the runway in use, including runway threshold, edge, centerline, touchdown zone, VASI or PAPI, and approach lighting of appropriate colors, as appropriate. (6) Taxiway lights. A subjective test is required. | X | X | X | X |

| 6.e | The distances at which runway features are visible, as measured from runway threshold to an airplane aligned with the runway on an extended glide slope must not be less than listed below: (1) Runway definition, strobe lights, approach lights, runway edge white lights VASI or PAPI system lights from 5 statute miles (8 kilometers (km)) of the runway threshold. (2) Runway centerline lights and taxiway definition from 3 statute miles (4.8 km). (3) Threshold lights and touchdown zone lights from 2 statute miles (3.2 km). (4) Runway markings within range of landing lights for night scenes and as required by three (3) arc-minutes resolution on day scenes. A subjective test is required. | X | X | X | X |

| 6.f | The simulator must provide visual system compatibility with dynamic response programming. A subjective test is required. | X | X | X | X |
## TABLE A1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>&lt;Information&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>6.g</td>
<td>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 a main wheel height of 100 feet (30 meters) above the touchdown zone, and with visibility of 1,200 ft (350 m) RVR. An SOC is required. An objective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.h</td>
<td>The simulator must provide visual cues necessary to assess sink rates (provide depth perception) during takeoffs and landings, to include: (1) Surface on runways, taxiways, and ramps. (2) Terrain features. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.i</td>
<td>The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.j</td>
<td>The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity. An SOC is required. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.k</td>
<td>The simulator must provide a minimum of three airport scenes including: (1) Surfaces on runways, taxiways, and ramps. (2) Lighting of appropriate color for all runways, including runway threshold, edge, centerline, VASI or PAPI, and approach lighting for the runway in use. (3) Airport taxiway lighting. (4) Ramps and buildings that correspond to the sponsor's Line Oriented scenarios, as appropriate. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.l</td>
<td>The simulator must be capable of producing at least 10 levels of occulting. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.m</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### Table A1A—Minimum Simulator Requirements—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>6.n</td>
<td>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. Additional requirements include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights. An SOC is required. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.o</td>
<td>Daylight Visual Scenes. The simulator must have night dusk (twilight), and 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. Additional requirements include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights. An SOC is required. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.p</td>
<td>The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.q</td>
<td>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. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.r</td>
<td>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. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.s</td>
<td>The simulator must present realistic color and directionality of all airport lighting. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

#### 7. Sound System

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.a</td>
<td>The simulator must provide cockpit sounds that result from pilot actions that correspond to those that occur in the airplane.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### Table A1A—Minimum Simulator Requirements—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.b</td>
<td>The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant airplane noises perceptible to the pilot during normal 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. An SOC is required. A subjective test is required.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>7.c</td>
<td>The simulator must provide realistic amplitude and frequency of cockpit 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. Objective tests are required.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

#### Table A1B (Reserved)

**Attachment 2 to Appendix A to Part 60—Full Flight Simulator (FFS) Objective Test**

---

**BEGIN INFORMATION**

1. For the purposes of this attachment, the flight conditions specified in the Flight Conditions Column of Table A2A, are defined as follows:
   (a) Ground—on ground, independent of airplane configuration;
   (b) Take-off—gear down with flaps/slots in any certified takeoff position;
   (c) First segment climb—gear down with flaps/slots in any certified takeoff position (normally not above 50 ft AGL);
   (d) Second segment climb—gear up with flaps/slots in any certified takeoff position (normally between 50 ft and 400 ft AGL);
   (e) Clean—flaps/slots retracted and gear up;
   (f) Cruise—clean configuration at cruise altitude and airspeed;
   (g) Approach—gear up or down with flaps/slots at any normal approach position as recommended by the airplane manufacturer; and
   (h) Landing—gear down with flaps/slots in any certified landing position.

2. 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.

3. The QPS Requirements section imposes a duty on the sponsor or other data provider to ensure that a steady state condition exists at the instant of time captured by the “snapshot” for cases where the objective test results authorize a “snapshot test” or a “series of snapshot tests” results in lieu of a time-history. This is often verified by showing that a steady state condition existed from some period prior to, through some period following, the snap shot. The time period most frequently used is from 5 seconds prior through 2 seconds following the instant of time captured by the snap shot. Other time periods may be acceptable as authorized by the NSPM.


5. 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**
BEGIN QPS REQUIREMENTS

1. Test Requirements

a. The ground and flight tests required for qualification are listed in Table of 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 flight test, 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.

c. Certain tests included in this attachment must be supported with a Statement of Compliance and Capability (SOC). In Table A2A, requirements for SOC's 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 validation, 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, except as may be authorized by the NSPM. 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 must 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. 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.”

1. 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.
j. 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.

k. For testing Computer Controlled Airplane (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.

l. 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.

m. Some tests will not be required for airplanes using airplane hardware in the simulator cockpit (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.

n. For objective test purposes, “Near maximum” gross weight is a weight chosen by the sponsor or data provider that is not less than the basic operating weight (BOW) of the airplane 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. “Light” gross weight is a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the airplane being simulated or as limited by the minimum practical operating weight of the test airplane. “Medium” gross weight is a weight chosen by the sponsor or data provider that is approximately ±10% of the average of the numerical values of the BOW and the maximum certificated gross weight. (Note: BOW is 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. (References: Advisory Circular 120–27, “Aircraft Weight and Balance;” and FAA–H–8083–1, “Aircraft Weight and Balance Handbook.”)

END QPS REQUIREMENTS
## TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS

### <<OPS REQUIREMENTS>>

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Taxi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A B C D</td>
<td></td>
</tr>
<tr>
<td>1.a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a.1</td>
<td>Minimum Radius Turn ...</td>
<td>±3 ft (0.9 m) or 20% of airplane turn radius.</td>
<td>Ground ..........</td>
<td>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.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>1.a.2</td>
<td>Rate of Turn vs. Nosewheel Steering Angle (NWA).</td>
<td>±10% or ±2% sec. turn rate ...</td>
<td>Ground ..........</td>
<td>Record a minimum of two speeds, greater than minimum turning radius speed, with a spread of at least 5 knots ground-speed.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>1.b</td>
<td>Ground Acceleration Time and Distance</td>
<td>±5% time and distance or ±5% time and ±200 ft (61 m) of distance.</td>
<td>Takeoff</td>
<td>Record acceleration time and distance for a minimum of 80% of the time from brake release to ( V_{R} ). Preliminary aircraft certification data may be used.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

1. Federal Aviation Administration, DOT Pt. 60, App. A

2. 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.).
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.b.2</td>
<td>Minimum Control Speed—ground ($V_{mcg}$) using aerodynamic controls only (per applicable airworthiness standard or alternative) or engine inoperative test to demonstrate ground control characteristics.</td>
<td>±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).</td>
<td>Takeoff</td>
<td>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 full flight simulator 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.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>±3 kts airspeed, ±1.5° pitch angle.</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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 of an early rotation take-off.</td>
</tr>
</tbody>
</table>

Federal Aviation Administration, DOT Pt. 60, App. A

VerDate Aug<31>2005 09:03 Feb 07, 2008 Jkt 214044 PO 00000 Frm 00051 Fmt 8010 Sfmt 8002 Y:\SGML\214044.XXX 214044yshivers on PROD1PC62 with CFR
<table>
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<th>Test No.</th>
<th>Test Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.b.4</td>
<td>Normal Takeoff</td>
<td>±3 kts airspeed, ±1.5° pitch angle, ±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).</td>
<td>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 configuration, 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.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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. Additionally, for those simulators of airplanes with reversible flight control systems: Stick/Column Force; ±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 component of at least 60% of the maximum demonstrated crosswind in the Airplane Flight Manual (AFM), as 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 included in the AFM, contact the NSPM.
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.b.7</td>
<td>Rejected Takeoff</td>
<td>±5% time or ±1.5 sec, ±7.5% distance or ±250 ft (±76 m).</td>
<td>Takeoff</td>
<td>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.</td>
<td>X X X X</td>
<td>Autobrakes will be used where applicable.</td>
</tr>
<tr>
<td>1.b.8</td>
<td>Dynamic Engine Failure After Takeoff.</td>
<td>±20% or ±2°/sec body angular rates.</td>
<td>Takeoff</td>
<td>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.).</td>
<td>X X</td>
<td>For safety considerations, airplane flight test may be performed out of ground effect at a safe altitude, but with correct airplane configuration and airspeed.</td>
</tr>
<tr>
<td>1.c.</td>
<td>Climb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.c.1 ......</td>
<td>Normal Climb, all engines operating.</td>
<td>±3 kts airspeed, ±5% or ±100 FPM (0.5 m/Sec.) climb rate.</td>
<td>Clean</td>
<td>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. (300m).</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1.c.2 ......</td>
<td>One engine Inoperative</td>
<td>±3 kts airspeed, ±5% or ±100 FPM (0.5 m/Sec.) climb rate, but not less than the FAA-Approved Airplane Flight Manual (AFM) values.</td>
<td>For part 23 airplanes, in accordance with part 23. For part 25 airplanes, Second Segment Climb.</td>
<td>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. (300m).</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1.c.3 ......</td>
<td>One Engine Inoperative En route Climb.</td>
<td>±10% time, ±10% distance, ±10% fuel used.</td>
<td>Clean</td>
<td>Record results for at least a 5000 ft (1550 m) climb segment. Flight test data or airplane performance manual data may be used.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Test</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.c.4</td>
<td>One Engine Inoperative Approach Climb (if the approved AFM requires specific performance in icing conditions).</td>
<td>±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.</td>
<td>Approach ............... Record results at near maximum gross landing weight as defined in appendix F. 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. (300m).</td>
<td>X X X X</td>
<td>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 AFM for an approach in icing conditions.</td>
</tr>
<tr>
<td>1.d</td>
<td>Cruise/Descent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.d.1</td>
<td>Level flight acceleration</td>
<td>±5% Time .........................</td>
<td>Cruise ...................... Record results for a minimum of 50 kts speed increase using maximum continuous thrust rating or equivalent.</td>
<td>X X X X</td>
<td></td>
</tr>
<tr>
<td>1.d.2</td>
<td>Level flight deceleration</td>
<td>±5% Time .........................</td>
<td>Cruise ...................... Record results for a minimum of 50 kts speed decrease using idle power.</td>
<td>X X X X</td>
<td></td>
</tr>
</tbody>
</table>
### Cruise Performance

| 1.d.3 | Cruise performance | ±0.05 EPR or ±5% of $N_1$, or ±5% of Torque, ±5% of fuel flow. | 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 |

### Stopping

<p>| 1.e | Stopping | ±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 |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.e.2</td>
<td>Stopping time and distance, using reverse thrust and no wheel brakes on a dry runway.</td>
<td>±5% time and the smaller of ±10% or ±200 ft (61 m) of distance.</td>
<td>Landing ...............</td>
<td>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.</td>
<td>A X X X</td>
<td></td>
</tr>
<tr>
<td>1.e.3</td>
<td>Stopping distance, using wheel brakes and no reverse thrust on a wet runway.</td>
<td>±10% of distance or ±200 ft (61 m).</td>
<td>Landing</td>
<td>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.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>1.e.4</td>
<td>Stopping distance, using wheel brakes and no reverse thrust on an icy runway.</td>
<td>±10% of distance or ±200 ft (61 m).</td>
<td>Landing</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1.f</td>
<td>Engines</td>
<td></td>
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</tbody>
</table>
TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.f.1</td>
<td>Acceleration</td>
<td>±10% T&lt;sub&gt;t&lt;/sub&gt; and ±10% T&lt;sub&gt;i&lt;/sub&gt;, or ±0.25 sec.</td>
<td>Approach or landing</td>
<td>Record engine power (N&lt;sub&gt;1&lt;/sub&gt;, N&lt;sub&gt;2&lt;/sub&gt;, EPR, Torque) from flight idle to go-around power for a rapid (slam) throttle movement.</td>
<td>X X X X</td>
<td>T&lt;sub&gt;i&lt;/sub&gt; is the total time from initial throttle movement until reaching a 10% response of engine power. T&lt;sub&gt;t&lt;/sub&gt; is the total time from initial throttle movement to reaching 90% of go around power.</td>
</tr>
<tr>
<td>1.f.2</td>
<td>Deceleration</td>
<td>±10% T&lt;sub&gt;t&lt;/sub&gt; and ±10% T&lt;sub&gt;i&lt;/sub&gt;, or ±0.25 sec.</td>
<td>Ground</td>
<td>Record engine power (N&lt;sub&gt;1&lt;/sub&gt;, N&lt;sub&gt;2&lt;/sub&gt;, EPR, Torque) from Max T/O power to 90% decay of Max T/O power for a rapid (slam) throttle movement.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 con-
currently, that provide satisfactory agreement. Repeat of the alternative method during the initial or up-
grade evaluation would then satisfy this test requirement. For initial and upgrade evaluations, the control
dynamic characteristics must be measured at and recorded directly from the cockpit 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 full flight simulator.

<table>
<thead>
<tr>
<th>2.a ..........</th>
<th>Static Control Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.a.1.a ....</td>
<td>Pitch Controller Position vs. Force Surface Position Calibration.</td>
</tr>
<tr>
<td>±2 lb (0.9 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2° elevator.</td>
<td>Ground ...............</td>
</tr>
<tr>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

2.a.1.b ... (Reserved)

2.a.2.a ... Roll Controller Position vs. Force Surface Position Calibration. | Ground ............... |
| ±2 lb (0.9 daN) breakout, ±10% or ±5 lb (1.3 daN) force, ±2° aileron, ±3° spoiler angle. |
| Record results for an uninterrupted control sweep to the stops. | X | X | X |
| Test results should be validated with in-flight data from tests such as engine out trims, steady state or sideslips. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. |

2.a.2.b ... (Reserved).
TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.a.3.a</td>
<td>Rudder Pedal Position vs. Force and Surface Position Calibration.</td>
<td>±5 lb (2.2 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2½ rudder angle.</td>
<td>Ground</td>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X X X X</td>
<td>Test results should be validated with in-flight data from tests such as engine out trims, steady state or sideslips. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures.</td>
</tr>
<tr>
<td>2.a.3.b</td>
<td>(Reserved).</td>
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</tr>
<tr>
<td>2.a.4</td>
<td>Nosewheel Steering Controller Force &amp; Position Calibration.</td>
<td>±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force, ±2½ nosewheel angle.</td>
<td>Ground</td>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X X X X</td>
<td></td>
</tr>
<tr>
<td>2.a.5</td>
<td>Rudder Pedal Steering Calibration.</td>
<td>±° nosewheel angle</td>
<td>Ground</td>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X X X X</td>
<td></td>
</tr>
<tr>
<td>2.a.6</td>
<td>Pitch Trim Indicator vs. Surface Position Calibration.</td>
<td>±0.5° of computed trim surface angle.</td>
<td>Ground</td>
<td></td>
<td>X X X</td>
<td>The purpose of the test is to compare full flight simulator against design data or equivalent.</td>
</tr>
<tr>
<td>2.a.7</td>
<td>(Reserved)</td>
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<tr>
<td>Test</td>
<td>Description</td>
<td>Ground</td>
<td>Requirements</td>
<td>Notes</td>
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<tr>
<td>2.a.8</td>
<td>Alignment of Cockpit Throttle Lever vs. Selected Engine Parameter</td>
<td>±5° of throttle lever angle, or ±3% N1 or ±03 EPR, or ±torque. For propeller-driven airplanes where the propeller control levers do not have angular travel, a tolerance of ±0.8 inch (±2 cm.) applies.</td>
<td>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 &quot;detents,&quot; all detents must be presented. May be a series of snapshot test results.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.a.9</td>
<td>Brake Pedal Position vs. Force and Brake System Pressure Calibration</td>
<td>±5 lb (2.2 daN) or 10% force, ±150 psi (1.0 MPa) or ±10% brake system pressure.</td>
<td>Hydraulic system pressure must be related to pedal position through a ground static test.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.b</td>
<td>Dynamic Control Tests</td>
<td></td>
<td></td>
<td>(3) 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 full flight simulator. Power setting is that required for level flight unless otherwise specified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test No.</td>
<td>Title</td>
<td>Tolerance</td>
<td>Flight Conditions</td>
<td>Test details</td>
<td>Simulator Level</td>
<td>Information Notes</td>
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<tr>
<td>2.b.1</td>
<td>Pitch Control</td>
<td>±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 (0.05 A_d). ±10% of time from 90% of initial displacement (0.9 A_d) to 10% of initial displacement (0.1 A_d).</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>For underdamped systems</td>
<td>Takeoff, Cruise, and Landing.</td>
<td>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 the maximum allowable pitch controller deflection for flight conditions limited by the maneuvering load envelope.</td>
<td>X</td>
<td>“n” is the sequential period of a full cycle of oscillation. Refer to paragraph 3 of this attachment for more information. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. For the alternate method (see paragraph 3 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.</td>
</tr>
</tbody>
</table>
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 (0.05 $A_d$), ±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 $A_d$).

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 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 3 of this attachment for more information. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures.

For the alternate method (see paragraph 3 of this attachment). The slow sweep is 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.
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test Details</th>
<th>Simulator Level</th>
<th>Information Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.b.3</td>
<td>Yaw Control</td>
<td>2.b.3</td>
<td>Takeoff, Cruise, and Landing.</td>
<td>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.</td>
<td>X</td>
<td>“n” is the sequential period of a full cycle of oscillation. Refer to paragraph 3 of this attachment for more information. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. For the alternate method (see paragraph 3 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.</td>
</tr>
<tr>
<td>2.b.4</td>
<td>Small Control Inputs—Pitch</td>
<td>±0.15°/sec body pitch rate or ±20% of peak body pitch rate applied throughout the time history.</td>
<td>Approach or Landing Control inputs must be typical of minor corrections made while established on an ILS approach course (approximately 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. CCA: Test in normal and non-normal control states.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>No.</td>
<td>Title</td>
<td>Tolerance</td>
<td>Flight Conditions</td>
<td>Test details</td>
<td>Simulator Level</td>
<td>Information notes</td>
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<tr>
<td>2.b.5</td>
<td>Small Control Inputs—Roll.</td>
<td>±0.15°/sec body roll rate or ±20% of peak body roll rate applied throughout the time history.</td>
<td>Approach or landing</td>
<td>Control inputs must be typical of minor corrections made while established on an ILS approach course (approximately 0.5°/sec to 2°/sec roll rate). The test must 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.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.b.6</td>
<td>Small Control Inputs—Yaw.</td>
<td>±0.15°/sec body yaw rate or ±20% of peak body yaw rate applied throughout the time history.</td>
<td>Approach or landing Control inputs must be typical of minor corrections made while established on an ILS approach course (approximately 0.5°/sec to 2°/sec yaw rate). The test must 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.</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>2.c</td>
<td>Longitudinal Control Tests</td>
<td>Power setting is that required for level flight unless otherwise specified</td>
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<tr>
<td>No.</td>
<td>Title</td>
<td>Tolerance</td>
<td>Flight Conditions</td>
<td>Test details</td>
<td>Simulator Level</td>
<td>Information notes</td>
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<tr>
<td>2.c.1</td>
<td>Power Change Dynamics</td>
<td>±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch angle.</td>
<td>Approach ................................</td>
<td>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. CCA: Test in normal and non-normal control states.</td>
<td>X</td>
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</table>

*CCA: Controlled Conditions Assessment*
<table>
<thead>
<tr>
<th>2.c.2</th>
<th>Flap/Slat Change Dynamics</th>
<th>±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° angle.</th>
<th>Takeoff through initial flap retraction, approach to landing.</th>
<th>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. CCA: Test in normal and non-normal control states.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.c.3</td>
<td>Spoiler/Speedbrake Change Dynamics</td>
<td>±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch.</td>
<td>Cruise.</td>
<td>Record results for both extension and retraction. CCA: Test in normal and non-normal control states.</td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Tolerance</td>
<td>Flight Conditions</td>
<td>Test details</td>
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<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2.c.4</td>
<td>Gear Change Dynamics</td>
<td>±3 kt airspeed, ±100 ft (30 m) altitude, ±20% or ±1.5° pitch angle.</td>
<td>Takeoff (retraction), and Approach (extension).</td>
<td>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. CCA: Test in normal and non-normal control states.</td>
</tr>
<tr>
<td>2.c.5</td>
<td>Longitudinal Trim</td>
<td>±0.5° stabilizer, ±1° elevator, ±1° pitch angle, ±5% net thrust or equivalent.</td>
<td>Cruise, Approach, and Landing.</td>
<td>Record steady-state condition with wings level and thrust set for level flight. May be a series of snapshot tests. CCA: Test in normal and non-normal control states.</td>
</tr>
<tr>
<td></td>
<td>Longitudinal Maneuvering Stability (Stick Force/(g)).</td>
<td>±5 lb (±2.2 daN) or ±10% pitch controller force. Alternative method: ±1° or ±10% change of elevator</td>
<td>Cruise, Approach, and Landing.</td>
<td>Continuous time history data or a series of snapshot tests may be used. Record results up to approximately 30° of bank for approach and landing configurations. Record results for up to approximately 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 full flight simulator. The alternative method applies to airplanes that do not exhibit “stick-force-per-g” characteristics. CCA: Test in normal and non-normal control states.</td>
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</tbody>
</table>
### TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.c.7</td>
<td>( \pm 5 \text{ lb (} \pm 22 \text{ daN)} \text{ or } \pm 10% \text{ pitch controller force.} ) Alternative method: ( \pm 1^\circ ) or ( \pm 10% \text{ change of elevator.} )</td>
<td>Approach</td>
<td>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 full flight simulator. The alternative method applies to airplanes that do not exhibit speed stability characteristics. CCA: Test in normal and non-normal control states.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.8</td>
<td>Stall Characteristics</td>
<td>±3 kt airspeed for initial buffet, stall warning, and stall speeds. Additionally, for those simulators with reversible flight control systems: ±10% or ±5 lb (2.2 daN) Stick/Column force (prior to &quot;g break&quot; only).</td>
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<td></td>
<td>Second Segment</td>
<td>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 staff and initiation of recovery. The stall warning signal must occur in the proper relation to buffet/stall. Full flight simulators of airplanes exhibiting a sudden pitch attitude change or &quot;g break&quot; must demonstrate this characteristic. CCA: Test in normal and non-normal control states.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Tolerance</td>
<td>Flight Conditions</td>
<td>Test details</td>
<td>Simulator Level</td>
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<tr>
<td>2.c.9</td>
<td>Phugoid Dynamics</td>
<td>±10% period, ±10% of time to ½ or double amplitude or ±0.02 of damping ratio.</td>
<td>Cruise</td>
<td>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 and non-normal control states.</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.c.10</td>
<td>Short Period Dynamics</td>
<td>±1.5° pitch angle or ±2°/sec pitch rate, ±0.10g acceleration.</td>
<td>Cruise</td>
<td>CCA: Test in Normal and Non-normal control states.</td>
<td>X X</td>
</tr>
<tr>
<td>2.c.11</td>
<td>(Reserved)</td>
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</tbody>
</table>

2.d Lateral Directional Tests

Power setting is that required for level flight unless otherwise specified.
2.d.1 Minimum Control Speed, Air \((V_{\text{mca}} \text{ or } V_{\text{mci}})\), per Applicable Airworthiness Standard or Low Speed Engine Inoperative Handling Characteristics in the Air.

<table>
<thead>
<tr>
<th>Roll Speed Speed</th>
<th>(\pm 3) kt airspeed</th>
<th>Takeoff or Landing (whichever is most critical in the airplane).</th>
<th>Takeoff thrust must be used on the operating engine(s). A time history or a series of snapshot tests may be used. CCA: Test in Normal and Non-normal control states.</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>Low Speed Engine Inoperative Handling may be governed by a performance or control limit that prevents demonstration of (V_{\text{mca}}) in the conventional manner.</th>
</tr>
</thead>
</table>

2.d.2 Roll Response (Rate) ... \(\pm 10\%\) or \(\pm 2^\circ/\text{sec}\) roll rate. Additionally, for those simulators of airplanes with reversible flight control systems: \(\pm 10\%\) or \(\pm 3\text{lb} \ (1.3\text{ daN})\) wheel force.

| Roll Speed Speed | \(\pm 10\%\) or \(\pm 2^\circ/\text{sec}\) roll rate | 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 | With wings level, apply a step roll control input using approximately one-third of the roll controller travel. When reaching approximately \(20^\circ\) to \(30^\circ\) of bank, abruptly return the roll controller to neutral and allow approximately 10 seconds of airplane free response. |

2.d.3 Roll Response to Cockpit Roll Controller Step Input.

<p>| Roll Speed Speed | (\pm 10%) or (\pm 2^\circ) 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). CCA: Test in Normal and Non-normal control states. | X | X | X | |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.d.4</td>
<td>Spiral Stability ..........</td>
<td>Correct trend and ±2° or ±10% bank angle in 20 seconds. Alternate test requires correct trend and ±2° aileron.</td>
<td>Cruise ..................</td>
<td>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 approximately 30°. CCA: Test in Normal and Non-normal control states.</td>
<td>X X X X</td>
<td>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.</td>
</tr>
<tr>
<td>2.d.5</td>
<td>Engine Inoperative Trim</td>
<td>±1° rudder angle or ±1° tab angle or equivalent pedal, ±2° sideslip angle.</td>
<td>Second Segment Climb, and Approach or Landing.</td>
<td>May be a series of snapshot tests.</td>
<td>X X X X</td>
<td>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.</td>
</tr>
<tr>
<td>Section</td>
<td>Test Description</td>
<td>Conditions</td>
<td>Data Collection</td>
<td></td>
<td></td>
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<tr>
<td>2.d.6</td>
<td>Rudder Response</td>
<td>±2°/sec or ±10% yaw rate</td>
<td>Approach or Landing</td>
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<tr>
<td></td>
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<td></td>
<td>Record results for stability augmentation system ON and OFF. A rudder step input of 20%–30% rudder pedal throw is used. CCA: Test in Normal and Non-normal control states.</td>
<td></td>
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</tr>
<tr>
<td>2.d.7</td>
<td>Dutch Roll (Yaw Damper OFF)</td>
<td>±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.</td>
<td>Cruise, and Approach or Landing</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Record results for at least 6 complete cycles with stability augmentation OFF. CCA: Test in Normal and Non-normal control states.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.8</td>
<td>Steady State Sideslip</td>
<td>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.</td>
<td>Approach or Landing</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>May be a series of snapshot test results using at least two rudder positions. Propeller driven airplanes must test in each direction.</td>
<td></td>
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</tr>
<tr>
<td>2.e</td>
<td>Landings</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
## TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

### <<OPS REQUIREMENTS>>

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.e.1</td>
<td>Normal Landing</td>
<td>±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±10% or ±10 ft (3 m) height. Additionally, for some simulators of airplanes with reversible flight control systems: ±10% or ±5 lbs (±2.2 daN) stick/column force.</td>
<td>Landing</td>
<td>Record results from a minimum of 200 ft (61 m) AGL to nosewheel touchdown. CCA: Test in Normal and Non-normal control states</td>
<td>X X X</td>
<td>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.</td>
</tr>
<tr>
<td>2.e.2</td>
<td>Minimum Flap Landing</td>
<td>±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±10% or ±10 ft (3 m) height. Additionally, for some simulators of airplanes with reversible flight control systems: ±10% or ±5 lbs (±2.2 daN) stick/column force.</td>
<td>Minimum Certified Landing Flap Configuration.</td>
<td>Record results from a minimum of 200 ft (61 m) AGL to nosewheel touchdown with airplane at near Maximum Landing Weight.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.e.3</td>
<td>Crosswind Landing</td>
<td>±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 some simulators of airplanes with reversible flight control systems: ±10% or ±3 lbs (±1.3 daN) wheel force ±10% or ±5 lb (±2.2 daN) rudder pedal force.</td>
<td>Landing</td>
<td>Record results from a minimum of 200 ft (61 m) AGL, through nosewheel touchdown, to 50% decrease in main landing gear touchdown speed.</td>
<td>X X X</td>
<td>Test data should include information on wind profile, for a crosswind component of 60% of the maximum described in the AFM as measured at 33 ft (10m) above the runway.</td>
</tr>
<tr>
<td>2.e.4</td>
<td>One Engine Inoperative Landing.</td>
<td>$\pm 3$ kt airspeed, $\pm 1.5^\circ$ pitch angle, $\pm 1.5^\circ$ angle of attack, $\pm 10%$ height or $\pm 10$ ft (3 m); $\pm 2^\circ$ bank angle, $\pm 2^\circ$ sideslip angle, $\pm 3^\circ$ heading.</td>
<td>Landing</td>
<td>Record results from a minimum of 200 ft (61 m) AGL, through nosewheel touchdown, to 50% decrease in main landing gear touchdown speed or less.</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>2.e.5</td>
<td>Autopilot landing (if applicable).</td>
<td>$\pm 5$ ft (1.5 m) flare height, $\pm 0.5$ sec $T_f$, $\pm 140$ ft/min (7 m/sec) rate of descent at touchdown. $\pm 10$ ft (3 m) lateral deviation during rollout.</td>
<td>Landing</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>T&lt;sub&gt;f&lt;/sub&gt; = duration of flare</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.e.6</td>
<td>All engines operating, autopilot, go around.</td>
<td>$\pm 3$ kt airspeed, $\pm 1.5^\circ$ pitch angle, $\pm 1.5^\circ$ angle of attack.</td>
<td>As per AFM</td>
<td>Normal, all-engines-operating, Go Around with the autopilot engaged (if applicable) at medium landing weight. CCA: Test in Normal and Non-normal control states</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Tolerance</td>
<td>Flight Conditions</td>
<td>Test details</td>
<td>Simulator Level</td>
<td>Information notes</td>
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<td>---------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>2.e.7</td>
<td>One engine inoperative go around.</td>
<td>±3 kt airspeed, ±1.5° pitch angle, ±1.5° angle of attack, ±2° bank angle, ±2° slideslip angle.</td>
<td>As per AFM ...............</td>
<td>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. CCA: Test in Normal and Non-normal control states</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>2.e.8</td>
<td>Directional control (rudder effectiveness) with symmetric reverse thrust.</td>
<td>±2°/sec yaw rate, ±5 kts airspeed.</td>
<td>Landing ....................</td>
<td>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.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>2.e.9</td>
<td>Directional control (rudder effectiveness) with symmetric reverse thrust.</td>
<td>±5 kt airspeed, ±3° heading angle.</td>
<td>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.</td>
<td>X X X</td>
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<td>----------------------------------------------------------------</td>
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</tr>
<tr>
<td>2.f</td>
<td>Ground Effect.</td>
<td>Test to demonstrate Ground Effect.</td>
<td>±1° elevator or 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.</td>
<td>Landing .......................... The Ground Effect model must be validated by the test selected and a rationale must be provided for selecting the particular test.</td>
<td>X X X</td>
<td>See paragraph 4, Ground Effect, in this attachment for additional information.</td>
</tr>
<tr>
<td>2.g</td>
<td>Windshear</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Test No.</td>
<td>Title</td>
<td>Flight Conditions</td>
<td>Tolerance</td>
<td>Simulator Level</td>
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</tr>
<tr>
<td>2.h</td>
<td>Flight Maneuver and Envelope Protection Functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.h.1</td>
<td>Overspeed</td>
<td>Cruise, Approach</td>
<td>±5 kt airspeed</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.h.2</td>
<td>Minimum Speed</td>
<td>Takeoff, Cruise, Approach</td>
<td>±3 kt airspeed</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.h.3</td>
<td>Load Factor</td>
<td>Cruise, Approach</td>
<td>±0.1g normal load factor</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.h.4</td>
<td>Pitch Angle</td>
<td>Cruise, Approach</td>
<td>±1.5° pitch angle</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.h.5</td>
<td>Bank Angle</td>
<td>Cruise, Approach</td>
<td>±2° or ±10% bank angle</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.h.6</td>
<td>Angle of Attack</td>
<td>±1.5° angle of attack</td>
<td>Second Segment Climb, and Approach or Landing</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
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<td>---------------------------------------------</td>
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<td>---</td>
</tr>
</tbody>
</table>

3. Motion System

3.a Frequency response.

<table>
<thead>
<tr>
<th>Based on Simulator Capability</th>
<th>N/A</th>
<th>The test must demonstrate frequency response of the motion system.</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>This test is not required as part of continuing qualification evaluations, and should be part of the MQTG.</th>
</tr>
</thead>
</table>

3.b (Reserved)

3.c (Reserved)

3.d Motion system repeatability

| ±0.05g actual platform linear acceleration. | None | A demonstration is required and must be made 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 |--------------------------------------------------|

3.e (Reserved)

3.f (Reserved)

4. Visual System


<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.a</td>
<td>Visual System Response Time: Relative responses of the motion system, visual system, and cockpit instruments must be coupled closely to provide integrated sensory cues. Visual change may start before motion response, but motion acceleration must be initiated before completion of the visual scan of the first video field containing different information</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td>See paragraph 14 of this attachment for additional information.</td>
</tr>
<tr>
<td>4.a.1</td>
<td>Latency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


These systems must respond to abrupt input at the pilot's position. The response must not be prior to that time when the airplane responds and may respond 300 ms (or less) after the airplane responds under the same conditions.

| N/A | Simultaneously record: 1) the output from the pilot's controller(s); 2) the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots' seats; 3) the output signal to the visual system display (including visual system analog delays); and 4) the output signal to the pilot's attitude indicator or an equivalent test approved by the Administrator. | X | X |

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. Simulator Latency is measured from the start of a control input to the appropriate perceivable change in flight instrument indication; visual system response; or motion system response (this does not include airplane response time as per the manufacturer's data).
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>Simultaneously</td>
<td>The transport delay is the time between the control input and the individual hardware (i.e., instruments, motion system, visual system) responses. If Transport Delay is the chosen method to demonstrate relative responses, it is expected that, when reviewing those existing tests where latency can be identified (e.g., short period, roll response) the sponsor and the NSPM will apply additional scrutiny to ensure proper simulator response.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transport Delay</td>
<td></td>
<td>record: 1) the output from the pilot’s controller(s); 2) the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots’ seats; 3) the output signal to the visual system display (including visual system analog delays); and 4) the output signal to the pilot’s attitude indicator or an equivalent test approved by the Administrator.</td>
<td></td>
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</tbody>
</table>
As an alternative to the Latency requirement, a transport delay objective test may be used to demonstrate that the simulator 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 the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the instrument displays, the motion system, and the visual system. An SOC is required.

<table>
<thead>
<tr>
<th>The response must not be prior to that time when the airplane responds and may respond 300 ms (or less) after controller movement.</th>
<th>A recordable start time for the test must be provided with the pilot flight control input. The migration of the signal must permit normal computation time to be consumed and must not alter the flow of information through the hardware/software system.</th>
<th>The transport delay is the time between the control input and the individual hardware (i.e., instruments, motion system, visual system) responses. If Transport Delay is the chosen method to demonstrate relative responses, it is expected that, when reviewing those existing tests where latency can be identified (e.g., short period, roll response, rudder response) the sponsor and the NSPM will apply additional scrutiny to ensure proper simulator response.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A .......................... ............................. X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The response must not be prior to that time when the airplane responds and may respond 150 ms (or less) after controller movement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A .......................... ............................. X X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.b</td>
<td>Field of View</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.b.1</td>
<td>Continuous collimated visual field of view.</td>
<td>Minimum continuous collimated field of view providing 45° horizontal and 30° vertical field of view for each pilot seat. Both pilot seat visual systems must be operable simultaneously.</td>
<td>N/A</td>
<td>Required as part of MQTG but not required as part of continuing evaluations.</td>
<td>X X</td>
<td>A vertical field of view of 30° may be insufficient to meet visual ground segment requirements.</td>
</tr>
<tr>
<td>4.b.2</td>
<td>(Reserved)</td>
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</tr>
<tr>
<td>4.b.3</td>
<td>(Reserved)</td>
<td></td>
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</tr>
<tr>
<td>4.c</td>
<td>(Reserved)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>4.d</td>
<td>Surface contrast ratio</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Notes:**
- The response must not be prior to that time when the airplane responds and may respond 150 ms (or less) after controller movement.
- X X indicates response, rudder response, the sponsor and the NSPM will apply additional scrutiny to ensure proper simulator response.
- A vertical field of view of 30° may be insufficient to meet visual ground segment requirements.
| Requirement | 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 | 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. |

<p>| 4.e. Highlight brightness | | | | | |</p>
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.f</td>
<td>Surface resolution</td>
<td>N/A</td>
<td>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.</td>
<td>X X</td>
<td>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.</td>
</tr>
<tr>
<td>Light point size</td>
<td>Not greater than three (3) arc minutes.</td>
<td>N/A</td>
<td>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.</td>
<td>X X The eye will subtend two arc minutes when positioned on a 3(^\circ) glide slope, 6,876 ft slant range from the centrally located threshold of a black runway surface painted with white threshold bars that are 16 ft wide with 4-foot gaps between the bars.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Light point size | Not greater than six (6) 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 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\(^\circ\) angle or less. |

4.h. Light point contrast ratio

4.h.1. (Reserved)
### TABLE A2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.h.2</td>
<td>For Level C and D simulators.</td>
<td>Not less than 25:1</td>
<td>N/A</td>
<td>An SOC is required and must include the relevant calculations.</td>
<td>X X</td>
<td>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.</td>
</tr>
</tbody>
</table>

4.i | Visual ground segment |
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 eye point, the airplane attitude, cockpit cut-off angle, and a visibility of 1200 ft (350 m) RVR. Simulator performance must be measured against the QTG calculations. Sponsors must provide this data for each simulator (regardless of previous qualification standards) to qualify the simulator for all instrument approaches. The data submitted must include at least the following:

1. Static airplane 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 eye point.
   iii. Static cockpit 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. Airplane pitch angle on approach.

3. Airplane data for manual testing:
   i. Gross weight.
### TABLE A2A—FULL FLIGHT(114,238),(885,719)(130,240),(888,720)SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Title</th>
<th>Tolerance</th>
<th>Flight Conditions</th>
<th>Test details</th>
<th>Simulator Level A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Information notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- (ii) airplane configuration.
- (iii) Approach airspeed.
Federal Aviation Administration, DOT

BEGIN INFORMATION

2. 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 PAA Advisory Circulars (AC) 25-7, as may be amended, Flight Test Guide for Certification of Transport Category Airplanes, and (AC) 25-8, as may be amended, Flight Test Guide for Certification of Part 23 Airplanes, for references and examples regarding flight testing requirements and techniques.

END INFORMATION

BEGIN INFORMATION

3. 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 a 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 with 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 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 feel 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 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 would satisfy 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 directly. 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 non-uniform 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 departure from this 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 reference measurements.

<table>
<thead>
<tr>
<th>Tolerance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T(P_o)$</td>
<td>±10% of $P_o$</td>
</tr>
<tr>
<td>$T(P_1)$</td>
<td>±20% of $P_1$</td>
</tr>
<tr>
<td>$T(P_2)$</td>
<td>±30% of $P_2$</td>
</tr>
<tr>
<td>$T(P_3)$</td>
<td>±10(n+1)% of $P_n$</td>
</tr>
<tr>
<td>$T(A_o)$</td>
<td>±10% of $A_o$</td>
</tr>
<tr>
<td>$T(A_d)$</td>
<td>±5% of $A_d$ residual band</td>
</tr>
</tbody>
</table>

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:

$T(P_o)$ ±10% of $P_o$

(c) Alternate method for Control Dynamics Evaluation. Another acceptable method of evaluating the response and the tolerance to be applied for airplanes with hydraulically powered flight controls and artificial feel systems is described below. Instead of free response measurements, the system is validated by measurements of control force and rate of movement. A sponsor using this alternate method to comply with the QPS requirements should perform the tests as follows:

(1) For each axis of pitch, roll and yaw, the control should be forced to its maximum extreme position for the following distinct rates. These tests would be conducted at typical taxi, takeoff, cruise and landing conditions.

(a) Static test. Slowly move the control such that approximately 100 seconds are required to achieve a full sweep. 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 in approximately 10 seconds.

(c) Fast dynamic test. Achieve a full sweep in approximately 4 seconds.

(1) The NSPM are open to alternative means such as the one described above. Such alternatives, however, would have to be justified and appropriate to the application. For example, the method described here may not apply to all manufacturers’ systems and certainly not to airplanes with reversible control systems. Hence, each case shall be considered on its own merit on an ad hoc basis.

If the NSPM finds that alternative methods do not result in satisfactory performance, then more conventionally accepted methods must be used.

END INFORMATION
Figure A2A
Underdamped Step Response

Displacement vs. Time

Figure A2B
Critically and Overdamped Step Response
4. 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.

5. [Reserved]

6. [Reserved]

7. [Reserved]

8. [Reserved]

9. [Reserved]

10. [Reserved]

11. [Reserved]

12. [Reserved]

13. [Reserved]

14. [Reserved]

15. [Reserved]

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

a. In recent years, considerable progress has been made in the improvement of aerodynamic modeling techniques. Additionally, those who have demonstrated success in combining these modeling techniques with minimal flight testing have incorporated the use of highly mature flight controls models and have had extensive experience in comparing the output of their effort with actual flight test data.

b. It has become standard practice for experienced simulator manufacturers to use modeling techniques to establish databases 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.

(3) The authorized uses of Level A and Level B simulators (as listed in the appropriate Commercial, Instrument, or Airline Transport Pilot and/or Type Rating Practical Test Standards) for “initial,” “transition,” or “upgrade” training, still requires additional flight training and/or flight testing/checking in the airplane or in a Level C or Level D simulator.

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 full flight simulators.

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 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).

TABLE A2E—ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION

<table>
<thead>
<tr>
<th>Information</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test reference number and title</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative data sources, procedures, and instrumentation</td>
<td>TIR, AFM, or Design data may be used.</td>
<td></td>
</tr>
<tr>
<td>Notes and reminders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a.2. Performance. Taxi. Rate of Turn vs. Nosewheel Steering Angle.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Alternative data sources, procedures, and instrumentation</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Notes and reminders</td>
<td>A single procedure may not be adequate for all airplane steering systems, therefore appropriate measurement procedures must be devised and proposed for NSPM concurrence.</td>
<td></td>
</tr>
<tr>
<td>1.b.1. Performance. Takeoff. Ground Acceleration Time and Distance</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alternative data sources, procedures, and instrumentation</td>
<td>Preliminary certification data may be used. Data may be acquired by using a stopwatch, 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.</td>
<td></td>
</tr>
<tr>
<td>Notes and reminders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test reference number and title</td>
<td>Sim level</td>
<td>Alternative data sources, procedures, and instrumentation</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>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.</td>
<td>X X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>1.b.3. Performance. Takeoff. Minimum Unstick Speed ($V_{mu}$) or equivalent test to demonstrate early rotation takeoff characteristics.</td>
<td>X X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>1.b.4. Performance. Takeoff. Normal Takeoff.</td>
<td>X X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>1.b.5. Performance. Takeoff. Critical Engine Failure during Takeoff.</td>
<td>X X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>1.b.6. Performance. Takeoff. Crosswind Takeoff.</td>
<td>X X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>1.b.7. Performance. Takeoff. Rejected Takeoff.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: Calibrated airplane instruments, thrust lever position, engine parameters, and distance (e.g., runway markers). A stopwatch is required.</td>
</tr>
<tr>
<td>1.b.8. Dynamic Engine Failure After Takeoff.</td>
<td>N/A N/A</td>
<td>Applicable only to Level C or Level D FSTDs.</td>
</tr>
<tr>
<td>1.c.1. Performance. Climb. Normal Climb all engines operating.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: Calibrated airplane instruments and engine power through-out the climb range.</td>
</tr>
<tr>
<td>1.c.2. Performance. Climb. One engine Inoperative Climb.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: Calibrated airplane instruments and engine power through-out the climb range.</td>
</tr>
<tr>
<td>1.c.3. One Engine Inoperative—Enroute Climb.</td>
<td>N/A N/A</td>
<td>Applicable only to Level C or Level D FSTDs.</td>
</tr>
<tr>
<td>1.c.4. Performance. Climb. One Engine Inoperative Approach Climb (if approved AFM requires specific performance in icing conditions).</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of calibrated airplane instruments and engine power through-out the climb range.</td>
</tr>
<tr>
<td>Test reference number and title</td>
<td>Sim level</td>
<td>Alternative data sources, procedures, and instrumentation</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>1.d.1. Cruise/Descent. Level flight acceleration.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time.</td>
</tr>
<tr>
<td>1.d.2. Cruise/Descent. Level flight deceleration.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time.</td>
</tr>
<tr>
<td>1.d.3. Cruise Performance ..........</td>
<td>N/A N/A</td>
<td>Applicable only to Level C or Level D FSTDs.</td>
</tr>
<tr>
<td>1.d.4. Cruise/Descent. Idle descent.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time.</td>
</tr>
<tr>
<td>1.d.5. Cruise/Descent. Emergency Descent.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video of: calibrated airplane instruments, thrust lever position, engine parameters, and elapsed time.</td>
</tr>
<tr>
<td>1.e.1. Performance. Stopping. Deceleration time and distance, using manual application of wheel brakes and no reverse thrust on a dry runway.</td>
<td>X X</td>
<td>Data may be acquired during landing tests using a stopwatch, runway markers, and a synchronized video of: calibrated airplane instruments, thrust lever position and the pertinent parameters of engine power.</td>
</tr>
<tr>
<td>1.e.2. Performance. Ground. Deceleration Time and Distance, using reverse thrust and no wheel brakes.</td>
<td>X X</td>
<td>Data may be acquired during landing tests using a stopwatch, runway markers, and a synchronized video of: calibrated airplane instruments, thrust lever position and the pertinent parameters of engine power.</td>
</tr>
<tr>
<td>1.e.3. Stopping Distance—wheel brakes, and no reverse thrust on a wet runway.</td>
<td>N/A N/A</td>
<td>Applicable only to Level C and Level D FSTDs.</td>
</tr>
<tr>
<td>1.e.4. Stopping Distance—wheel brakes, and no reverse thrust on an icy runway.</td>
<td>N/A N/A</td>
<td>Applicable only to Level C and Level D FSTDs.</td>
</tr>
<tr>
<td>1.f.2. Performance. Engines. Deceleration.</td>
<td>X X</td>
<td>Data may be acquired with a synchronized video recording of: engine instruments and throttle position.</td>
</tr>
<tr>
<td>2.a.1.a. Handling Qualities. Static Control Checks. Pitch Controller Position vs. Force and Surface Position Calibration.</td>
<td>X X</td>
<td>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 (for airplanes with reversible control systems, this function should be accomplished with winds less than 5 kts.). Force data may be acquired by using a hand-held force gauge at the same column position data points.</td>
</tr>
<tr>
<td>Test reference number and title</td>
<td>Sim level</td>
<td>Alternative data sources, procedures, and instrumentation</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>2.a.2.a. Handling Qualities. Static Control Checks. Roll Controller Position vs. Force and Surface Position Calibration.</td>
<td>X X</td>
<td>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 (for airplanes with reversible control systems, this function should be accomplished with winds less than 5 kts.). Force data may be acquired by using a hand-held force gauge at the same wheel position data points.</td>
</tr>
<tr>
<td>2.a.3.a. Handling Qualities. Static Control Checks. Rudder Pedal Position vs. Force and Surface Position Calibration.</td>
<td>X X</td>
<td>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 (for airplanes with reversible control systems, this function should be accomplished with winds less than 5 kts.). Force data may be acquired by using a hand-held force gauge at the same rudder pedal position data points.</td>
</tr>
<tr>
<td>2.a.4. Handling Qualities. Static Control Checks. Nosewheel Steering Controller Force &amp; Position.</td>
<td>X X</td>
<td>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.</td>
</tr>
<tr>
<td>2.a.5. Handling Qualities. Static Control Checks. Rudder Pedal Steering Calibration.</td>
<td>X X</td>
<td>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 nose wheel position.</td>
</tr>
<tr>
<td>2.a.6. Handling Qualities. Static Control Checks. Pitch Trim Indicator vs. Surface Position Calibration.</td>
<td>X X</td>
<td>Data may be acquired through calculations.</td>
</tr>
<tr>
<td>2.a.7. Handling qualities. Static control tests. Pitch trim rate.</td>
<td>X X</td>
<td>Data may be acquired by using a synchronized video of pitch trim indication and elapsed time through range of trim indication.</td>
</tr>
<tr>
<td>2.a.8. Handling Qualities. Static Control tests. Alignment of Cockpit Throttle Lever Angle vs. Selected engine parameter.</td>
<td>X X</td>
<td>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.</td>
</tr>
<tr>
<td>2.a.9. Handling qualities. Static control tests. Brake pedal position vs. force and brake system pressure calibration.</td>
<td>X X</td>
<td>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.</td>
</tr>
<tr>
<td>Test reference number and title</td>
<td>Alternative data sources, procedures, and instrumentation</td>
<td>Notes and reminders</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>2.c.1. Handling qualities. Longitudinal control tests. Power change dynamics.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments and throttle position.</td>
</tr>
<tr>
<td>2.c.2. Handling qualities. Longitudinal control tests. Flap/slat change dynamics.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: Calibrated airplane instruments and flap/slat position.</td>
</tr>
<tr>
<td>2.c.3. Handling qualities. Longitudinal control tests. Spoiler/speedbrake change dynamics.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments and spoiler/speedbrake position.</td>
</tr>
<tr>
<td>2.c.4. Handling qualities. Longitudinal control tests. Gear change dynamics.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments and gear position.</td>
</tr>
<tr>
<td>2.c.5. Handling qualities. Longitudinal control tests. Longitudinal trim.</td>
<td>X</td>
<td>Data may be acquired through use of an inertial measurement system and a synchronized video of: The cockpit controls position (previously calibrated to show related surface position) and the engine instrument readings.</td>
</tr>
<tr>
<td>2.c.6. Handling qualities. Longitudinal control tests. Longitudinal maneuvering stability (stick force/g).</td>
<td>X</td>
<td>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.</td>
</tr>
<tr>
<td>2.c.7. Handling qualities. Longitudinal control tests. Longitudinal static stability.</td>
<td>X</td>
<td>Data may be acquired through the use of a synchronized video of: the airplane flight instruments and a hand-held force gauge.</td>
</tr>
<tr>
<td>2.c.8. Handling qualities. Longitudinal control tests. Stall characteristics.</td>
<td>X</td>
<td>Data may be acquired through a synchronized video recording of: A stopwatch 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.</td>
</tr>
<tr>
<td>2.c.9. Handling qualities. Longitudinal control tests. Phugoid dynamics.</td>
<td>X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>2.c.10. Handling qualities. Longitudinal control tests. Short period dynamics.</td>
<td>X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>2.d.1. Handling qualities. Lateral directional tests. Minimum control speed, air $(V_{\text{mca}}$ or $V_{\text{mci}}$), per applicable airworthiness standard or Low speed engine inoperative handling characteristics in the air.</td>
<td>X</td>
<td>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 cockpit controls.</td>
</tr>
<tr>
<td>Test reference number and title</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2.d.2. Handling qualities. Lateral directional tests. Roll response (rate).</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.3. Handling qualities. Lateral directional tests. Roll response to cockpit roll controller step input.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.4. Handling qualities. Lateral directional tests. Spiral stability.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.5. Handling qualities. Lateral directional tests. Engine inoperative trim.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.6. Handling qualities. Lateral directional tests. Rudder response.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.7. Handling qualities. Lateral directional tests. Dutch roll, (yaw damper OFF).</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.8. Handling qualities. Lateral directional tests. Steady state sideslip.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.e.1. Handling qualities. Landings. Normal landing.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
### Information

<table>
<thead>
<tr>
<th>Test reference number and title</th>
<th>Sim level</th>
<th>Alternative data sources, procedures, and instrumentation</th>
<th>Notes and reminders</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.e.3. Handling qualities. Landings. Crosswind landing.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls.</td>
<td></td>
</tr>
<tr>
<td>2.e.4. Handling qualities. Landings. One engine inoperative landing.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip.</td>
<td></td>
</tr>
<tr>
<td>2.e.5. Handling qualities. Landings. Autopilot landing (if applicable).</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip.</td>
<td></td>
</tr>
<tr>
<td>2.e.6. Handling qualities. Landings. All engines operating, autopilot, go around.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip.</td>
<td></td>
</tr>
<tr>
<td>2.e.7. Handling qualities. Landings. One engine inoperative go around.</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip.</td>
<td></td>
</tr>
<tr>
<td>2.e.8. Handling qualities. Landings. Directional control (rudder effectiveness with symmetric thrust).</td>
<td>X</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip.</td>
<td></td>
</tr>
<tr>
<td>2.e.9. Handling qualities. Landings. Directional control (rudder effectiveness with asymmetric reverse thrust).</td>
<td></td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls. Normal and lateral accelerations may be recorded in lieu of AOA and sideslip.</td>
<td></td>
</tr>
<tr>
<td>2.f. Handling qualities. Ground effect. Test to demonstrate ground effect.</td>
<td>X</td>
<td>Data may be acquired by using calibrated airplane instruments, an inertial measurement system, and a synchronized video of: The calibrated airplane instruments; the force/position measurements of cockpit controls.</td>
<td></td>
</tr>
</tbody>
</table>
ATTACHMENT 3 TO APPENDIX A TO PART 60—
SIMULATOR SUBJECTIVE EVALUATION

1. DISCUSSION

BEGIN INFORMATION

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 must not be used to limit or exceed the authorizations for use of a given level of simulator as described on the Statement of Qualification or as may be 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 is 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. Previously qualified simulators with certain early generation Computer Generated Image (CGI) visual systems, are limited by either 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, SP3, and SP2.

2. Some 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).

The NSPM will evaluate each device to determine the appropriate qualification level.
### TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tasks in this table are subject to evaluation if appropriate for the airplane simulated as indicated in the SOQ Configuration List and/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.</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Preparation For Flight. 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.</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.</td>
<td>Surface Operations (Pre-Take-Off)</td>
<td></td>
</tr>
<tr>
<td>2.a.</td>
<td>Engine Start.</td>
<td></td>
</tr>
<tr>
<td>2.a.1.</td>
<td>Normal start</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.a.2.</td>
<td>Alternate start procedures</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.a.3.</td>
<td>Abnormal starts and shutdowns (e.g., hot/hung start, tail pipe fire)</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.b.</td>
<td>Pushback/Powerback</td>
<td>X X</td>
</tr>
<tr>
<td>2.c.</td>
<td>Taxi.</td>
<td></td>
</tr>
<tr>
<td>2.c.1.</td>
<td>Thrust response</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.c.2.</td>
<td>Power lever friction</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.c.3.</td>
<td>Ground handling</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.c.4.</td>
<td>Nose wheel scuffing</td>
<td>X X</td>
</tr>
<tr>
<td>2.c.5.</td>
<td>Brake operation (normal and alternate/emergency)</td>
<td>X X X X</td>
</tr>
<tr>
<td>2.c.6.</td>
<td>Brake fade (if applicable)</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.</td>
<td>Take-off.</td>
<td></td>
</tr>
<tr>
<td>3.a.1.</td>
<td>Airplane/engine parameter relationships</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.2.</td>
<td>Acceleration characteristics (motion)</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.3.</td>
<td>Nose wheel and rudder steering</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.4.</td>
<td>Crosswind (maximum demonstrated)</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.5.</td>
<td>Special performance (e.g., reduced $V_1$, max de-rate, short field operations)</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.6.</td>
<td>Low visibility take-off</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.7.</td>
<td>Landing gear, wing flap leading edge device operation</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.a.8.</td>
<td>Contaminated runway operation</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.b.</td>
<td>Abnormal/emergency</td>
<td></td>
</tr>
<tr>
<td>3.b.1.</td>
<td>Rejected Take-off</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.b.2.</td>
<td>Rejected special performance (e.g., reduced $V_1$, max de-rate, short field operations).</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.b.3.</td>
<td>With failure of most critical engine at most critical point, continued take-off</td>
<td>X X X X</td>
</tr>
</tbody>
</table>
## TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.b.4</td>
<td>With wind shear</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.b.5</td>
<td>Flight control system failures, reconfiguration modes, manual reversion and associated handling.</td>
<td>X X X X</td>
</tr>
<tr>
<td>3.b.6</td>
<td>Rejected takeoff with brake fade</td>
<td>X X</td>
</tr>
<tr>
<td>3.b.7</td>
<td>Rejected, contaminated runway</td>
<td>X X</td>
</tr>
<tr>
<td>(i)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Climb</td>
<td></td>
</tr>
<tr>
<td>4.a.</td>
<td>Normal</td>
<td>X X X X</td>
</tr>
<tr>
<td>4.b.</td>
<td>One or more engines inoperative</td>
<td>X X X X</td>
</tr>
<tr>
<td>5.</td>
<td>Cruise</td>
<td></td>
</tr>
<tr>
<td>5.a.</td>
<td>Performance characteristics (speed vs. power)</td>
<td>X X X X</td>
</tr>
<tr>
<td>5.b.</td>
<td>High altitude handling</td>
<td>X X X X</td>
</tr>
<tr>
<td>5.c.</td>
<td>High Mach number handling (Mach tuck, Mach buffet) and recovery (trim change)</td>
<td>X X X X</td>
</tr>
<tr>
<td>5.d.</td>
<td>Overspeed warning (in excess of $V_{mo}$ or $M_{mo}$)</td>
<td>X X X X</td>
</tr>
<tr>
<td>5.e.</td>
<td>High IAS handling</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.</td>
<td>Maneuvers</td>
<td></td>
</tr>
<tr>
<td>6.a.</td>
<td>High angle of attack, approach to stalls, stall warning, buffet, and g-break (take-off, cruise, approach, and landing configuration).</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.b.</td>
<td>Flight envelope protection (high angle of attack, bank limit, overspeed, etc)</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.c.</td>
<td>Turns with/without speedbrake/spoilers deployed</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.d.</td>
<td>Normal and steep turns</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.e.</td>
<td>In flight engine shutdown and restart (assisted and windmill)</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.f.</td>
<td>Maneuvering with one or more engines inoperative, as appropriate</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.g.</td>
<td>Specific flight characteristics (e.g., direct lift control)</td>
<td>X X X X</td>
</tr>
<tr>
<td>6.h.</td>
<td>Flight control system failures, reconfiguration modes, manual reversion and associated handling.</td>
<td>X X X X</td>
</tr>
<tr>
<td>7.</td>
<td>Descent</td>
<td></td>
</tr>
<tr>
<td>7.a.</td>
<td>Normal</td>
<td>X X X X</td>
</tr>
<tr>
<td>7.b.</td>
<td>Maximum rate (clean and with speedbrake, etc)</td>
<td>X X X X</td>
</tr>
<tr>
<td>7.c.</td>
<td>With autopilot</td>
<td>X X X X</td>
</tr>
<tr>
<td>7.d.</td>
<td>Flight control system failures, reconfiguration modes, manual reversion and associated handling.</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.</td>
<td>Instrument Approaches and Landing</td>
<td></td>
</tr>
</tbody>
</table>
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 windshear conditions, and with relevant system failures, including the failure of the Flight Director. If Standard Operating Procedures allow use of autopilot for non-precision approaches, evaluation of the autopilot will be included. Level A simulators are not authorized to credit the landing maneuver.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.a.1.</td>
<td>PAR</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.a.2.</td>
<td>CAT I/GBAS (ILS/MLS) published approaches</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(i) Manual approach with/without flight director including landing</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(ii) Autopilot/autothrottle coupled approach and manual landing</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(iii) Manual approach to DH and go-around all engines.</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(iv) Manual one engine out approach to DH and go-around</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(v) Manual approach controlled with and without flight director to 30 m (100 ft)</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>below CAT I minima.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. With cross-wind (maximum demonstrated)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. With windshear</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(vi) Autopilot/autothrottle coupled approach, one engine out to DH and go-</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>around approach, one engine out to DH and go-around.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(vii) Approach and landing with minimum/standby electrical power</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.a.3.</td>
<td>CAT II/GBAS (ILS/MLS) published approaches</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(i) Autopilot/autothrottle coupled approach to DH and landing</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(ii) Autopilot/autothrottle coupled approach to DH and go-around</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(iii) Autocoupled approach to DH and manual go-around</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(iv) Category II published approach (auto-coupled, autothrottle)</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.a.4.</td>
<td>CAT III/GBAS (ILS/MLS) published approaches</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(i) Autopilot/autothrottle coupled approach to land and rollout</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(ii) Autopilot/autothrottle coupled approach to DH/Alert Height and go-around</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>(iii) Autopilot/autothrottle coupled approach to land and rollout with one</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>engine out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iv) Autopilot/autothrottle coupled approach to DH/Alert Height and go-around</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>A. With generator failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. With 10 knot tail wind</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. With 10 knot crosswind</td>
<td></td>
</tr>
<tr>
<td>8.b.1.</td>
<td>NDB</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.b.2.</td>
<td>VOR, VOR/DME, VOR/TAC</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.b.3.</td>
<td>RNAV (GNSS/GPS)</td>
<td>X X X X</td>
</tr>
<tr>
<td>8.b.4.</td>
<td>ILS LLZ (LOC), LLZ/LOC/BC</td>
<td>X X X X</td>
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</tbody>
</table>
### TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.b.5</td>
<td>ILS offset localizer</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.6</td>
<td>Direction finding facility (ADF/SDF)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.7</td>
<td>Airport surveillance radar (ASR)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.8</td>
<td>Visual Approaches (Visual Segment) And Landings</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>8.b.9</td>
<td>Maneuvering, normal approach and landing, all engines operating with and without visual approach aid guidance.</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.10</td>
<td>Approach and landing with one or more engines inoperative</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.11</td>
<td>Operation of landing gear, flaps/slats and speedbrakes (normal and abnormal)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.12</td>
<td>Approach and landing with crosswind (max. demonstrated)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.13</td>
<td>Approach to land with windshear on approach</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.14</td>
<td>Approach and landing with flight control system failures, reconfiguration modes, manual reversion and associated handling (most significant degradation which is probable).</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.15</td>
<td>Approach and landing with trim malfunctions</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.16</td>
<td>Longitudinal trim malfunction</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.17</td>
<td>Lateral-directional trim malfunction</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.18</td>
<td>Approach and landing with standby (minimum) electrical/hydraulic power</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.19</td>
<td>Approach and landing from circling conditions (circling approach)</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.20</td>
<td>Approach and landing from visual traffic pattern</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.21</td>
<td>Approach and landing from non-precision approach</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.22</td>
<td>Approach and landing from precision approach</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.23</td>
<td>Approach procedures with vertical guidance (APV), e.g., SBAS.</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.24</td>
<td>Missed Approach.</td>
<td></td>
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<tr>
<td>8.b.25</td>
<td>All engines</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.26</td>
<td>One or more engine(s) out</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.27</td>
<td>With flight control system failures, reconfiguration modes, manual reversion and associated handling.</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.28</td>
<td>Surface Operations (Landing roll and taxi).</td>
<td></td>
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<td></td>
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<tr>
<td>8.b.29</td>
<td>Spoiler operation</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.30</td>
<td>Reverse thrust operation</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.31</td>
<td>Directional control and ground handling, both with and without reverse thrust</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.32</td>
<td>Reduction of rudder effectiveness with increased reverse thrust (rear pod-mounted engines).</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.33</td>
<td>Brake and anti-skid operation with dry, wet, and icy conditions</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.34</td>
<td>Brake operation, to include auto-braking system where applicable</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>8.b.35</td>
<td>Any Flight Phase.</td>
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# TABLE A3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
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<tbody>
<tr>
<td>12.a.</td>
<td>Airplane and engine systems operation.</td>
<td>A</td>
</tr>
<tr>
<td>12.a.1.</td>
<td>Air conditioning and pressurization (ECS)</td>
<td>X</td>
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<tr>
<td>12.a.2.</td>
<td>De-icing/anti-icing</td>
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<tr>
<td>12.a.3.</td>
<td>Auxiliary power unit (APU)</td>
<td>X</td>
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<tr>
<td>12.a.4.</td>
<td>Communications</td>
<td>X</td>
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<tr>
<td>12.a.5.</td>
<td>Electrical</td>
<td>X</td>
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<tr>
<td>12.a.6.</td>
<td>Fire and smoke detection and suppression</td>
<td>X</td>
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<tr>
<td>12.a.7.</td>
<td>Flight controls (primary and secondary)</td>
<td>X</td>
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<tr>
<td>12.a.8.</td>
<td>Fuel and oil, hydraulic and pneumatic</td>
<td>X</td>
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<tr>
<td>12.a.9.</td>
<td>Landing gear</td>
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<tr>
<td>12.a.10.</td>
<td>Oxygen</td>
<td>X</td>
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<tr>
<td>12.a.11.</td>
<td>Engine</td>
<td>X</td>
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<tr>
<td>12.a.12.</td>
<td>Airborne radar</td>
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<tr>
<td>12.a.13.</td>
<td>Autopilot and Flight Director</td>
<td>X</td>
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<tr>
<td>12.a.14.</td>
<td>Collision avoidance systems. (e.g., (E)GPWS, TCAS)</td>
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<tr>
<td>12.a.15.</td>
<td>Flight control computers including stability and control augmentation</td>
<td>X</td>
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<tr>
<td>12.a.16.</td>
<td>Flight display systems</td>
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<tr>
<td>12.a.17.</td>
<td>Flight management computers</td>
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<tr>
<td>12.a.18.</td>
<td>Head-up guidance, head-up displays</td>
<td>X</td>
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<tr>
<td>12.a.20.</td>
<td>Stall warning/avoidance</td>
<td>X</td>
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<tr>
<td>12.a.21.</td>
<td>Wind shear avoidance equipment</td>
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<tr>
<td>12.a.22.</td>
<td>Automatic landing aids</td>
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<tr>
<td>12.b.</td>
<td>Airborne procedures</td>
<td>A</td>
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<tr>
<td>12.b.1.</td>
<td>Holding</td>
<td>X</td>
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<tr>
<td>12.b.2.</td>
<td>Air hazard avoidance (Traffic, Weather)</td>
<td>X</td>
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<td>12.b.3.</td>
<td>Windshear.</td>
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<td>12.b.4.</td>
<td>Effects of airframe ice</td>
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<td>12.c.</td>
<td>Engine shutdown and parking</td>
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<tr>
<td>12.c.1.</td>
<td>Engine and systems operation</td>
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<tr>
<td>12.c.2.</td>
<td>Parking brake operation</td>
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TABLE A3G—FUNCTIONS AND SUBJECTIVE TESTS

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<tr>
<th>Item number</th>
<th>Operations tasks</th>
<th>Simulator level</th>
</tr>
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<tr>
<td></td>
<td></td>
<td>A   B   C   D</td>
</tr>
<tr>
<td>1.</td>
<td>Simulator Power Switch(es)</td>
<td>X   X   X   X</td>
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<tr>
<td>2.</td>
<td>Airplane conditions.</td>
<td></td>
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<tr>
<td>2.a</td>
<td>Gross weight, center of gravity, fuel loading and allocation</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>2.b</td>
<td>Airplane systems status</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>2.c</td>
<td>Ground crew functions (e.g., ext. power, push back)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>3.</td>
<td>Airports.</td>
<td></td>
</tr>
<tr>
<td>3.a</td>
<td>Number and selection</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>3.b</td>
<td>Runway selection</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>3.c</td>
<td>Runway surface condition (e.g., rough, smooth, icy, wet)</td>
<td>X</td>
</tr>
<tr>
<td>3.d</td>
<td>Preset positions (e.g., ramp, gate, #1 for takeoff, takeoff position, over FAF)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>3.e</td>
<td>Lighting controls</td>
<td>X   X   X   X</td>
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<tr>
<td>4.</td>
<td>Environmental controls.</td>
<td></td>
</tr>
<tr>
<td>4.a</td>
<td>Visibility (statute miles (kilometers))</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>4.b</td>
<td>Runway visual range (in feet (meters))</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>4.c</td>
<td>Temperature</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>4.d</td>
<td>Climate conditions (e.g., ice, snow, rain)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>4.e</td>
<td>Wind speed and direction</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>4.f</td>
<td>Windshear</td>
<td>X</td>
</tr>
<tr>
<td>4.g</td>
<td>Clouds (base and tops)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>5.</td>
<td>Airplane system malfunctions (Inserting and deleting malfunctions into the simulator)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>6.</td>
<td>Locks, Freezes, and Repositioning</td>
<td></td>
</tr>
<tr>
<td>6.a</td>
<td>Problem (all) freeze / release</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>6.b</td>
<td>Position (geographic) freeze/release</td>
<td>X   X   X   X</td>
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<tr>
<td>6.c</td>
<td>Repositioning (locations, freezes, and releases)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>6.d</td>
<td>Ground speed control</td>
<td>X   X   X   X</td>
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<tr>
<td>7.</td>
<td>Remote IOS</td>
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<tr>
<td>8.</td>
<td>Sound Controls On / off / adjustment</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>9.</td>
<td>Motion / Control Loading System</td>
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</tr>
<tr>
<td>9.a</td>
<td>On / off / emergency stop</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>9.b</td>
<td>Crosstalk (motion response in a given degree of freedom not perceptible in other degrees of freedom)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>9.c</td>
<td>Smoothness (no perceptible “turn-around bump” as the direction of motion reverses with the simulator being “flown” normally)</td>
<td>X   X   X   X</td>
</tr>
<tr>
<td>10.</td>
<td>Observer Seats / Stations. Position / Adjustment / Positive restraint system</td>
<td>X   X   X   X</td>
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</table>
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 their 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) Cockpit 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. Cockpit Checks.
(1) Cockpit 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) Nose Wheel 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 visual models and perform the following checks with Day, Dusk and Night selected, as appropriate):
(1) Visual Controls.
(a) Daylight, Dusk, Night Scene Controls.
(b) Cockpit “Daylight” ambient lighting.
(c) Environment Light Controls.
(d) Runway Light Controls.
(e) Taxiway Light Controls.
(2) Scene 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 & 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 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 m.
(g) Runway end, red stop bars.
(h) Braking fade effect.
(i) Brake temperature indications.
(j) Engine Failure between VI and V2.
(k) Normal Takeoff:
(i) 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.
(8) 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 Airplanes.
(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.
1. 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.
2. 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/sec² 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 Airplanes.
(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° 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) Auto pilot 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.
3. 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 nose wheel.
(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.
(a) Aircraft handling.
(b) Aircraft handling.
(c) Radio Aids and instruments.
(d) Visual scene content and cues.
(e) Motion cues.
(f) Sound cues.
(6) Non-precision Approach—All Engines Operating.
(a) Aircraft handling.
(b) Aircraft handling.
(c) Radio Aids and instruments.
(d) Visual scene content and cues.
(e) Motion cues.
(f) Sound cues.
(7) Circling Approach.
(a) Aircraft handling.
(b) Aircraft handling.
(c) Radio Aids and instruments.
(d) Visual scene content and cues.
(e) Motion cues.
(f) Sound cues.
(8) 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.
4. 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 nose wheel.
(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.
(a) Aircraft handling.
(b) Aircraft handling.
(c) Radio Aids and instruments.
(d) Visual scene content and cues.
(e) Motion cues.
(f) Sound cues.
(6) Non-precision Approach—All Engines Operating.
(a) Aircraft handling.
(b) Aircraft handling.
(c) Radio Aids and instruments.
(d) Visual scene content and cues.
(e) Motion cues.
(f) Sound cues.
(7) Circling Approach.
(a) Aircraft handling.
(b) Aircraft handling.
(c) Radio Aids and instruments.
(d) Visual scene content and cues.
(e) Motion cues.
(f) Sound cues.
(8) 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.
(8) Non-precision Approach—One Engine Inoperative.
   (a) Aircraft handling.
   (b) Aircraft handling.
   (c) Radio Aids and instruments.
   (d) Visual scene content and cues.
   (e) Motion cues.
   (f) Sound cues.
   (b) One Engine Inoperative Go-around.
   (a) Aircraft handling.
   (b) Aircraft handling.
   (c) Radio Aids and instruments.
   (d) Visual scene content and cues.
   (e) Motion cues.
   (f) Sound cues.
   (9) One Engine Inoperative Go-around.
   (a) Aircraft handling.
   (b) Aircraft handling.
   (c) Radio Aids and instruments.
   (d) Visual scene content and cues.
   (e) Motion cues.
   (f) Sound cues.
   (10) CAT I Approach and Landing with raw-data ILS.
       (a) Aircraft handling.
       (b) Aircraft handling.
       (c) Radio Aids and instruments.
       (d) Visual scene content and cues.
       (e) Motion cues.
       (f) Sound cues.
       (11) CAT I Approach and Landing with Limiting Crosswind.
           (a) Aircraft handling.
           (b) Aircraft handling.
           (c) Radio Aids and instruments.
           (d) Visual scene content and cues.
           (e) Motion cues.
           (f) 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 visual scene content as described below:
           (1) Visual Controls.
               (a) Daylight, Dusk, Night Scene Controls.
               (b) Cockpit ambient lighting during "daylight" conditions.
               (c) Environment Light Controls.
               (d) Runway Light Controls.
               (e) Taxiway Light Controls.
               (f) Approach Light Controls.
           (2) Scene Content.
               (a) Airport environment for correct terrain and significant features.
               (b) Runs for correct markings, runway slope, directionality of runway lights.
               (c) Visual scene for aliasing, colour, 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) Scene 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) Scene 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) Scene content.
                   (a) Runway thresholds.
                   (b) Touchdown zone lights. At 200 ft radio altitude and still on glide slope, select Flight Freeze. Check the following:
               (6) Scene content.
                   (a) Runway markings.
                   Set the weather to Category I conditions and check the following:
               (7) Scene 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) Scene content.
                   (a) Runway markings.
                   Select night/dusk (twilight) conditions and check the following:
               (9) Scene 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) Scene content.
                   (a) Visual ground segment.
                   Set WX to "missed approach" conditions, release Flight Freeze, re-select Flight Freeze at 15 feet radio altitude, and check the following:
               (11) Scene content.
                   (a) Visual ground segment.
                   When on the ground, stop the aircraft. Set 0 feet RVR, ensure strobe/beacon lights are switched on and check the following:
               (12) Scene content.
                   (a) Visual effect of strobe and beacon.
Federal Aviation Administration, DOT

Reposition to final approach, set weather to “Clear,” continue approach for an automatic landing, and check the following:

1. Scene content.
2. Visual cues during flare to assess sink rate.
4. Cockpit height above ground.


(1) After Landing Checks.
(2) Taxi back to gate (Check the following):
(a) Visual model satisfactory.
(b) Parking brake operation satisfactory.
(c) 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

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: FSTD Information Form
Figure A4C—Sample Qualification Test Guide Cover Page
Figure A4D—Sample Statement of Qualification—Certificate
Figure A4E—Sample Statement of Qualification—Configuration List
Figure A4F—Sample Statement of Qualification “List of Qualified Tasks
Figure A4G—Sample Continuing Qualification Evaluation Requirements Page
Figure A4H—Sample MQTG Index of Effective FSTD 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 (FSTD Manufacturer),
(Aircraft Type/Level) Flight Simulation Training Device (FSTD), (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 FSTD will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FSTD will be sponsored under the following options: (Select One)

☐ The FSTD will be used within the sponsor’s FAA approved training program and placed on the sponsor’s Training/Operations Specifications; or

☐ The FSTD will be used for dry lease only in accordance with Paragraph 3b, FSTD Guidance Bulletin 03-08.

We agree to provide the formal request for the evaluation (Ref: Appendix 4, AC 120-40B) 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 “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:

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: FSTD Information Form
cc: POI/TCPM
## Section 1. FSTD Information and Characteristics

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ATTACHMENT 4 TO APPENDIX A TO PART 60—
Figure A4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
Attachment: FSTD Information Form

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**Section 2. Supplementary Information**

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**Section 3. Training, Testing and Checking Considerations**

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</tr>
</tbody>
</table>
ATTACHMENT 4 TO APPENDIX A TO PART 60—
Figure A4C — 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
Federal Aviation Administration
National Simulator Program

Statement 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 found it to meet the standards set forth in
AC 120-40B

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 January 31, 2009

Unless sooner rescinded or extended by the National Simulator Program Manager

December 15, 2007 (date)  J. B. Checkin, Jr. (for the NSPM)
ATTACHMENT 4 TO APPENDIX A TO PART 60—
Figure A4E – Sample Statement of Qualification; Configuration List

INFORMATION
STATEMENT of QUALIFICATION
CONFIGURATION LIST

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<th>Date:</th>
<th>Section 1. FSTD Information and Characteristics</th>
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<tr>
<td></td>
<td>Manager:</td>
</tr>
<tr>
<td></td>
<td>Nearest Airport: (Airport Designator)</td>
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Type of Evaluation Requested:  
☐ Initial  ☐ Upgrade  ☐ Recurrent  ☐ Special  ☐ Reinstatement

Qualification Basis:
☐ A  ☐ B  ☐ Interim C  ☐ C  ☐ D
☐ 6  ☐ 7  ☐ Provisional Status

Initial Qualification:
(If Applicable)  
Date: _____ Level _____  
Manufacturer’s Identification/Serial No: _____

Upgrade Qualification:
(If Applicable)  
Date: _____ Level _____  
QTG MM/DD/YYYY

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: _____

Aircraft model/series:  
Source of aerodynamic model: _____

Engine model(s) and data revision:  
Source of aerodynamic coefficient data: _____

FMS identification and revision level:  
Aerodynamic data revision number: _____

Visual system manufacturer/model:  
Visual system display: _____

Flight control data revision:  
FSTD computer(s) identification: _____

Motion system manufacturer/type:  

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</table>
**RETURN TO APPENDIX A TO PART 60—**

**Figure A4F — 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

<table>
<thead>
<tr>
<th>The FSTD is qualified to perform all of the Maneuvers, Procedures, Tasks, and Functions Listed in Appendix A, Attachment I, Table A1B, Minimum FSTD Requirements In Effect on [mm/dd/yyyy] except for the following listed Tasks or Functions.</th>
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<tr>
<td>Qualified for all tasks in Table A1B, for which the sponsor has requested qualification, except for the following:</td>
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<td>3.e(1)(i) NDB approach</td>
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<tr>
<td>3.f. Recovery from Unusual Attitudes</td>
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<tr>
<td>4.3. Circling Approach</td>
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<tr>
<td>Additional tasks for which this FSTD is qualified (i.e., in addition to the list in Table A1B)</td>
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<tr>
<td>1. Enhanced Visual System</td>
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<td>2. Windshear Training IAW Section 121.409(d).</td>
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<tr>
<td>The airport visual models evaluated for qualification at this level are:</td>
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<tr>
<td>1. Atlanta Hartsfield International Airport (KATL)</td>
</tr>
<tr>
<td>2. Miami International Airport (KMIA)</td>
</tr>
<tr>
<td>3. Dallas/Ft. Worth Regional Airport (KDFW)</td>
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### Recurrent Evaluation Requirements

**Completed at conclusion of Initial Evaluation**

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<th>Recurrent Evaluations to be conducted each</th>
<th>Recurrent evaluations are due as follows:</th>
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<tr>
<td>(fill in) months</td>
<td>(month) and (month) and (month)</td>
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<td>(enter or strike out, as appropriate)</td>
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</tbody>
</table>

Alloting _____ hours of FTD time.

Signed: ________________

NSFM / Evaluation Team Leader ________________

Date ________________

---

**Revision:**

Based on (enter reasoning):

---

**Recurrence:**

<table>
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<th>Recurrent evaluations are due as follows:</th>
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Signed: ________________

NSFM Evaluation Team Leader ________________

Date ________________

---

**Revision:**

Based on (enter reasoning):

---

**Recurrence:**

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<th>Recurrent evaluations are due as follows:</th>
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<td>(enter or strike out, as appropriate)</td>
</tr>
</tbody>
</table>

Signed: ________________

NSFM Evaluation Team Leader ________________

Date ________________

(Repeat as Necessary)
1. APPLICABILITY

BEGIN QPS REQUIREMENTS

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.

END QPS REQUIREMENTS

2. STATEMENT OF COMPLIANCE AND CAPABILITY (SOC)

BEGIN QPS REQUIREMENTS

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 cockpit 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.

END QPS REQUIREMENTS

3. MODELS

BEGIN QPS REQUIREMENTS

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 may be appropriate for the appropriate 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.

END QPS REQUIREMENTS

4. DEMONSTRATIONS

BEGIN QPS REQUIREMENTS
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 in all of the following situations:
(1) Takeoff—through calm air.
(2) Takeoff—through the first selected survivable windshear.
(3) Approach—through calm air.
(4) Approach—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.

END QPS REQUIREMENTS

5. RECORDING PARAMETERS

BEGIN QPS REQUIREMENTS
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.

END QPS REQUIREMENTS

6. EQUIPMENT INSTALLATION AND OPERATION

BEGIN QPS REQUIREMENTS
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.

END QPS REQUIREMENTS

7. QUALIFICATION TEST GUIDE

BEGIN QPS REQUIREMENTS
a. All QTG material must be forwarded to the NSPM.

b. A simulator windshear evaluation will be scheduled in accordance with normal procedures. Recurrent 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

8. SUBJECTIVE EVALUATION

BEGIN INFORMATION

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).

Other scenarios may be examined at the NSPM’s discretion.

END INFORMATION

9. QUALIFICATION BASIS

BEGIN INFORMATION

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.

END INFORMATION

10. DEMONSTRATION REPEATABILITY

BEGIN INFORMATION

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

APPENDIX B TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR AIRPLANE FLIGHT TRAINING DEVICES

BEGIN INFORMATION

This appendix establishes the standards for Airplane Flight Training Device (FTD) evaluation and qualification at Level 4, Level 5, or Level 6. The Flight Standards Service, National Simulator Program Manager (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

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. 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.
   (11) AC 120–29, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
   (13) AC 120–41, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.
   (14) AC 120–57A, Surface Movement Guidance and Control System (SMGS).
   (15) AC 190/5300–13, Airport Design.
   (16) AC 190/5340–1G, Standards for Airport Markings.
   (17) AC 150/5340–4C, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.
   (18) AC 150/5340–19, Taxiway Centerline Lighting Systems.
   (19) AC 150/5340–24, Runway and Taxiway Edge Lighting Systems.
   (20) AC 150/5365–26D, Precision Approach Path Indicator (PAPI) Systems.

2. APPLICABILITY (§§ 60.1 & 60.2)

There is no additional regulatory or informative material that 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.
6. Sponsor Qualification Requirements (§60.7)

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:

(i) 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 October 30, 2007 the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with §60.19 after October 30, 2007 and continues for each subsequent 12-month period;

(ii) A device qualified on or after October 30, 2007 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.

(ii) 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)(2)). 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.

(iii) 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, recordkeeping, 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

7. Additional Responsibilities of the Sponsor (§60.9)

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
8. FSTD Use (§60.11)

There is no additional regulatory or informational material that applies to §60.11, FSTD use.

9. FTD Objective Data Requirements (§60.13)

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.
   (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:
      (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.
      (4) With any necessary guidance information provided; and
      (5) Without alteration, adjustments, or bias; however the 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. This notification must be made within 10 working days.

END QPS Requirements
test data. However, the NSPM notes that inexperienced data gatherers often provide data that is irrelevant, improperly marked, 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.

h. 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, Attachment 2 requires the sponsor or other data provider to ensure that a steady state condition exists at the instant of time captured by the “snapshot.” This is often verified by showing that a steady state condition existed from some period of time during which the snapshot is taken. The time period most frequently used is 5 seconds prior through 2 seconds following the instant of time captured by the snapshot. This paragraph is primarily addressing the source data and the method by which the data provider ensures that the steady state condition for the snapshot is representative.

1. The NSPM will consider, on a case-by-case basis, whether or not 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 FTD (§60.14)

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 FTD users that raise questions regarding 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;
2. Meet the objective testing requirements listed in Attachment 2 (Level 4 FTDs do not require objective tests); and
3. Satisfactorily accomplish the subjective tests listed in Attachment 3.

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 qualification test guide (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 applicable QPS;
   c. The result of FTD subjective tests prescribed in the applicable QPS;
   d. A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

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;

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

(e) The flight control data revision number or reference.

(f) The flight management system identification and revision level.

(g) The FTD model and manufacturer.

(h) The date of FTD manufacture.

(i) The FTD computer identification.

(j) The motion system type and manufacturer, including display type.

(k) The visual system model and manufacturer, including display type.

(l) The form and manner of presentation of objective test results.

(m) The recording procedures or equipment required to accomplish the objective tests.

(6) The following information for each objective test designated in Attachment 2, 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 supplemental QTG for each 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, crossplotting, 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. 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 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 October 30, 2013 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 subpara- graph “j”) must have an electronic copy of the MQTG by and after October 30, 2013. A copy of the eMQTG 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.

END QPS REQUIREMENTS

BEGIN INFORMATION

1. 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.

m. 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, the objective tests listed in Attachment 2, 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) Cockpit 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.

n. 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.
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 the design tolerances specified for FTD manufacture. In making decisions regarding tests and test results, the NSPM relies on the use of operational and engineering standards in the application of data (including consideration of the way in which the flight test was flown and the data was gathered and applied) data presentations, and the applicable tolerances for each test.

p. 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.

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

(1) If a problem with an objective test result is detected by the NSPM 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.

r. After an FTD is successfully evaluated, the NSPM issues a statement of qualification (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. However, it is the sponsor’s responsibility to obtain TPAA approval prior to using the FTD in an FAA-approved flight training program.

s. 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.

t. 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.

u. Contact the NSPM or visit the NSPM Web site for additional information regarding the preferred qualifications of pilots used to meet the requirements of §60.13(d).

v. 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.

END INFORMATION

12. ADDITIONAL QUALIFICATIONS FOR CURRENTLY QUALIFIED FTDs (§60.16)

There is no additional regulatory or informational material that applies to §60.16, Additional Qualifications for a Currently Qualified FTD.

13. PREVIOUSLY QUALIFIED FTDs (§60.17)

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 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 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 October 30, 2007, 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.

End QPS Requirements

Begin Information

d. 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.

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

f. The intent of the requirement listed in §60.17(b), for each FTD to have a Statement of Qualification within 6 years, is to have the availability of that statement (including the configuration list and the limitations to authorities) 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.

g. Downgrading of an FTD is a permanent change in qualification level and will necessitate the issuance of a revised Statement of Qualification 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 on-going 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.

h. 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.

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 Evaluation Qualification 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 pre-flight inspection 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.

End QPS Requirements

Begin Information

d. 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.

e. 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.

f. 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.

g. 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)

There is no additional regulatory or informational material that applies to §60.20, Logging FTD Discrepancies.

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

BEGIN INFORMATION

There is no additional regulatory or informational material that 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 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. 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.

c. 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 recordkeeping 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)

There are no additional QPS requirements or informational material that apply to §60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

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 cockpit and at least one operating system with air/ground logic (no aerodynamic programming required).

(2) Level 5. A device that may have an open airplane-specific flight deck area, or an enclosed airplane-specific cockpit and a generic aerodynamic program with at least one operating system and control loading that is representative of the simulated airplane only at an approach speed and configuration.

(3) Level 6. A device that has an enclosed airplane-specific cockpit and aerodynamic program with all applicable airplane systems operating and control loading that is representative of the simulated airplane throughout its ground and flight envelope and significant sound representation.

END INFORMATION

25. FSTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA) (§60.37)

BEGIN INFORMATION

There are no additional QPS requirements or informational material that apply to §60.37, FSTD 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 a Statement of Compliance and Capability (SOC), which may include objective and subjective tests. The SOC will confirm that the requirement was satisfied, and describe how the requirement was met. The requirements for SOCs and tests 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

END INFORMATION

### TABLE B1A—MINIMUM FTD REQUIREMENTS

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>1.</td>
<td>General Cockpit Configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a</td>
<td>The FTD must have a cockpit that is a replica of the airplane simulated with controls, equipment, observable cockpit 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 &quot;eye position&quot;.</td>
<td>X</td>
<td>For FTD purposes, the cockpit 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 item such as landing gear pin storage compartments, fire axes or extinguishers, spare light bulbs, aircraft documents pouches are not considered essential and may be omitted.</td>
</tr>
<tr>
<td>1.b</td>
<td>The FTS 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 cockpit or an open flight deck area. Actuation of equipment must replicate the appropriate function in the airplane.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

2. Programming
### Table B1A—Minimum FTD Requirements—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD level</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4 5 6</td>
<td>Notes</td>
</tr>
<tr>
<td>2.a</td>
<td>The FTD must provide the proper effect of</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>aerodynamic changes for the combinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of drag and thrust normally encountered</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>in flight. This must include the effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of change in airplane attitude, thrust,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>drag, altitude, temperature, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>configuration. Level 6 additionally</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>requires the effects of changes in gross</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>weight and center of gravity. Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 requires only generic aerodynamic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>programming.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 2.b | The FTD must have the computer (analog or | X X X    |             |
|     | digital) capability (i.e., capacity, |           |             |
|     | accuracy, resolution, and dynamic |           |             |
|     | response) needed to meet the qualification |           |             |
|     | level sought. |           |             |

| 2.c | Relative responses of the cockpit | 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 14. |
|     | 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 |           |             |
|     | would respond under the same |           |             |
|     | conditions. 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. 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. |           |             |

### 3. Equipment Operations

| 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      |             |

<p>| 3.b | Navigation equipment must be installed and operate within the tolerances applicable for the airplane. Levels 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. Level 5 need have only that navigation equipment necessary to fly an instrument approach. | X X      |             |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4 5 6</td>
<td></td>
</tr>
<tr>
<td>3.c</td>
<td>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. Level 6 must simulate all applicable airplane flight, navigation, and systems operation. Level 5 must have at least functional flight and navigational controls, displays, and instrumentation. Level 4 must have at least one airplane system installed and functional.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>3.d</td>
<td>The lighting environment for panels and instruments must be sufficient for the operation being conducted.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3.e</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3.f</td>
<td>The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Instructor or Evaluator Facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.a</td>
<td>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).</td>
<td>X X X</td>
<td>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.</td>
</tr>
<tr>
<td>4.b</td>
<td>The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions as may be appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Motion System (not required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.a</td>
<td>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 must 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 would respond under the same conditions. A Subjective Test is required.</td>
<td>X X X</td>
<td>The motion system standards set out in part 60, appendix A for at least Level A simulators is acceptable.</td>
</tr>
<tr>
<td>6.</td>
<td>Visual System (not required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.a</td>
<td>The FTD may have a visual system, if desired, although it is not required. If a visual system is installed, it must not be distracting.</td>
<td>X X X</td>
<td></td>
</tr>
</tbody>
</table>
## TABLE B1A—MINIMUM FTD REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD level</th>
<th>Notes</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.b</td>
<td>If a visual system is installed and additional training, testing, or checking credits are being sought on the basis of having a visual system, the visual system must meet the following criteria:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.b.1</td>
<td>The visual system must respond to abrupt input at the pilot’s position. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.b.2</td>
<td>The visual system must be at least a single channel, non-collimated display. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.b.3</td>
<td>The visual system must provide at least a field of view of 18° vertical/24° horizontal for the pilot flying. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.b.4</td>
<td>The visual system must provide for a maximum parallax of 10° per pilot. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.b.5</td>
<td>The visual scene content may not be distracting. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.b.6</td>
<td>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. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.b.7</td>
<td>The visual system must provide for a minimum resolution of 5 arc-minutes for both computed and displayed pixel size. An SOC is required.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

### 7. Sound System

| 7.a | The FTD must simulate significant cockpit sounds resulting from pilot actions that correspond to those heard in the airplane. | X |

**ATTACHMENT 2 TO APPENDIX B TO PART 60—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS**

**BEGIN INFORMATION**

1. 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.

2. 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.

3. The QPS Requirements section imposes a duty on the sponsor or other data provider to ensure that a steady state condition exists at the instant of time captured by the “snapshot” for cases where the objective test results authorize a “snapshot test” or a “series of snapshot tests” results in lieu of a time-history. This is often verified by showing that a steady state condition existed from some period prior to, through some period following, the snap shot. The time period most frequently used is from 5 seconds prior through 2 seconds following the instant of time captured by the snap shot. Other time periods may be acceptable as authorized by the NSPM.


5. 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.

6. A Level 4 FTD does not require objective test results and therefore, Level 4 is not addressed in the following table.

END INFORMATION

BEGIN QPS REQUIREMENTS

1. TEST REQUIREMENTS

a. The ground and flight tests required for qualification are listed in Table B2A Objective Evaluation. 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 §69.13, 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 between the two tables and substantially reduces the potential for confusion when referring to objective test numbers for either FFSs or FTDs.

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 tolerances are given for a parameter, the less restrictive may be used unless otherwise indicated.

c. Certain tests included in this attachment must be supported with a Statement of Compliance and Capability (SOC). In Table B2A, requirements for SOC 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 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. 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.”
i. 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.
j. 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.
k. Testing Computer Controlled Airplane (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.
l. 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.
m. Some tests will not be required for airplanes using airplane hardware in the FTD cockpit (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.

END QPS REQUIREMENTS
<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Test details</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1.a</td>
<td>(Reserved)</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>1.b</td>
<td>Takeoff</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1.b.1</td>
<td>Ground Acceleration Time</td>
<td>±5% time or ±1 sec</td>
<td>Takeoff</td>
<td></td>
</tr>
<tr>
<td>1.b.2</td>
<td>through</td>
<td>(Reserved)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.b.7</td>
<td>Rejected Takeoff</td>
<td>±3% time or ±1 second</td>
<td>Dry Runway</td>
<td></td>
</tr>
<tr>
<td>1.b.8</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.c</td>
<td>Climb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.c.1</td>
<td>Normal Climb all engines operating</td>
<td>≤3 kt airspeed, ±5% or ±100 ft/min (0.5 m/sec) climb rate.</td>
<td>Clean</td>
<td></td>
</tr>
<tr>
<td>1.c.2</td>
<td>through</td>
<td>(Reserved)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.d</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.e</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 1.f. Engines

<table>
<thead>
<tr>
<th>1.f.1</th>
<th>Acceleration</th>
<th>±10% T, ±1 sec for Level 5</th>
<th>Approach or Landing</th>
<th>Record engine power (N₁, N₂, EPR, Torque, Manifold Pressure) from idle to maximum takeoff power for a rapid (slam) throttle movement.</th>
<th>X</th>
<th>T is the total time from initial throttle movement to reaching 90% of go around power.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.f.2</td>
<td>Deceleration</td>
<td>±10% T, or ±1 sec for Level 5</td>
<td>Ground</td>
<td>Record engine power (N₁, N₂, EPR, Torque, Manifold Pressure) from maximum takeoff power to idle for a rapid (slam) throttle movement.</td>
<td>X</td>
<td>T is the total time from initial throttle movement to reaching 90% decay of maximum takeoff power.</td>
</tr>
</tbody>
</table>

### 2. Handling Qualities

(3) 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.

#### 2.a Static Control Tests

| 2.a.1a | 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 | Testing of position versus force is not applicable if forces are generated solely by use of airplane hardware in the FTD. |
| 2.a.1b | Pitch Controller Position vs. Force. | ±2 lb (0.9 daN) breakout, ±10% or ±5 lb (2.2 daN) force. | Ground | Record results for an uninterrupted control sweep to the stops. | 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.2a | 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 | |

**VerDate Aug<31>2005 09:03 Feb 07, 2008 Jkt 214044 PO 00000 Frm 00151 Fmt 8010 Sfmt 8002 Y:\SGML\214044.XXX 214044yshivers on PROD1PC62 with CFR**
<table>
<thead>
<tr>
<th>Number</th>
<th>Test</th>
<th>Tolerances</th>
<th>Flight conditions</th>
<th>Test details</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.a.2.b.</td>
<td>Roll Controller Position vs. Force.</td>
<td>±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force.</td>
<td>Ground</td>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X</td>
<td>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.</td>
</tr>
<tr>
<td>2.a.3.a.</td>
<td>Rudder Pedal Position vs. Force and Surface Position Calibration.</td>
<td>±5 lb (2.2 daN) breakout, ±10% or ±5 lb (2.2 daN) force, ±2° rudder angle.</td>
<td>Ground</td>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X</td>
<td>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.</td>
</tr>
<tr>
<td>2.a.3.b.</td>
<td>Rudder Pedal Position vs. Force.</td>
<td>±5 lb (2.2 daN) breakout, ±10% or ±5 lb (2.2 daN) force.</td>
<td>Ground</td>
<td>Record results for an uninterrupted control sweep to the stops.</td>
<td>X</td>
<td>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.</td>
</tr>
<tr>
<td>2.a.4</td>
<td>Nosewheel Steering Controller Force.</td>
<td>±2 lb (0.9 daN) breakout, ±10% or ±3 lb (1.3 daN) force.</td>
<td>Ground</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.a.5</td>
<td>Rudder Pedal Steering Calibration.</td>
<td>±2° nosewheel angle</td>
<td>Ground</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.a.6</td>
<td>Pitch Trim Indicator vs. Surface Position Calibration.</td>
<td>±0.5° of computed trim surface angle</td>
<td>Ground</td>
<td></td>
<td>X</td>
<td>The purpose of the test is to compare the FTD against design data or equivalent.</td>
</tr>
<tr>
<td>Test</td>
<td>Description</td>
<td>Tolerance</td>
<td>Conditions</td>
<td>Notes</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>2.a.8</td>
<td>Alignment of Cockpit Throttle Lever vs. Selected Engine Parameter</td>
<td>±5° of throttle lever angle or 0.8 in (2 cm) for power control without angular travel</td>
<td>Ground</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.a.9</td>
<td>Brake Pedal Position vs. Force</td>
<td>±5 lb (2.2 daN) or 10% force</td>
<td>Ground</td>
<td>Two data points are required: zero and maximum deflection. Computer output results may be used to show compliance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.b</td>
<td>(Reserved)</td>
<td></td>
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</tr>
<tr>
<td>2.c</td>
<td>Longitudinal Control Tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.1</td>
<td>Power Change Force</td>
<td>±5 lb (2.2 daN) or ±20% force</td>
<td>Cruise or Approach</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.2</td>
<td>Flap/Slat Change Force</td>
<td>±5 lb (2.2 daN) or ±20% force</td>
<td>Takeoff through initial flap retraction, and approach to landing</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.3</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.4</td>
<td>Gear Change Force</td>
<td>±5 lb (2.2 daN) or ±20% force</td>
<td>Takeoff (extension) and Approach (extension)</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>Test Title</td>
<td>Tolerances</td>
<td>Flight conditions</td>
<td>Test details</td>
<td>FTD level</td>
<td>Notes</td>
</tr>
<tr>
<td>--------</td>
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<td>------------------------------------------------</td>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>2.c.5</td>
<td>Longitudinal Trim</td>
<td>±0.5° trim surface angle ±1° pitch angle ±5% net thrust or equivalent.</td>
<td>Cruise, Approach, and Landing.</td>
<td>May be a series of snapshot tests. Level 5 may use equivalent stick and trim controllers in lieu of elevator and trim surface.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.6</td>
<td>Longitudinal Maneuvering Stability (Stick Force/g)</td>
<td>±5 lb (±2.2 daN) or ±10% pitch controller force.</td>
<td>Cruise, Approach and Landing.</td>
<td>May be a series of snapshot test results.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.7</td>
<td>Longitudinal Static Stability</td>
<td>±5 lb (±2.2 daN) or ±10% pitch controller force.</td>
<td>Approach</td>
<td>May be a series of snapshot test results. Level 5 must exhibit positive static stability, but need not comply with the numerical tolerance.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.8</td>
<td>Stall Warning (actuation of stall warning device)</td>
<td>±3 kts. airspeed, ±2° bank</td>
<td>Second Segment Climb, and Approach or Landing.</td>
<td>Record the stall warning signal.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The stall maneuver may be entered with thrust at or near idle power and wings level (1g).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.9a</td>
<td>Phugoid Dynamics</td>
<td>±10% period, ±10% of time to ½ or double amplitude or ±.02 of damping ratio.</td>
<td>Cruise</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.c.9b</td>
<td>Phugoid Dynamics</td>
<td>±10% period, Representative damping</td>
<td>Cruise</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Test Category</td>
<td>Description</td>
<td>Test Conditions</td>
<td>Test Conditions</td>
<td>Test Conditions</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2.c.10</td>
<td>Short Period Dynamics</td>
<td>±1.5° pitch angle or ±2°/sec pitch rate, ±0.10g acceleration.</td>
<td>Cruise</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d</td>
<td>(3) Lateral Directional Tests</td>
<td>(3) Power setting is that required for level flight unless otherwise specified.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.1</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.2</td>
<td>Roll Response (Rate)</td>
<td>±10% or ±2°/sec roll rate</td>
<td>Cruise, and Approach or Landing</td>
<td>X X Results should be recorded 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.).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.3</td>
<td>Roll Response to Cockpit Roll Controller Step Input.</td>
<td>±10% or ±2° bank angle</td>
<td>Approach or Landing</td>
<td>X May be combined with roll response (rate) test (2.d.2.).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.4.a</td>
<td>Spiral Stability</td>
<td>Correct trend and ±3° or ±10% bank angle in 20 seconds.</td>
<td>Cruise</td>
<td>X Airplane data averaged from multiple tests in same direction may be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.4.b</td>
<td>Spiral Stability</td>
<td>Correct trend</td>
<td>Cruise</td>
<td>X Airplane data averaged from multiple tests in same direction may be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.5</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.6.a</td>
<td>Rudder Response</td>
<td>±2°/sec or ±10% yaw rate.</td>
<td>Approach or Landing</td>
<td>X A rudder step input of 20%–30% rudder pedal throw may be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.6.b</td>
<td>Rudder Response</td>
<td>Roll rate ±2°/sec, bank angle ±3°</td>
<td>Approach or Landing</td>
<td>May be roll response to a given rudder deflection.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Number</th>
<th>Test</th>
<th>Tolerances</th>
<th>Flight conditions</th>
<th>Test details</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.d.7</td>
<td>Dutch, Roll, (Yaw Damper OFF).</td>
<td>±0.5 sec or ±10% of period, ±10% of time to 1/2 or double amplitude or ±0.2 of damping ratio.</td>
<td>Cruise, and Approach or Landing.</td>
<td>Record results for at least 6 complete cycles with stability augmentation OFF, or the number of cycles sufficient to determine time to 1/2 or double amplitude.</td>
<td>5</td>
<td>X</td>
</tr>
<tr>
<td>2.d.8</td>
<td>Steady State Sideslip</td>
<td>For given rudder position ±2° bank angle, ±1° sideslip angle, ±10% or ±2° aileron, ±10% or ±25° spoiler or equivalent roll, controller position or force.</td>
<td>Approach or Landing</td>
<td>May be a series of snap-shot test results. Propeller driven airplanes must test in each direction.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.e. through 2.h</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
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</tr>
<tr>
<td>3</td>
<td>(Reserved)</td>
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<td>4</td>
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<td>5</td>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6. FTD System Response Time

<table>
<thead>
<tr>
<th>Number</th>
<th>Test</th>
<th>Tolerances</th>
<th>Flight conditions</th>
<th>Test details</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6a</td>
<td>Latency</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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). Transport Delay. If Transport Delay is chosen to demonstrate response time than Latency, it is expected that when reviewing those existing tests where latency can be identified (e.g., short period, roll response, rudder response) the sponsor and the NSPM will apply additional scrutiny to ensure proper FTD response.

<table>
<thead>
<tr>
<th>Number</th>
<th>Test</th>
<th>Tolerances</th>
<th>Flight conditions</th>
<th>Test details</th>
<th>FTD level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>300 ms (or less) after controller movement.</td>
<td>N/A</td>
<td>A separate test is required in each axis (pitch, roll, and yaw).</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
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 3.
   - Motion System, paragraph 5.
   - Sound System, paragraph 6.
   - Engineering Simulator Validation Data, paragraph 8.
   - Approval Guidelines for Engineering Simulator Validation Data, paragraph 9.
   - Validation Test Tolerances, paragraph 10.
   - Validation Data Road Map, paragraph 11.
   - Acceptance Guidelines for Alternative Engines Data, paragraph 12.
   - Transport Delay Testing, paragraph 14.
   - Continuing Qualification Evaluation Validation Data Presentation, paragraph 15.

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 recurrent 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.

TABLE B2B. — ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (RECIPROCATING) AIRPLANE

<table>
<thead>
<tr>
<th>No.</th>
<th>Applicable test</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.c</td>
<td>Performed climb with nominal gross weight, at best rate-of-climb airspeed.</td>
<td>Climb rate = 500–1200 fpm (2.5–6 m/sec).</td>
<td></td>
</tr>
<tr>
<td>1.f.1</td>
<td>Engines.</td>
<td>Acceleration, idle to takeoff power</td>
<td>2–4 Seconds.</td>
</tr>
<tr>
<td>1.f.2</td>
<td>Engines.</td>
<td>Deceleration, takeoff power to idle</td>
<td>2–4 Seconds.</td>
</tr>
</tbody>
</table>

2. Handling Qualities

<table>
<thead>
<tr>
<th>No.</th>
<th>Title and procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.c.1</td>
<td>Power change force</td>
</tr>
</tbody>
</table>
### TABLE B2B. — ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (RECIPROCATING) AIRPLANE—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>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 stabilization, record column force necessary to maintain original airspeed.</td>
<td>5–15 lbs (2.2–6.6 daN) of force (Pull).</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>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.</td>
<td>5–15 lbs (2.2–6.6 daN) of force (Push).</td>
</tr>
</tbody>
</table>

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.

2.c.8 ..... Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of approximately one (1) knot 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 1/8 or double amplitude in less than 2 cycles.
### Table B2B — Alternative Data Source for FTD Level 5 Small, Single Engine (Reciprocating) Airplane—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Applicable Test</th>
<th>Authorized Performance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.d</td>
<td>Lateral Directional Tests.</td>
<td></td>
</tr>
<tr>
<td>2.d.2</td>
<td>Roll response</td>
<td>Must have a roll rate of 6–40 degrees/second.</td>
</tr>
<tr>
<td>2.d.4.b</td>
<td>Spiral stability</td>
<td>Initial bank angle (±5 degrees) after 20 seconds.</td>
</tr>
<tr>
<td>2.d.6.b</td>
<td>Rudder response</td>
<td>6–12 degrees/second yaw rate.</td>
</tr>
<tr>
<td>2.d.7</td>
<td>Dutch roll, yaw damper off</td>
<td>A period of 2–6 seconds; and 1/4–2 cycles.</td>
</tr>
<tr>
<td>2.d.8</td>
<td>Steady state sideslip</td>
<td>2–10 degrees of bank; 4–10 degrees of sideslip; and 2–10 degrees of aileron.</td>
</tr>
</tbody>
</table>

### Table B2C — Alternative Data Source for FTD Level 5 Small, Multi-Engine (Reciprocating) Airplane

<table>
<thead>
<tr>
<th>Number</th>
<th>Applicable Test</th>
<th>Authorized Performance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.c</td>
<td>Climb</td>
<td>Climb airspeed = 95–115 knots. Climb rate = 500–1500 fpm (2.5–7.5 m/sec).</td>
</tr>
<tr>
<td>1.c.1</td>
<td>Normal climb with nominal gross weight, at best rate-of-climb airspeed.</td>
<td></td>
</tr>
<tr>
<td>1.f</td>
<td>Engines</td>
<td></td>
</tr>
<tr>
<td>1.f.1</td>
<td>Acceleration; idle to takeoff power</td>
<td>2–5 Seconds</td>
</tr>
<tr>
<td>1.f.2</td>
<td>Deceleration; takeoff power to idle</td>
<td>2–5 Seconds</td>
</tr>
</tbody>
</table>

### 2. Handling Qualities

#### 2.c Longitudinal Tests

<table>
<thead>
<tr>
<th>2.c.1</th>
<th>Power change force</th>
<th>10–25 lbs (2.2–6.6 daN) of force (Pull).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

### OR
### TABLE B2C—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, MULTI-ENGINE (RECIPROCATING) AIRPLANE—Continued

#### 2.c.2 Flap/slat change force

<table>
<thead>
<tr>
<th>Number</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>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.</td>
<td>5–15 lbs (2.2–6.6 daN) of force (Push).</td>
</tr>
</tbody>
</table>

#### 2.c.4 Gear change force

<table>
<thead>
<tr>
<th>Number</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>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.</td>
<td>2–12 lbs (0.88–5.3 daN) of force (Pull).</td>
</tr>
</tbody>
</table>

OR

<table>
<thead>
<tr>
<th>Number</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>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.</td>
<td>2–12 lbs (0.88–5.3 daN) of force (Push).</td>
</tr>
</tbody>
</table>

#### 2.c.9.b Phugoid dynamics

<table>
<thead>
<tr>
<th>Number</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Landing configuration:</td>
<td>60–90 knots; ± 5° of bank.</td>
</tr>
<tr>
<td>b)</td>
<td>Clean configuration:</td>
<td>Landing configuration speed × 10–20%.</td>
</tr>
<tr>
<td>Must have a phugoid with a period of 30–60 seconds. May not reach ½ or double amplitude in less than 2 cycles.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 2.d Lateral Directional Tests

### 2.d.2 Roll response

<table>
<thead>
<tr>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll response:</td>
<td>Must have a roll rate of 6–40 degrees/second.</td>
</tr>
</tbody>
</table>
### TABLE B2C—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, MULTI-ENGINE
(RICIPROCATING) AIRPLANE—Continued

<table>
<thead>
<tr>
<th>Number</th>
<th>Applicable test</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.d.4.b</td>
<td>Spiral stability</td>
<td>Cruise configuration and normal cruise airspeed. Establish a 20–30 degree bank. When stabilized, neutralize the aileron control and release. Must be completed in both directions of turn. Initial bank angle (±5 degrees) after 20 seconds.</td>
</tr>
<tr>
<td>2.d.6.b</td>
<td>Rudder response</td>
<td>Use 50 percent of maximum rudder deflection. (Applicable to approach or landing configuration.) 6–12 degrees/second yaw rate.</td>
</tr>
<tr>
<td>2.d.7</td>
<td>Dutch roll, yaw damper off</td>
<td>(Applicable to cruise and approach configurations.) A period of 2–5 seconds; and ½–2 cycles.</td>
</tr>
<tr>
<td>2.d.8</td>
<td>Steady state sideslip</td>
<td>Use 50 percent rudder deflection. (Applicable to approach and landing configurations.) 2–10 degrees of bank; 4–10 degrees of sideslip; and 2–10 degrees of aileron.</td>
</tr>
</tbody>
</table>

### 6. FTD System Response Time

6.a | Cockpit 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

<table>
<thead>
<tr>
<th>Number</th>
<th>Applicable test</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.f</td>
<td>Engines</td>
<td></td>
</tr>
<tr>
<td>1.f.1</td>
<td>Acceleration; idle to takeoff power</td>
<td>4–6 Seconds</td>
</tr>
<tr>
<td>1.f.2</td>
<td>Deceleration; takeoff power to idle</td>
<td>3–7 Seconds</td>
</tr>
</tbody>
</table>

### 2. Handling Qualities

#### 2.c Longitudinal Tests

2.c.1 | Power change force | **OR**
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>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)</td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>Title and procedure</td>
<td>Authorized performance range</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>2.c.2.a</td>
<td>Flap/Slat change force</td>
<td>Flaps fully retracted at a constant airspeed within the flaps-extracted 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.</td>
</tr>
<tr>
<td>2.c.2.b</td>
<td>Flap/Slat change force</td>
<td>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.</td>
</tr>
<tr>
<td>2.c.4.a</td>
<td>Gear change force</td>
<td>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.</td>
</tr>
<tr>
<td>2.c.4.b</td>
<td>Gear change force</td>
<td>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.</td>
</tr>
<tr>
<td>2.b.5</td>
<td>Longitudinal trim</td>
<td>Must be able to trim longitudinal stick force to “zero” in each of the following configurations: cruise; approach; and landing.</td>
</tr>
<tr>
<td>2.c.7</td>
<td>Longitudinal static stability</td>
<td>Must exhibit positive static stability.</td>
</tr>
<tr>
<td>2.c.8.a</td>
<td>Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of approximately one (1) knot per second.</td>
<td>Landing configuration: 60–90 knots; ±5° of bank.</td>
</tr>
<tr>
<td>2.c.8.b</td>
<td>Phugoid dynamics</td>
<td>Must have a phugoid with a period of 30–60 seconds. Must not reach ½ or double amplitude in less than 2 cycles.</td>
</tr>
<tr>
<td>2.d</td>
<td>Lateral Directional Tests</td>
<td>Roll rate must be measured through at least 30 degrees of roll. Aileron control must be deflected ½ (50 percent) of maximum travel.</td>
</tr>
<tr>
<td>2.d.2</td>
<td>Roll response</td>
<td>Cruise configuration and normal cruise airspeed. Establishment of a 20–30 degree bank. When stabilized, neutralize the aileron control and release. Must be completed in both directions of turn.</td>
</tr>
<tr>
<td>2.d.6.b</td>
<td>Rudder response</td>
<td>Must have a rudder response of 6–12 degrees/second yaw rate.</td>
</tr>
</tbody>
</table>
### TABLE B2D—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 SMALL, SINGLE ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

<table>
<thead>
<tr>
<th>Number</th>
<th>Applicable test</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.d.7</td>
<td>Dutch roll, yaw damper off</td>
<td>A period of 2–6 seconds; and 1.2–3 cycles.</td>
</tr>
<tr>
<td>2.d.8</td>
<td>Steady state sideslip</td>
<td>2–10 degrees of bank; 4–10 degrees of sideslip; and 2–10 degrees of alienor.</td>
</tr>
</tbody>
</table>

#### 6. FTD System Response Time

<table>
<thead>
<tr>
<th>No.</th>
<th>Applicable test</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.a</td>
<td>Cockpit instrument systems response to an abrupt pilot controller input. One test is required in each axis (pitch, roll, yaw).</td>
<td>300 milliseconds or less.</td>
</tr>
</tbody>
</table>

### TABLE B2E—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 MULTI-ENGINE (TURBO-PROPELLER) AIRPLANE

<table>
<thead>
<tr>
<th>Number</th>
<th>Applicable test</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.c</td>
<td>Climb</td>
<td></td>
</tr>
<tr>
<td>1.b.1</td>
<td>Normal climb with nominal gross weight, at best rate-of-climb airspeed</td>
<td>Climb airspeed= 120–140 knots. Climb rate= 1000–3000 ft/min (5–15 m/sec).</td>
</tr>
<tr>
<td>1.f</td>
<td>Engines</td>
<td></td>
</tr>
<tr>
<td>1.f.1</td>
<td>Acceleration; idle to takeoff power</td>
<td>2–6 Seconds.</td>
</tr>
<tr>
<td>1.f.2</td>
<td>Deceleration; takeoff power to idle</td>
<td>1–5 Seconds.</td>
</tr>
</tbody>
</table>

#### 2. Handling Qualities

### 2.c Longitudinal Tests

<table>
<thead>
<tr>
<th>2.c.1</th>
<th>Power change force</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>8 lbs (3.5 daN) of Push force to 8 lbs (3.5 daN) of Pull force.</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>12–22 lbs (5.3–9.7 daN) of force (Push).</td>
<td></td>
</tr>
</tbody>
</table>

| 2.c.2 | Flap/slat change force | |

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### TABLE B2E—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 MULTI-ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Title and procedure</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>a)</strong> 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</td>
<td>5–15 lbs (2.2–6.6 daN) of force (Pull).</td>
</tr>
<tr>
<td></td>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>b)</strong> 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</td>
<td>5–15 lbs (2.2–6.6 daN) of force (Push).</td>
</tr>
<tr>
<td>2.c.4</td>
<td>Gear change force</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>a)</strong> 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</td>
<td>2–12 lbs (0.88–5.3 daN) of force (Pull).</td>
</tr>
<tr>
<td></td>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>b)</strong> 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</td>
<td>2–12 lbs (0.88–5.3 daN) of force (Push).</td>
</tr>
<tr>
<td>2.b.5</td>
<td>Longitudinal trim</td>
<td>Must be able to trim longitudinal stick force to “zero” in each of the following configurations; cruise; approach; and landing.</td>
</tr>
<tr>
<td>2.c.7</td>
<td>Longitudinal static stability</td>
<td>Must exhibit positive static stability.</td>
</tr>
<tr>
<td>2.c.8</td>
<td>Stall warning (actuation of stall warning device) with nominal gross weight; wings level; and a deceleration rate of approximately one (1) knot per second</td>
<td>80–100 knots; ± 5° of bank.</td>
</tr>
<tr>
<td></td>
<td><strong>a)</strong> Landing configuration</td>
<td>80–100 knots; ± 5° of bank.</td>
</tr>
<tr>
<td></td>
<td><strong>b)</strong> Clean configuration</td>
<td>Landing configuration speed ± 10–20%</td>
</tr>
<tr>
<td></td>
<td><strong>2.c.b.b)</strong> Phugoid dynamics</td>
<td>Must have a phugoid with a period of 30–60 seconds. May not reach ½ or double amplitude in less than 2 cycles.</td>
</tr>
<tr>
<td>2.d</td>
<td>Lateral Directional Test</td>
<td></td>
</tr>
<tr>
<td>2.d.2</td>
<td>Roll response</td>
<td>Must have a roll rate of 6–40 degrees/second.</td>
</tr>
<tr>
<td></td>
<td><strong>Roll rate</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Aileron control</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>must be measured through at least 30 degrees of roll.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Must be deflected approximately ½ (50 percent) of maximum travel</strong></td>
<td></td>
</tr>
<tr>
<td>2.d.4</td>
<td>Spiral stability</td>
<td>Initial bank angle (±15 degrees) after 20 seconds.</td>
</tr>
</tbody>
</table>
Federal Aviation Administration, DOT

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TABLE B2E—ALTERNATIVE DATA SOURCE FOR FTD LEVEL 5 MULTI-ENGINE (TURBO-PROPELLER) AIRPLANE—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Applicable test</th>
<th>Authorized performance range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.d.6.b</td>
<td>Rudder response</td>
<td>6-12 degrees/second yaw rate.</td>
</tr>
<tr>
<td></td>
<td>(Use 50 percent of maximum rudder deflection)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Applicable to approach or landing configuration.)</td>
<td></td>
</tr>
<tr>
<td>2.d.7</td>
<td>Dutch roll, yaw damper off</td>
<td>A period of 2–5 seconds; and ½–3 cycles.</td>
</tr>
<tr>
<td></td>
<td>(Applicable to cruise and approach configurations.)</td>
<td></td>
</tr>
<tr>
<td>2.d.8</td>
<td>Steady state sideslip</td>
<td>2–10 degrees of bank;</td>
</tr>
<tr>
<td></td>
<td>(Use 50 percent rudder deflection)</td>
<td>4–10 degrees of sideslip; and</td>
</tr>
<tr>
<td></td>
<td>(Applicable to approach and landing configurations.)</td>
<td>2–10 degrees of aileron.</td>
</tr>
</tbody>
</table>

6. FTD System Response Time

6.a | Cockpit 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

5. ALTERNATIVE DATA SOURCES, PROCEDURES, AND INSTRUMENTATION: LEVEL 6 FTD ONLY.

BEGIN INFORMATION

a. In recent years, considerable progress has been made by highly experienced aircraft and FTD manufacturers in improvement of aerodynamic modeling techniques. In conjunction with increased accessibility to very high powered computer technology, these techniques have become quite sophisticated. Additionally, those who have demonstrated success in combining these modeling techniques with minimal flight testing have incorporated the use of highly mature flight controls models and have had extensive experience in comparing the output of their effort with actual flight test data—and they have been able to do so on an iterative basis over a period of years.

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. 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.

a. 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 the following Table be coordinated with the NSPM prior to employment in a flight test or data gathering effort.

b. 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...
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.

c. This table is not applicable to Computer Controlled Aircraft FTDs.

d. 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.

e. The term ‘inertial measurement system’ allows the use of a functional global positioning system (GPS).

### Table B2F—Alternative Data Sources, Procedures, and Instrumentation Level 6 FTD Information

<table>
<thead>
<tr>
<th>Objective test reference number and title</th>
<th>Alternative data sources, procedures, and instrumentation</th>
<th>Notes and reminders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.b.1 ........................................</td>
<td>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.</td>
<td>This test is required only if RTO is sought.</td>
</tr>
<tr>
<td>1.b.7 ........................................</td>
<td>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.</td>
<td>This test is required only if RTO is sought.</td>
</tr>
<tr>
<td>1.c.1 ........................................</td>
<td>Data may be acquired with a synchronized video of calibrated airplane instruments and engine power throughout the climb range.</td>
<td></td>
</tr>
<tr>
<td>1.f.1 ........................................</td>
<td>Data may be acquired with a synchronized video recording of engine instruments and throttle position.</td>
<td></td>
</tr>
<tr>
<td>1.f.2 ........................................</td>
<td>Data may be acquired with a synchronized video recording of engine instruments and throttle position.</td>
<td></td>
</tr>
<tr>
<td>2.a.1.a ......................................</td>
<td>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 (for airplanes with reversible control systems, this function should be accomplished with winds less than 5 kt). Force data may be acquired by using a hand held force gauge at the same column position data points.</td>
<td></td>
</tr>
<tr>
<td>2.a.2.a ......................................</td>
<td>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 (for airplanes with reversible control systems, this function should be accomplished with winds less than 5 kt). Force data may be acquired by using a hand held force gauge at the same column position data points.</td>
<td></td>
</tr>
<tr>
<td>Objective test reference number and title</td>
<td>Alternative data sources, procedures, and instrumentation</td>
<td>Notes and reminders</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>2.a.3.a ........................................</td>
<td>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 (for airplanes with reversible control systems, this function should be accomplished with winds less than 5 kt). Force data may be acquired by using a hand held force gauge at the same column position data points.</td>
<td></td>
</tr>
<tr>
<td>2.a.4 ...........................................</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>2.a.5 ...........................................</td>
<td>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 nose wheel position.</td>
<td></td>
</tr>
<tr>
<td>2.a.6 ...........................................</td>
<td>Data may be acquired through calculations. .........................</td>
<td></td>
</tr>
<tr>
<td>2.a.8 ...........................................</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>2.a.9 ...........................................</td>
<td>Use of design or predicted data is acceptable. Data may be acquired by measuring deflection at “zero” and at “max.”</td>
<td></td>
</tr>
<tr>
<td>2.c.1 ...........................................</td>
<td>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 cockpit controls.</td>
<td>Power change dynamics test is acceptable using the same data acquisition methodology.</td>
</tr>
<tr>
<td>2.c.2 ...........................................</td>
<td>Data may be acquired by using an inertial measurement system and a synchronized video of the calibrated airplane instruments, flap/slot position, and the force/position measurements of cockpit controls.</td>
<td>Flap/slot change dynamics test is acceptable using the same data acquisition methodology.</td>
</tr>
<tr>
<td>2.c.4 ...........................................</td>
<td>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 cockpit controls.</td>
<td>Gear change dynamics test is acceptable using the same data acquisition methodology.</td>
</tr>
<tr>
<td>2.c.5 ...........................................</td>
<td>Data may be acquired through use of an inertial measurement system and a synchronized video of the cockpit controls position (previously calibrated to show related surface position) and the engine instrument readings.</td>
<td></td>
</tr>
<tr>
<td>2.c.6 ...........................................</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Objective test reference number and title</td>
<td>Alternative data sources, procedures, and instrumentation</td>
<td>Notes and reminders</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>2.c.7 ................................... Handling qualities</td>
<td>Data may be acquired through the use of a synchronized video of the airplane flight instruments and a hand held force gauge.</td>
<td></td>
</tr>
<tr>
<td>2.c.8 ................................... Handling qualities</td>
<td>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.</td>
<td>Airspeeds may be cross checked with those in the TIR and AFM.</td>
</tr>
<tr>
<td>2.c.9.a .................................. Handling qualities</td>
<td>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 cockpit controls.</td>
<td></td>
</tr>
<tr>
<td>2.c.10 .................................. Handling qualities</td>
<td>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 cockpit controls.</td>
<td></td>
</tr>
<tr>
<td>2.c.11 .................................. Handling qualities</td>
<td>May use design data, production flight test schedule, or maintenance specification, together with an SOC.</td>
<td></td>
</tr>
<tr>
<td>2.d.2 ................................... Handling qualities</td>
<td>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 cockpit controls.</td>
<td></td>
</tr>
<tr>
<td>2.d.3 ................................... Handling qualities</td>
<td>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 cockpit controls.</td>
<td></td>
</tr>
<tr>
<td>2.d.4 ................................... Handling qualities</td>
<td>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 cockpit controls; and a stop watch.</td>
<td></td>
</tr>
<tr>
<td>2.d.6.a .................................. Handling qualities</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>2.d.7 ................................... Handling qualities</td>
<td>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 cockpit controls.</td>
<td></td>
</tr>
<tr>
<td>2.d.8 ................................... Handling qualities</td>
<td>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 cockpit controls.</td>
<td></td>
</tr>
</tbody>
</table>

**ATTACHMENT 3 TO APPENDIX B TO PART 60—FLIGHT TRAINING DEVICE (FTD) SUBJECTIVE EVALUATION**

**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 in the Statement of Qualification or as may be 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.

e. 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 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.

### Table B3A—Table of Functions and Subjective Tests Level 6 FTD

<table>
<thead>
<tr>
<th>No.</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preflight</td>
<td>Accomplish a functions check of all installed switches, indicators, systems, and equipment at all crewmembers’ and instructors’ stations, and determine that the cockpit (or flight deck area) design and functions replicate the appropriate airplane.</td>
</tr>
<tr>
<td>2. Surface Operations (pre-takeoff)</td>
<td>Engine start:</td>
</tr>
<tr>
<td>2.a</td>
<td>No.</td>
</tr>
<tr>
<td>2.a.1</td>
<td>Normal start.</td>
</tr>
<tr>
<td>2.a.2</td>
<td>Alternative procedures start.</td>
</tr>
<tr>
<td>2.a.3</td>
<td>Abnormal procedures start/shut down.</td>
</tr>
<tr>
<td>2.b</td>
<td>Pushback/Powerback (powerback requires visual system).</td>
</tr>
<tr>
<td>3. Takeoff (requires appropriate visual system as set out in Table B1A, item 6.b.; appendix B, Attachment 1)</td>
<td>Instrument takeoff:</td>
</tr>
<tr>
<td>3.a</td>
<td>No.</td>
</tr>
<tr>
<td>3.a.1</td>
<td>Engine checks (e.g., engine parameter relationships, propeller/mixture controls).</td>
</tr>
<tr>
<td>3.a.2</td>
<td>Acceleration characteristics.</td>
</tr>
<tr>
<td>3.a.3</td>
<td>Nosewheel/rudder steering.</td>
</tr>
<tr>
<td>3.a.4</td>
<td>Landing gear, wing flap, leading edge device operation.</td>
</tr>
<tr>
<td>3.b</td>
<td>Rejected takeoff:</td>
</tr>
<tr>
<td>3.b.1</td>
<td>Deceleration characteristics.</td>
</tr>
<tr>
<td>3.b.2</td>
<td>Brakes/engine reverse/ground spoiler operation.</td>
</tr>
<tr>
<td>3.b.3</td>
<td>Nosewheel/rudder steering.</td>
</tr>
<tr>
<td>4. In-Flight Operations</td>
<td>Normal climb:</td>
</tr>
<tr>
<td>4.a</td>
<td>No.</td>
</tr>
<tr>
<td>4.b</td>
<td>Cruise:</td>
</tr>
<tr>
<td>&lt;&lt; QPS requirement &gt;&gt;</td>
<td>No.</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----</td>
</tr>
<tr>
<td>4.b.1 ............. Demonstration of performance characteristics (speed vs. power).</td>
<td></td>
</tr>
<tr>
<td>4.b.2 ............. Normal turns.</td>
<td></td>
</tr>
<tr>
<td>4.b.3 ............. Demonstration of high altitude handling.</td>
<td></td>
</tr>
<tr>
<td>4.b.4 ............. Demonstration of high airspeed handling/overspeed warning.</td>
<td></td>
</tr>
<tr>
<td>4.b.5 ............. Demonstration of Mach effects on control and trim.</td>
<td></td>
</tr>
<tr>
<td>4.b.6 ............. Steep turns.</td>
<td></td>
</tr>
<tr>
<td>4.b.10 ........... In-Flight engine shutdown (procedures only).</td>
<td></td>
</tr>
<tr>
<td>4.b.11 ........... In-Flight engine restart (procedures only).</td>
<td></td>
</tr>
<tr>
<td>4.b.13 ........ Specific flight characteristics.</td>
<td></td>
</tr>
<tr>
<td>4.b.14 ........ Response to loss of flight control power.</td>
<td></td>
</tr>
<tr>
<td>4.b.15 ........ Response to other flight control system failure modes.</td>
<td></td>
</tr>
<tr>
<td>4.b.19 ........ Operations during icing conditions.</td>
<td></td>
</tr>
<tr>
<td>4.b.20 ........ Effects of airframe/engine icing.</td>
<td></td>
</tr>
<tr>
<td>4.c ............. Other flight phase:</td>
<td></td>
</tr>
<tr>
<td>4.c.1 ........ Approach to stalls in the following configurations:</td>
<td></td>
</tr>
<tr>
<td>4.c.1.a ........ Cruise.</td>
<td></td>
</tr>
<tr>
<td>4.c.1.b ........ Takeoff or approach.</td>
<td></td>
</tr>
<tr>
<td>4.c.1.c ........ Landing.</td>
<td></td>
</tr>
<tr>
<td>4.c.2 ........ High angle of attack maneuvers in the following configurations:</td>
<td></td>
</tr>
<tr>
<td>4.c.2.a ........ Cruise.</td>
<td></td>
</tr>
<tr>
<td>4.c.2.b ........ Takeoff or approach.</td>
<td></td>
</tr>
<tr>
<td>4.c.2.c ........ Landing.</td>
<td></td>
</tr>
<tr>
<td>4.c.3 ........ Slow flight.</td>
<td></td>
</tr>
<tr>
<td>4.c.4 ........ Holding.</td>
<td></td>
</tr>
<tr>
<td>5.a ............. Non-precision Instrument Approaches:</td>
<td></td>
</tr>
<tr>
<td>5.a.1 ........ With use of autopilot and autothrottle, as applicable.</td>
<td></td>
</tr>
<tr>
<td>5.a.1.a.1 ........ Without use of autopilot and autothrottle, as applicable.</td>
<td></td>
</tr>
<tr>
<td>5.a.1.b.1 ........ With 10 knot tail wind.</td>
<td></td>
</tr>
<tr>
<td>5.a.1.b.2 ........ With 10 knot crosswind.</td>
<td></td>
</tr>
<tr>
<td>5.a.2 ........ Precision Instrument Approaches:</td>
<td></td>
</tr>
<tr>
<td>5.a.2.a.1 ........ With use of autopilot, autothrottle, and autoland, as applicable.</td>
<td></td>
</tr>
<tr>
<td>5.a.2.a.2 ........ Without use of autopilot, autothrottle, and autoland, as applicable.</td>
<td></td>
</tr>
<tr>
<td>5.a.2.b.1 ........ With 10 knot tail wind.</td>
<td></td>
</tr>
<tr>
<td>5.a.2.b.2 ........ With 10 knot crosswind.</td>
<td></td>
</tr>
<tr>
<td>6 ........ Missed Approach</td>
<td></td>
</tr>
<tr>
<td>6.a ............... Manually controlled.</td>
<td></td>
</tr>
<tr>
<td>Requirement</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>6.b</td>
<td>Automatically controlled (if applicable).</td>
</tr>
<tr>
<td>7.a</td>
<td>Normal system operation (installed systems).</td>
</tr>
<tr>
<td>7.b</td>
<td>Abnormal/Emergency system operation (installed systems).</td>
</tr>
<tr>
<td>7.c</td>
<td>Flap operation.</td>
</tr>
<tr>
<td>7.d</td>
<td>Landing gear operation.</td>
</tr>
<tr>
<td>7.e</td>
<td>Engine Shutdown and Parking.</td>
</tr>
<tr>
<td>7.e.1</td>
<td>Systems operation.</td>
</tr>
<tr>
<td>7.e.2</td>
<td>Parking brake operation.</td>
</tr>
<tr>
<td>8.a</td>
<td>Power Switch(es).</td>
</tr>
<tr>
<td>8.b</td>
<td>Airplane conditions.</td>
</tr>
<tr>
<td>8.b.1</td>
<td>Gross weight, center of gravity, and fuel loading and allocation.</td>
</tr>
<tr>
<td>8.b.2</td>
<td>Airplane systems status.</td>
</tr>
<tr>
<td>8.b.3</td>
<td>Ground crew functions (e.g., external power, push back).</td>
</tr>
<tr>
<td>8.c</td>
<td>Airports.</td>
</tr>
<tr>
<td>8.c.1</td>
<td>Selection.</td>
</tr>
<tr>
<td>8.c.2</td>
<td>Runway selection.</td>
</tr>
<tr>
<td>8.c.3</td>
<td>Preset positions (e.g., ramp, over FAF).</td>
</tr>
<tr>
<td>8.d</td>
<td>Environmental controls.</td>
</tr>
<tr>
<td>8.d.1</td>
<td>Temperature.</td>
</tr>
<tr>
<td>8.d.2</td>
<td>Climate conditions (e.g., ice, rain).</td>
</tr>
<tr>
<td>8.d.3</td>
<td>Wind speed and direction.</td>
</tr>
<tr>
<td>8.e</td>
<td>Airplane system malfunctions.</td>
</tr>
<tr>
<td>8.e.1</td>
<td>Insertion/deletion.</td>
</tr>
<tr>
<td>8.e.2</td>
<td>Problem clear.</td>
</tr>
<tr>
<td>8.f</td>
<td>Locks, Freezes, and Repositioning.</td>
</tr>
<tr>
<td>8.f.1</td>
<td>Problem (all) freeze/release.</td>
</tr>
<tr>
<td>8.f.2</td>
<td>Position (geographic) freeze/release.</td>
</tr>
<tr>
<td>8.f.3</td>
<td>Repositioning (locations, freezes, and releases).</td>
</tr>
<tr>
<td>8.f.4</td>
<td>Ground speed control.</td>
</tr>
<tr>
<td>8.f.5</td>
<td>Remote IOS, if installed.</td>
</tr>
</tbody>
</table>

9. Sound Controls. On/off/Adjustment
### Table B3A—Table of Functions and Subjective Tests Level 6 FTD—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Operation tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Control Loading System (as applicable) On/off/ emergency stop</td>
</tr>
<tr>
<td>11.</td>
<td>Observer Stations</td>
</tr>
<tr>
<td>11.a</td>
<td>Position.</td>
</tr>
<tr>
<td>11.b</td>
<td>Adjustments.</td>
</tr>
</tbody>
</table>

**END QPS REQUIREMENTS**

### Table B3B—Table of Functions and Subjective Tests—Level 5 FTD

<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Preflight</td>
</tr>
<tr>
<td>2.</td>
<td>Surface Operations (pre-takeoff)</td>
</tr>
<tr>
<td>2.a</td>
<td>Engine start (if installed):</td>
</tr>
<tr>
<td>2.a.1</td>
<td>Normal start.</td>
</tr>
<tr>
<td>2.a.2</td>
<td>Alternative procedures start.</td>
</tr>
<tr>
<td>2.a.3</td>
<td>Abnormal/Emergency procedures start / shut down.</td>
</tr>
<tr>
<td>3.</td>
<td>In-Flight Operations</td>
</tr>
<tr>
<td>3.a</td>
<td>Normal climb.</td>
</tr>
<tr>
<td>3.b.1</td>
<td>Performance characteristics (speed vs. power).</td>
</tr>
<tr>
<td>3.b.2</td>
<td>Normal turns.</td>
</tr>
<tr>
<td>3.c</td>
<td>Normal descent.</td>
</tr>
<tr>
<td>4.</td>
<td>Approaches</td>
</tr>
<tr>
<td>4.a</td>
<td>Coupled instrument approach maneuvers (as applicable for the systems installed).</td>
</tr>
<tr>
<td>5.</td>
<td>Any Flight Phase</td>
</tr>
<tr>
<td>5.a</td>
<td>Normal system operation (Installed systems).</td>
</tr>
<tr>
<td>5.b</td>
<td>Abnormal/Emergency system operation (installed systems).</td>
</tr>
<tr>
<td>5.c</td>
<td>Flap operation.</td>
</tr>
<tr>
<td>5.d</td>
<td>Landing gear operation.</td>
</tr>
<tr>
<td>5.e</td>
<td>Engine Shutdown and Parking (if installed).</td>
</tr>
<tr>
<td>5.e.1</td>
<td>Systems operation.</td>
</tr>
<tr>
<td>5.e.2</td>
<td>Parking brake operation.</td>
</tr>
<tr>
<td>6.</td>
<td>Instructor Operating Station (IOS)</td>
</tr>
</tbody>
</table>
### TABLE B3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS—LEVEL 5 FTD—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.a</td>
<td>Power Switch(es).</td>
</tr>
<tr>
<td>6.b</td>
<td>Preset positions—ground, air.</td>
</tr>
<tr>
<td>6.c</td>
<td>Airplane system malfunctions (Installed systems).</td>
</tr>
<tr>
<td>6.c.1</td>
<td>Insertion/deletion.</td>
</tr>
<tr>
<td>6.c.2</td>
<td>Problem clear.</td>
</tr>
</tbody>
</table>

### TABLE B3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS—LEVEL 4 FTD

<table>
<thead>
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<th>Operations tasks</th>
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<td>1</td>
<td>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.</td>
</tr>
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</table>

Level 4 FTDs are required to have at least one system. However, the NSP will accomplish a functions check of all installed systems, switches, indicators, and equipment at all crew-members' and instructors' stations, and determine that the cockpit (or flight deck area) design and functions replicate the appropriate airplane.

---

**ATTACHMENT 4 TO APPENDIX B TO PART 60—SAMPLE DOCUMENTS**

BEGIN INFORMATION

TABLE OF CONTENTS

Title of Sample

- Figure B4A—Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
- Figure B4B—Attachment: FSTD Information Form
- Figure B4C—Sample Qualification Test Guide Cover Page
- Figure B4D—Sample Statement of Qualification—Certificate
- Figure B4E—Sample Statement of Qualification—Configuration List
- Figure B4F—Sample Statement of Qualification—List of Qualified Tasks
- Figure B4G—Sample Continuing Qualification Evaluation Requirements Page
- Figure B4H—Sample MQTG Index of Effective FSTD Directives

---

163
Date __________

Edward D. Cook, Ph.D.
Manager, National Simulator Program
Federal Aviation Administration
100 Hartfield 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 (FSTD Manufacturer), (Aircraft Type/Level) Flight Simulation Training Device (FSTD), (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 FSTD will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FSTD will be sponsored under the following options: (Select One)

☐ The FSTD will be used within the sponsor’s FAA approved training program and placed on the sponsor's Training/Operations Specifications; or

☐ The FSTD will be used for dry lease only in accordance with Paragraph 3b, FSTD Guidance Bulletin 03-08.

We agree to provide the formal request for the evaluation (Ref: Appendix 4, AC 120-40B) 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 “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:

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: FSTD Information and Characteristics Form
cc: POI/TCPM
### Section 1. FSTD Information and Characteristics

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| (If Applicable)                      |                         |

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### ATTACHMENT 4 TO APPENDIX A TO PART 60—
Figure B4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
Attachment: FSTD Information Form

#### INFORMATION

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### Section 3. Training, Testing and Checking Considerations

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<td>Instrument Rating - Training / Checks: (142)</td>
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166
## Section 3. Training, Testing and Checking Considerations

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<td>CAT II: (RVR 1200 ft, DH 100 ft)</td>
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<td>Auto-land / Roll Out Guidance</td>
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ATTACHMENT 4 TO APPENDIX B TO PART 60—
Figure B4C – 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: ____________

(Sponsor) Date: ____________

Manager, National Simulator Program, FAA
Federal Aviation Administration, DOT
Pt. 60, App. B

ATTACHMENT 4 TO APPENDIX B TO PART 60—
Figure B4D – Sample Statement of Qualification - Certificate

INFORMATION

Federal Aviation Administration
National Simulator Program

Statement 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 found it to meet the standards set forth in
AC 120-45A

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 December 31, 2008

Unless sooner rescinded or extended by the National Simulator Program Manager

November 15, 2007 ____________________________
(date) J. B. Checkin, Jr.
(for the NSPM)
## Section 1. FSTD Information and Characteristics

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### Type of Evaluation Requested:  
- [ ] Initial  
- [ ] Upgrade  
- [ ] Recurrent  
- [ ] Special  
- [ ] Reinstatement

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</tr>
</thead>
</table>
## Attachment 4 to Appendix B to Part 60—
### Figure B4E – Sample Statement of Qualification; Configuration List

<table>
<thead>
<tr>
<th>INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual System Manufacturer and Type:</strong></td>
</tr>
<tr>
<td>Aircraft Make/Model/Series:</td>
</tr>
<tr>
<td><strong>Aircraft Equipment</strong></td>
</tr>
<tr>
<td>Flight Instrumentation:</td>
</tr>
<tr>
<td>□ EFIS □ HUD □ HGS □ EFVS □ TCAS □ GPWS □ Plain View □ GPS □ FMS Type:</td>
</tr>
<tr>
<td>□ WX Radar □ Other:</td>
</tr>
</tbody>
</table>

| Airport Models: | Engine Instrumentation: |
| 3.6.1 | Airport Designator 3.6.2 | Airport Designator 3.6.3 |
| 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 □ TCFM □ 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

<table>
<thead>
<tr>
<th>Area/Function/Maneuver</th>
<th>Requested</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Private Pilot - Training / Checks: (142)</td>
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<td></td>
</tr>
<tr>
<td>Commercial Pilot - Training / Checks (142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Engine Rating - Training / Checks (142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrument Rating - Training / Checks (142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type Rating - Training / Checks (135/121/142)</td>
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<td></td>
</tr>
<tr>
<td>Proficiency Checks (135/121/142)</td>
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<td></td>
</tr>
<tr>
<td>CAT I: (RVR 2400/1800 ft, DH200 ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFORMATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Pilot - Training / Checks (142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Engine Rating - Training / Checks (142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrument Rating - Training / Checks (142)</td>
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<td></td>
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<tr>
<td>Type Rating - Training / Checks (135/121/142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proficiency Checks (135/121/142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAT I: (RVR 2400/1800 ft. DH 200 ft)</td>
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<td></td>
</tr>
<tr>
<td>CAT II: (RVR 1200 ft. DH 100 ft)</td>
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</tr>
<tr>
<td>CAT III * (lowest minimum) RVR _____ ft.</td>
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<td></td>
</tr>
<tr>
<td>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circling Approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windshear Training (FSTD GB-03-05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windshear Training LAW 121.409d (121 Turbojets Only) (FSTD GB-03-05)</td>
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<tr>
<td>Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB-04-03)</td>
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<td></td>
</tr>
<tr>
<td>Specific Unusual Attitudes Recoveries (HBAT 95-10) (FSTD GB-04-03)</td>
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<td></td>
</tr>
<tr>
<td>Auto-coupled Approach/Auto Go Around</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-land / Roll Out Guidance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCAS/ACAS I/II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WX-Radar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUD (FSTD GB-03-02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGS (FSTD GB-03-02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFVS (FSTD GB-04-03)</td>
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<td>Future Air Navigation Systems (HBAT 98-16A)</td>
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<tr>
<td>GPWS / EGPWS</td>
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</tr>
<tr>
<td>ETOPS Capability</td>
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<tr>
<td>GPS</td>
<td></td>
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<td>SMGCS</td>
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<tr>
<td>Helicopter Slope Landings</td>
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<tr>
<td>Helicopter External Load Operations</td>
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<tr>
<td>Helicopter Pinnacle Approach to Landings</td>
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<td></td>
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<td>Helicopter Night Vision Maneuvers</td>
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<td></td>
</tr>
<tr>
<td>Helicopter Category A Takeoffs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Go Fast Airline Training — Farnsworth Z-100 — Level D — FAA ID# 999

The FSTD 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:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.e</td>
<td>Circling Approach</td>
</tr>
<tr>
<td>6. (a)</td>
<td>Emergency Descent (maximum rate)</td>
</tr>
<tr>
<td>6. (b)</td>
<td>Inflight Fire and Smoke Removal</td>
</tr>
<tr>
<td>6. (c)</td>
<td>Rapid Decompression</td>
</tr>
<tr>
<td>6. (d)</td>
<td>Emergency Evacuation</td>
</tr>
</tbody>
</table>

Additional tasks for which this FSTD is qualified (i.e., in addition to the list in Table B1B):

NONE
## Recurrent Evaluation Requirements

**Completed at conclusion of Initial Evaluation**

<table>
<thead>
<tr>
<th>Recurrent Evaluations to be conducted each</th>
<th>Recurrent evaluations are due as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(fill in) months</td>
<td>(month) and (month) and (month)</td>
</tr>
<tr>
<td></td>
<td>(enter or strike out, as appropriate)</td>
</tr>
</tbody>
</table>

Allotting _____ hours of FTD time.

Signed: 
NSPM / Evaluation Team Leader

Date

---

## Revision:

Based on (enter reasoning):

---

## Recurrent Evaluations are to be conducted each

<table>
<thead>
<tr>
<th>(fill in) months. Allotting _____ hours.</th>
<th>Recurrent evaluations are due as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(month) and (month) and (month)</td>
</tr>
<tr>
<td></td>
<td>(enter or strike out, as appropriate)</td>
</tr>
</tbody>
</table>

Signed: 
NSPM Evaluation Team Leader

Date

---

## Revision:

Based on (enter reasoning):

---

## Recurrent Evaluations are to be conducted each

<table>
<thead>
<tr>
<th>(fill in) months. Allotting _____ hours.</th>
<th>Recurrent evaluations are due as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(month) and (month) and (month)</td>
</tr>
<tr>
<td></td>
<td>(enter or strike out, as appropriate)</td>
</tr>
</tbody>
</table>

Signed: 
NSPM Evaluation Team Leader

Date

(Repeat as Necessary)
APPENDIX C TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FULL FLIGHT SIMULATORS

BEGIN INFORMATION

This appendix establishes the standards for Helicopter Full Flight Simulator (FFS) evaluation and qualification. The Flight Standards Service, National Simulator Program Manager (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. FSTD Use (§ 60.11).
9. Simulator Objective Data Requirements (§ 60.13).
10. Special Equipment and Personnel Requirements for Qualification of the Simulator (§ 60.14).
11. Initial (and Upgrade) Qualification Requirements (§ 60.15).
12. Additional Qualifications for a Currently Qualified Simulator (§ 60.16).
13. Previously Qualified Simulators (§ 60.17).
15. Logging Simulator Discrepancies (§ 60.20).
16. Interim Qualification of Simulators for New Helicopter Types or Models (§ 60.21).
17. Modifications to Simulators (§ 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]
Pt. 60, App. C

25. FSTD 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—Simulator Objective Tests.

Attachment 3 to Appendix C to Part 60—Simulator Subjective Evaluation.

Attachment 4 to Appendix C 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. 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.


(11) AC 120–57A, Surface Movement Guidance and Control System (SMGS).

(12) AC 150/5300–13, Airport Design.

(13) AC 150/5345–1G, Standards for Airport Markings.

(14) AC 150/5340–4C, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.

(15) AC 150/5340–19, Taxiway Centerline Lighting System.

(16) AC 150/5340–24, Runway and Taxiway Edge Lighting System.

(17) AC 150/5345–28D, Precision Approach Path Indicator (PAPI) Systems.

(18) AC 150/5390–2B, Heliport Design.


END INFORMATION

2. APPLICABILITY (§§ 60.1 & 60.2)

BEGIN INFORMATION

There is no additional regulatory or informative material that 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 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

There is no additional regulatory or informative material that applies to § 60.4, Qualification Performance Standards.

END INFORMATION

5. QUALITY MANAGEMENT SYSTEM (§ 60.5)
Federal Aviation Administration, DOT

BEGIN INFORMATION
See appendix E 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 October 30, 2007, the 12-month period begins on the date of the first continuing qualification evaluation conducted in accordance with §60.19 after October 30, 2007 and continues for each subsequent 12-month period;

(ii) A device qualified on or after October 30, 2007 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.

(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 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.

END INFORMATION

7. Additional Responsibilities of the Sponsor (§60.9)
8. FSTD Use (§ 60.11)

There is no additional regulatory or informational material that applies to § 60.11, FSTD Use.

9. Simulator Objective Data Requirements (§ 60.13)

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.
   (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:
      (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 yaw damper or throttle position; and
      (5) Without alteration, adjustments, or bias; however the 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 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 certificate was issued. This notification must be made within 10 working days.
   e. 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).
   f. 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 (a validation data roadmap) 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.

f. 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.

g. In those cases where the objective test results authorize a “snapshot test” or a “series of snapshot tests,” a time-history result, Attachment 2 requires the sponsor or other data provider to ensure that a steady state condition existed at the instant of time captured by the “snapshot.” This is often verified by showing that a steady state condition existed from some period of time during which the snapshot is taken. The time period most frequently used is 5 seconds prior through 2 seconds following the instant of time captured by the snapshot. This paragraph is primarily addressing the source data and the method by which the data provider ensures that the steady state condition for the snapshot is representative.

h. The NSPM will consider, on a case-by-case basis, whether or not 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 SIMULATOR (§60.14)

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 FFS that raise questions regarding the continued qualification or use of the FFS.

END INFORMATION

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

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;
2. Meet the objective testing requirements listed in Attachment 2; and
3. Satisfactorily accomplish the subjective tests listed in Attachment 3.

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 qualification test guide (QTG), acceptable to the NSPM, that includes all of the following:
   i. Objective data obtained from aircraft testing or another approved source.
   ii. Correlating objective test results obtained from the performance of the FFS as prescribed in the applicable QPS.
   iii. The result of FFS subjective tests prescribed in the applicable QPS.
   iv. 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, 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, 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 C4H, 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 engine model(s) and its data revision number or reference.

(e) The flight control data revision number or reference.

(f) The flight management system identification and revision level.

(g) The FFS model and manufacturer.

(h) The date of FFS manufacture.

(i) The FFS computer identification.

(j) The visual system model and manufacturer, including display type.

(k) The motion system type and manufacturer, including degrees of freedom.

(l) A Table of Contents.

(m) A log of revisions and a list of effective pages.

(5) 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. SOCs must provide references to the sources of information that show the capability of the FFS to comply with the requirements. SOCs must also provide a rationale explaining how the referenced material is used, the mathematical equations and parameter values used, and the conclusions reached. Refer to the “Additional Details” column in Attachment 1, Table C1A, “Simulator Standards,” or in the “Test Details” column in Attachment 2, Table C2A, “Simulator Objective Tests,” to see when SOCs are required.

(9) Recording procedures or equipment required to accomplish the objective tests.

(10) The following information for each objective test designated in Attachment 2, 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 supplemented QTG for each 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.
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(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 October 30, 2013 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 October 30, 2013. A copy of the eMQTG 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.

END QPS REQUIREMENTS

BEGIN INFORMATION

1. Only those FFSs that are sponsored by a certificate holder as defined in appendix F 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.

m. 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, the objective tests listed in Attachment 2, 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) Cockpit 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);

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.

n. 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.

o. 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.

p. 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.

q. 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.

r. 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. However, it is the sponsor’s responsibility to obtain TPAA approval prior to using the FSTD in an FAA-approved flight training program.

s. 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 C4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation.

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.

u. 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(c).

v. 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(c)(6), include take-offs and landing from slopes and pinnacles.

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

There is no additional regulatory or informational material that applies to §60.16. Additional Qualifications for a Currently Qualified FFS.

13. PREVIOUSLY QUALIFIED SIMULATORS (§60.17)

BEGIN QPS REQUIREMENTS

a. In instances where a sponsor plans to remove a 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
BEGIN INFORMATION

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

END QPS REQUIREMENTS

BEGIN INFORMATION

d. 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.

The issuance of the statement will not requalify the FFS inventory regulated by the FAA.

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.

d. The sponsor’s QMS.

e. If the NSPM 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

BEGIN QPS REQUIREMENTS

BEGIN INFORMATION

END INFORMATION

END INFORMATION

END QPS REQUIREMENTS
tests include latencies, control dynamics, sounds and vibrations, motion, and/or some visual system tests.

f. 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.

g. The requirement established in §60.19(b)(4) regarding the frequency of NSPM-conducted continuing qualification evaluations in §60.19(b)(4) regarding the frequency of NSPM-conducted continuing qualification evaluations for each FFS 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.

17. Modifications to Simulators (§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

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. 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.

c. 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
19. Automatic Loss of Qualification and Procedures for Restoration of Qualification (§ 60.27)

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

20. Other Losses of Qualification and Procedures for Restoration of Qualification (§ 60.29)

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

21. Recordkeeping and Reporting (§ 60.31)

BEGIN QPS REQUIREMENTS

a. FSTD modifications can include hardware or software changes. For FSTD 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)

There are no additional QPS requirements or informational material that apply to § 60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

23. [Reserved]

24. [Reserved]

25. FSTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA) (§ 60.37)

There are no additional QPS requirements or informational material that apply to § 60.37. FSTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).

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 a Statement of Compliance and Capability (SOC), which may include objective and subjective tests. The SOC will confirm that the requirement was satisfied, and describe how the requirement was met, such as gear modeling approach or coefficient of friction sources. The requirements for SOCs and tests 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 and the examination of functions and subjective tests listed in Attachment 3 to determine the complete requirements for a specific level simulator.

b. The material contained in this attachment is divided into the following categories:
TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS

<table>
<thead>
<tr>
<th>QPS requirements</th>
<th>Simulator levels</th>
<th>Information Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>General simulator requirements</td>
<td>A</td>
</tr>
<tr>
<td>1. General Cockpit Configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a.</td>
<td>The simulator must have a cockpit that is a replica of the helicopter simulated with controls, equipment, observable cockpit 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 &quot;eye position&quot; established for the helicopter being simulated. Equipment for the operation of the cockpit windows must be included, but the actual windows need not be operable. Fire axes, extinguishers, spare light bulbs, etc., 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. An SOC is required.</td>
<td>X</td>
</tr>
<tr>
<td>1.b.</td>
<td>Those circuit breakers that affect procedures and/or result in observable cockpit indications must be properly located and functionally accurate. An SOC is required.</td>
<td>X</td>
</tr>
<tr>
<td>2. Programming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.a.</td>
<td>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 helicopter attitude, thrust, drag, altitude, temperature, gross weight, moments of inertia, center of gravity location, and configuration. An SOC is required.</td>
<td>X</td>
</tr>
<tr>
<td>2.b.</td>
<td>The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought. An SOC is required.</td>
<td>X</td>
</tr>
<tr>
<td>2.c.</td>
<td>Ground handling and aerodynamic programming must include the following:</td>
<td></td>
</tr>
<tr>
<td>2.c.1</td>
<td>Ground effect ..................................................</td>
<td>X</td>
</tr>
</tbody>
</table>

Level B does not require hover programming. An SOC is required.
<table>
<thead>
<tr>
<th>No.</th>
<th>GQS requirements</th>
<th>Simulator levels</th>
<th>Information Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General simulator requirements</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>2.c.2</td>
<td>Ground reaction</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Level B does not require hover programming.</td>
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<tr>
<td></td>
<td>An SOC is required.</td>
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<tr>
<td>2.c.3</td>
<td>Ground handling characteristics. Control inputs required during operations in crosswind, during braking and deceleration, and for turning radius.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>An SOC is required.</td>
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<tr>
<td></td>
<td>This may include an automated system, which could be used for conducting at least a portion of the QTG tests. Automatic &quot;flagging&quot; of out-of-tolerance situations is encouraged.</td>
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<tr>
<td>2.e</td>
<td>Relative responses of the motion system, visual system, and cockpit 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:</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.e.1</td>
<td>Response must be within 150 milliseconds of the helicopter response. Objective Tests are required. See Attachment 2 for Transport Delay and Latency Tests.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.e.2</td>
<td>Response must be within 100 milliseconds of the helicopter response. Objective Tests are required. See Attachment 2 for Transport Delay and Latency Tests.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.f</td>
<td>The simulator must accurately reproduce the following runway conditions:</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>(1) Dry;</td>
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<td></td>
<td>(2) Wet;</td>
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<td></td>
<td>(3) Icy;</td>
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<td></td>
<td>(4) Patchy Wet</td>
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<td></td>
<td>(5) Patchy Icy</td>
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<tr>
<td></td>
<td>An SOC is required.</td>
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<tr>
<td></td>
<td>Objective tests are required for dry, wet, and icy runway conditions.</td>
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<td></td>
<td>Subjective tests are required for patchy wet, patchy icy, and wet on rubber residue in touchdown zone conditions.</td>
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<tr>
<td>2.g</td>
<td>The simulator must simulate:</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>(1) Brake and tire failure dynamics (including anti-skid failure).</td>
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<td></td>
<td>(2) Decreased brake efficiency due to high brake temperatures, if applicable.</td>
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</tr>
<tr>
<td></td>
<td>An SOC is required.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Simulator pitch, side loading, and directional control characteristics should be representative of the helicopter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>General simulator requirements</td>
<td>Simulator levels</td>
<td>Information Notes</td>
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<tr>
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<td>-----------------------------------------------------------------------------------------------</td>
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<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
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<tr>
<td>2.h</td>
<td>The modeling in the simulator must include:</td>
<td>X</td>
<td>X</td>
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<tr>
<td></td>
<td>(1) Ground effect,</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(2) Effects of airframe icing (if applicable),</td>
<td></td>
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<tr>
<td></td>
<td>(3) Aerodynamic interference effects between the rotor wake and fuselage,</td>
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<tr>
<td></td>
<td>(4) Influence of the rotor on control and stabilization systems, and</td>
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</tr>
<tr>
<td></td>
<td>(5) Representations of nonlinearities due to side-slip.</td>
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<tr>
<td></td>
<td>An SOC is required and must include references to computations of aeroelastic</td>
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<tr>
<td></td>
<td>representations and of nonlinearities due to sideslip.</td>
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<tr>
<td></td>
<td>An SOC and a demonstration of icing effects (if applicable) are required.</td>
<td></td>
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</tr>
<tr>
<td>2.i</td>
<td>The simulator must provide for realistic mass properties, including gross weight,</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>center of gravity, and moments of inertia as a function of payload and fuel loading.</td>
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<tr>
<td></td>
<td>An SOC is required and must include a range of tabulated target values to enable a subjective</td>
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<tr>
<td></td>
<td>test of the mass properties model to be conducted from the instructor’s station.</td>
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<tr>
<td>3.</td>
<td>Equipment Operation</td>
<td></td>
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</tr>
<tr>
<td>3.a</td>
<td>All relevant instrument indications in the simulation of the helicopter must automatically</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>respond to control movement or external disturbances to the simulated helicopter; e.g.,</td>
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</tr>
<tr>
<td></td>
<td>turbulence or windshear. Numerical values must be presented in the appropriate units.</td>
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<tr>
<td></td>
<td>A subjective test is required.</td>
<td></td>
<td></td>
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<tr>
<td>3.b</td>
<td>Communications, navigation, caution, and warning equipment must be installed and operate within</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>the tolerances applicable for the helicopter being simulated.</td>
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<tr>
<td></td>
<td>A subjective test is required.</td>
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<td></td>
</tr>
<tr>
<td>3.c</td>
<td>Simulated airplane systems must operate as the helicopter systems would operate under normal,</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>abnormal, and emergency operating conditions on the ground and in flight.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>A subjective test is required.</td>
<td></td>
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<tr>
<td>3.d</td>
<td>The simulator must provide pilot controls with control forces and control travel that</td>
<td>X</td>
<td>X</td>
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<td></td>
<td>correspond to the simulated helicopter. The simulator must also react in the same manner as</td>
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<td></td>
<td>in the helicopter under the same flight conditions.</td>
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<tr>
<td></td>
<td>An objective test is required.</td>
<td></td>
<td></td>
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<tr>
<td>4.</td>
<td>Instructor / Evaluator Facilities</td>
<td></td>
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<tr>
<td>4.a</td>
<td>In addition to the flight crewmember stations, the simulator must have at least two suitable</td>
<td>X</td>
<td>X</td>
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<td></td>
<td>seats for the instructor/check airman and FAA inspector. These seats must provide adequate</td>
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<td>vision to the pilot’s panel and forward windows. All seats other than flight crew seats need</td>
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<td>not represent those found in the helicopter but must be adequately secured to the floor and</td>
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<td></td>
<td>equipped with similar positive restraint devices.</td>
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<tr>
<td></td>
<td>A subjective test is required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>General simulator requirements</td>
<td>Simulator levels</td>
<td>Information Notes</td>
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<tr>
<td>4.b</td>
<td>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. A subjective test is required.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>4.c</td>
<td>The simulator must have instructor controls for environmental conditions including wind speed and direction. A subjective test is required.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>4.d</td>
<td>The simulator must provide the instructor or evaluator the ability to present ground and air hazards. For example, another aircraft crossing the active runway and converging airborne traffic.</td>
<td>X X</td>
<td></td>
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<tr>
<td>5. Motion System</td>
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</tr>
<tr>
<td>5.a</td>
<td>The simulator must have motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave). An SOC is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5.b</td>
<td>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). An SOC is required.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>5.d</td>
<td>The simulator must provide for the recording of the motion system response time. An SOC is required.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>5.e</td>
<td>The simulator must provide motion effects programming to include the following: (1) Runway rumble, oleo deflections, effects of ground speed, uneven runway, characteristics. (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 settling with power. (6) Representative cues resulting from touchdown. (7) Rotor vibrations. A subjective test is required for each.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>5.f</td>
<td>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 cockpit. A subjective test is required.</td>
<td>X</td>
<td>For air turbulence, general purpose demonstrable flight test data are acceptable. The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to helicopter data.</td>
</tr>
</tbody>
</table>
### TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information Notes</th>
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<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
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</tbody>
</table>

6. Visual System

6.a The simulator must have a visual system providing an out-of-the-cockpit view. A subjective test is required.  
   
   | X | X | X |

6.b The simulator must provide a continuous minimum collimated field of view of 75° horizontally and 30° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. An SOC is required.  
   
   | X |

6.c The simulator must provide a continuous minimum collimated visual field of view of 150° horizontally and 40° 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. An SOC is required.  
   Optimization of the visual field of view may be considered with respect to the specific helicopter cockpit cut-off angle.  
   
   | X |

6.d The simulator must provide a continuous minimum collimated visual field of view of 180° horizontally and 60° 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. An SOC is required.  
   Optimization of the visual field of view may be considered with respect to the specific airplane cockpit cut-off angle.  
   
   | X |

6.e The visual system must be free from optical discontinuities and artifacts that create non-realistic cues. A subjective test is required.  
   Non-realistic 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.  
   
   | X | X | X |

6.f The simulator must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights. A subjective test is required.  
   
   | X | X |

6.g The simulator must have instructor controls for the following:  
   (1) Cloudbase.  
   (2) Visibility in statute miles (kilometers) and runway visual range (RVR) in ft. (meters).  
   (3) Airport or landing area selection.  
   (4) Airport or landing area lighting.  
   A subjective test is required.  
   
   | X | X | X |

6.h Each airport scene displayed must include the following:  
   1. Airport runways and taxiways.  
   2. Runway definition:  
      a. Runway surface and markings.  
      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.  
      c. Taxiway lights.  
   A subjective test is required.  
   
   | X | X |

6.i The distances at which runway features are visible, as measured from runway threshold to a helicopter aligned with the runway on an extended 3° glide slope must not be less than listed below:  
   
   | X | X |
### TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
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<tr>
<td>1.</td>
<td>Runway definition, strobe lights, approach lights, runway edge white lights and VASI or PAPI system lights from 5 statute miles (8 km) of the runway threshold.</td>
<td></td>
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<tr>
<td>2.</td>
<td>Runway centerline lights and taxiway definition from 3 statute miles (4.8 km).</td>
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<tr>
<td>3.</td>
<td>Threshold lights and touchdown zone lights from 2 statute miles (3.2 km).</td>
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<tr>
<td>4.</td>
<td>Runway markings within range of landing lights for night scenes and as required by three (3) arc-minutes resolution on day scenes.</td>
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<tr>
<td></td>
<td>A subjective test is required.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>6.j</td>
<td>The simulator must provide visual system compatibility with dynamic response programming.</td>
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<td></td>
<td>A subjective test is required.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>6.k</td>
<td>The simulator must show that the segment of the ground visible from the simulator cockpit is the same as from the airplane cockpit (within established tolerances) when at the correct airspeed, in the landing configuration, at a main wheel height of 100 feet (30 meters) above the touchdown zone. Data submitted must include at least the following:</td>
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<tr>
<td></td>
<td>(1) Static helicopter dimensions as follows:</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(i) Horizontal and vertical distance from main landing gear (MLG) or landing skids to glideslope reception antenna.</td>
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<td></td>
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<tr>
<td></td>
<td>(ii) Horizontal and vertical distance from MLG or skids to pilot’s eyepoint.</td>
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<td></td>
<td>(iii) Static cockpit cutoff angle.</td>
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<td></td>
<td>(2) Approach data as follows:</td>
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<tr>
<td></td>
<td>(i) Identification of runway.</td>
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<tr>
<td></td>
<td>(ii) Horizontal distance from runway threshold to glideslope intercept with runway.</td>
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<td></td>
<td>(iii) Glideslope angle.</td>
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<td></td>
<td>(iv) Helicopter pitch angle on approach.</td>
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<tr>
<td></td>
<td>(2) Helicopter data for manual testing:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(i) Gross weight.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(ii) Helicopter configuration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) Approach airspeed.</td>
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<td></td>
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<tr>
<td></td>
<td>The QTG must contain appropriate calculations and a drawing showing the pertinent data used to establish the helicopter location and the segment of the ground that is visible considering the helicopter attitude (cockpit cut-off angle) and a runway visual range of 1,200 feet or 350 meters. Simulator performance must be measured against the QTG calculations. Sponsors must provide this data for each simulator (regardless of previous qualification standards) to qualify the simulator for all precision instrument approaches. At the near end of the visual ground segment, lights and ground objects computed to be visible from the helicopter cockpit must be visible in the FFS. The far end of the visual ground segment must be at the computed end of the segment ±20% of the computed visible segment distance. An SOC is required. An objective test is required.</td>
<td></td>
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<tr>
<td>6.1</td>
<td>The simulator must provide visual cues necessary to assess rate of change of height, height AGL, as well as translational displacement and rates during takeoffs and landings. A subjective test is required.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>General simulator requirements</td>
<td>Simulator levels</td>
<td>Information Notes</td>
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<td>A</td>
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<tr>
<td>6.m</td>
<td>The simulator must have night and dusk (or twilight) visual scene capability, including general terrain characteristics and significant landmarks, free from apparent quantization. Dusk (or twilight) scene must enable identification of a visible horizon and general terrain characteristics. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.n</td>
<td>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. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.o</td>
<td>The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.p</td>
<td>The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity. An SOC is required. A subjective test is required.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.q</td>
<td>The simulator must provide a minimum of three airport scenes including the following: 1. Surfaces on runways, taxiways, and ramps. 2. Lighting of appropriate color for all runways, including runway threshold, edge, centerline, VASI (or PAPI), and approach lighting for the runway in use. 3. Airport taxiway lighting. 4. Ramps and buildings that correspond to the sponsor’s Line Oriented scenarios, as appropriate. A subjective test is required.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>6.r</td>
<td>The simulator must be capable of producing at least 10 levels of occulting. A subjective test is required.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>6.s</td>
<td>The fog simulator must be able to provide weather representations including the following: (1) Variable cloud density. (2) Partial obscuration of ground scenes; i.e., the effect of a scattered to broken cloud deck. (3) Gradual breakout. (4) Patchy fog. (5) The effect of fog on airport lighting. The weather representations must be provided at and below an altitude of 2,000 ft (610 m) height above the airport and within a radius of 10 miles (16 km) from the airport. A subjective test is required.</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>
### Table C1A—Minimum Simulator Requirements—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>Simulator levels</th>
<th>Information Notes</th>
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<tbody>
<tr>
<td>6.t</td>
<td>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 airplane landing lights.</td>
<td>X X X</td>
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<tr>
<td>6.u</td>
<td>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.</td>
<td>X X</td>
<td>An SOC is required.</td>
</tr>
<tr>
<td>6.v</td>
<td>Night, Dusk (Twilight), and Daylight Visual Scenes. The simulator must have night, dusk (twilight), and 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 &quot;washout&quot; 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 quantization and other distracting visual effects while the simulator is in motion. <strong>Note:</strong> These requirements are applicable to any level of simulator equipped with a daylight visual system.</td>
<td>X</td>
<td>An SOC is required. A subjective test is required. Objective tests are required.</td>
</tr>
<tr>
<td>6.w</td>
<td>The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots.</td>
<td>X</td>
<td>For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features.</td>
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</table>
### TABLE C1A—MINIMUM SIMULATOR REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General simulator requirements</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tr>
<td></td>
<td>A subjective test is required.</td>
<td></td>
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<tr>
<td>6.x</td>
<td>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. A subjective test is required.</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>6.y</td>
<td>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. A subjective test is required.</td>
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<td>X</td>
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<tr>
<td>6.z</td>
<td>The simulator must present realistic color and directionality of all airport lighting. A subjective test is required.</td>
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</table>

### Sound System

7.a ... The simulator must provide cockpit 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. An SOC is required. A subjective test is required. X X

7.d ... The simulator must provide realistic amplitude and frequency of cockpit 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

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**ATTACHMENT 2 TO APPENDIX C TO PART 60—SIMULATOR OBJECTIVE TESTS**

**BEGIN INFORMATION**

1. **DISCUSSION.**

(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).

**END INFORMATION**

**BEGIN QPS REQUIREMENTS**

1. **TEST REQUIREMENTS.**

a. The ground and flight tests required for qualification are listed in Table 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). When a 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 condition must be provided to allow 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.

c. Certain tests included in this attachment must be supported with a Statement of Compliance and Capability (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 validation, 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 helicopter 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 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, except as may be authorized by the NSPM. 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 dynamic, 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. 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.”

i. 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.

j. 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 but identifiable reference points and must also be achieved by driving one degree of freedom at a time.
k. 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.

l. Some tests will not be required for helicopters using helicopter hardware in the simulator cockpit (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.

m. For objective test purposes, “Near maximum” gross weight is a weight chosen by the sponsor or data provider that is not less than the basic operating weight (BOW) of the helicopter 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. “Light” gross weight is a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the helicopter being simulated or as limited by the minimum practical operating weight of the test helicopter. “Medium” gross weight is a weight chosen by the sponsor or data provider that is approximately ±10% of the average of the numerical values of the BOW and the maximum certificated gross weight. (Note: BOW is 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. (References: Advisory Circular 120–27, “Aircraft Weight and Balance;” and FAA–H–8083–1, “Aircraft Weight and Balance Handbook.”).
**Table C2A—Full Flight Simulator (FFS) Objective Tests**

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Description</th>
<th>Flight Condition</th>
<th>Test Details</th>
<th>Simulator Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Engine Assessment</td>
<td>Light Off Time — ±10% or ±1 sec., Torque — ±5%, Rotor Speed — ±5%, Fuel Flow — ±10%, Gas Generator Speed — ±5%, Power Turbine Speed — ±5%, Gas Turbine Temp. — ±30 °C.</td>
<td>Ground with the Rotor Brake Used and Not Used.</td>
<td>A B C D</td>
<td>X X X</td>
</tr>
<tr>
<td>1.2</td>
<td>Power Turbine Speed Trim</td>
<td>±10% of total change of power turbine speed.</td>
<td>Ground</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>1.3</td>
<td>Engine and Rotor Speed Governing</td>
<td>Torque — ±5%, Rotor Speed — 1.5%.</td>
<td>Climb, descent</td>
<td></td>
<td>X X X</td>
</tr>
</tbody>
</table>

**Notes:**
- X indicates a pass.
- X X indicates a pass in both directions.
- X X X indicates a pass in all directions.
<table>
<thead>
<tr>
<th>No.</th>
<th>Test</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.b</td>
<td>Surface Operations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.b.1</td>
<td>Minimum Radius Turn</td>
<td>±3 ft. (0.9m) or 20% of helicopter turn radius.</td>
<td>Ground</td>
<td>If brakes are used, brake force must be matched to the helicopter flight test value.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>1.b.2</td>
<td>Rate of Turn vs. Pedal Deflection or Nosewheel Angle.</td>
<td>±10% or ±2°/sec. Turn Rate ...</td>
<td>Ground Takeoff</td>
<td></td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>1.b.3</td>
<td>Taxi</td>
<td>Pitch Angle — ±1.5°, Torque — ±3%, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Directional Control Position.</td>
<td>Ground</td>
<td>Record results for control position and pitch attitude during ground taxi for a specific ground speed, wind speed and direction, and density altitude.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>1.b.4</td>
<td>Brake Effectiveness</td>
<td>±5%, Collective Control Position — ±5%.</td>
<td></td>
<td></td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>1.c</td>
<td>Takeoff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 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 | 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 |

| 1.d | Hover.


<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Title</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>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%</td>
<td>In Ground Effect (IGE); and Out of Ground Effect (OGE)</td>
<td>Record results for light and heavy gross weights. May be a series of snapshot tests.</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Climb</td>
<td>Vertical Velocity — ±100 fpm (0.50 m/sec) or ±10%, Directional Control Position — ±5%, Collective Control Position — ±5%</td>
<td>From OGE Hover ...</td>
<td>Record results for light and heavy gross weights. May be a series of snapshot tests.</td>
<td>X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level Flight</td>
<td>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%</td>
<td>Cruise (Augmentation On and Off)</td>
<td>Record results for two gross weight and CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests.</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.h.1</td>
<td>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%.</td>
<td>At or near 1,000 fpm rate of descent (RoD) at normal approach speed. Augmentation System(s) On and Off.</td>
<td>Results must be recorded for two gross weight and CG combinations. May be a series of snapshot tests.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1.h.2</td>
<td>Autorotation 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%. Vertical Velocity ±100 fpm or 19%. Rotor Speed ±1.5%.</td>
<td>Steady descents. Augmentation System(s) On and Off.</td>
<td>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.) May be a series of snapshot tests.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>1.i</td>
<td>Autorotation.</td>
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<tr>
<td>Test No.</td>
<td>Title</td>
<td>Tolerance(s)</td>
<td>Flight condition</td>
<td>Test details</td>
<td>Simulator level</td>
<td>Notes</td>
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<tr>
<td>Entry</td>
<td>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%.</td>
<td>Cruise or Climb</td>
<td>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.</td>
<td></td>
<td></td>
<td>X X</td>
</tr>
</tbody>
</table>
### 1.j.1 All Engines

<table>
<thead>
<tr>
<th>Airspeed</th>
<th>±3 kts.</th>
<th>Altitude</th>
<th>±20 ft (6.1m)</th>
<th>Torque</th>
<th>±3%</th>
<th>Rotor Speed</th>
<th>±1.5%</th>
<th>Pitch Attitude</th>
<th>±1.5°</th>
<th>Bank Attitude</th>
<th>±1.5°</th>
<th>Heading</th>
<th>±2°</th>
<th>Longitudinal Control Position</th>
<th>±10%</th>
<th>Lateral Control Position</th>
<th>±10%</th>
<th>Directional Control Position</th>
<th>±10%</th>
<th>Collective Control Position</th>
<th>±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td></td>
<td>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.</td>
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</tbody>
</table>

### 1.j.2 One Engine Inoperative

<table>
<thead>
<tr>
<th>Airspeed</th>
<th>±3 kts.</th>
<th>Altitude</th>
<th>±20 ft (6.1m)</th>
<th>Torque</th>
<th>±3%</th>
<th>Rotor Speed</th>
<th>±1.5%</th>
<th>Pitch Attitude</th>
<th>±1.5°</th>
<th>Bank Attitude</th>
<th>±1.5°</th>
<th>Heading</th>
<th>±2°</th>
<th>Longitudinal Control Position</th>
<th>±10%</th>
<th>Lateral Control Position</th>
<th>±10%</th>
<th>Directional Control Position</th>
<th>±10%</th>
<th>Collective Control Position</th>
<th>±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td></td>
<td>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.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>No.</td>
<td>Test Title</td>
<td>Tolerance(s)</td>
<td>Flight condition</td>
<td>Test details</td>
<td>Simulator level</td>
<td>Notes</td>
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<tr>
<td>1.j.3</td>
<td>Balked Landing</td>
<td>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%.</td>
<td>Approach ..........</td>
<td>Record the results for the maneuver initiated from a stabilized approach at the landing decision point (LDP).</td>
<td>X</td>
<td>X X</td>
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</tr>
<tr>
<td>1.j.4</td>
<td>Autorotational Landing</td>
<td>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%.</td>
<td>Landing ..........</td>
<td>Record the results of an autorotational deceleration and landing from a stabilized autorotational descent, to touch down.</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
</tbody>
</table>

2. Handling Qualities.

2.a. Control System Mechanical Characteristic(s).

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 would then satisfy this test requirement. For initial and upgrade evaluations, the control dynamic characteristics must be measured at and recorded directly from the cockpit controls, and must be accomplished in hover, climb, cruise, and autorotation. 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/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. | .... | 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.
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Title</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.a.6</td>
<td>Freeplay</td>
<td>±0.10 in</td>
<td>Ground; Static conditions</td>
<td>Record and compare results for all controls</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>2.b</td>
<td>Low Airspeed Handling Qualities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.b.1</td>
<td>Trimmed Flight Control Positions.</td>
<td></td>
<td></td>
<td>Record results for several airspeed increments to the translational airspeed limits and for 45 kts. forward airspeed. May be a series of snapshot tests.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.b.2</td>
<td>Critical Azimuth</td>
<td></td>
<td></td>
<td>Record results for three relative wind directions (including the most critical case) in the critical quadrant. May be a series of snapshot tests.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.b.3</td>
<td>Control Response</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.b.3.a</td>
<td>Longitudinal</td>
<td></td>
<td></td>
<td>Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.b.3.b</td>
<td>Lateral</td>
<td>Roll Rate—±10% or ±2% sec. Pitch Attitude Change—±10% or 1.5°.</td>
<td>Hover, Augmentation On and Off.</td>
<td>Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.b.3.c</td>
<td>Directional</td>
<td>Yaw Rate—±10% or ±2% sec. Heading Change—±10% or 2°.</td>
<td>Hover, Augmentation On and Off.</td>
<td>Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.b.3.d</td>
<td>Vertical</td>
<td>Normal Acceleration—±0.1 g</td>
<td>Hover control input. The Off-axis response must show correct trend for unaugmented cases.</td>
<td>Record results for a step.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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 |
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Title</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.c.2</td>
<td>Static Stability</td>
<td>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%.</td>
<td>Cruise or Climb. Autorotation. Augmentation On and Off.</td>
<td>Record results for a minimum of two speeds on each side of the trim speed. May be a series of snapshot tests.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.3</td>
<td>Dynamic Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.3.a</td>
<td>Long Term Response</td>
<td>±10% of calculated period, ±10% of time to 1⁄2 or double amplitude, or ±0.02 of damping ratio.</td>
<td>Cruise Augmentation On and Off.</td>
<td>Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to 1⁄2 or double amplitude, whichever is less. For non-period responses, the time history must be matched.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.3.b</td>
<td>Short Term Response</td>
<td>±1.5° Pitch or ±2°/sec. Pitch Rate. ±0.1 g Normal Acceleration.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>Record results for at least two airspeeds.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.4</td>
<td>Maneuvering Stability</td>
<td></td>
<td>Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3mm) or Longitudinal Control Forces—±0.5 lb. (0.223 daN) or ±10%</td>
<td>Cruise or Climb, Augmentation On and Off</td>
<td>Record results for at least two airspeeds. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests</td>
<td>X</td>
</tr>
<tr>
<td>2.c.5</td>
<td>Landing Gear Operating Times</td>
<td></td>
<td>±1 sec</td>
<td>Takeoff (Retraction) Approach (Extension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d</td>
<td>Lateral and Directional Handling Qualities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.1</td>
<td>Control Response</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.1.a</td>
<td>Lateral</td>
<td></td>
<td>Roll Rate—±10% or ±3'/sec., Roll Attitude Change—±10% or ±3°</td>
<td>Cruise Augmentation On and Off</td>
<td>Record results for 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 un-augmented cases</td>
<td>X</td>
</tr>
<tr>
<td>Test</td>
<td>Tolerance(s)</td>
<td>Flight condition</td>
<td>Test details</td>
<td>Simulator level</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>------</td>
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<td>------------------</td>
<td>--------------</td>
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<td>-------</td>
<td></td>
</tr>
<tr>
<td>2.d.1.b</td>
<td>Directional</td>
<td>Yaw Rate—±10% or ±2°/sec., Yaw Attitude Change—±10% or ±2°.</td>
<td>Cruise Augmentation On and Off.</td>
<td>X X X</td>
<td>This is a steady heading sideslip test.</td>
<td></td>
</tr>
<tr>
<td>2.d.2</td>
<td>Directional Static Stability</td>
<td>Lateral Control Position—±10% of change from trim or ±0.25 in. (6.3mm) 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. (6.3mm) or Directional Control Force—±1 lb. (0.448 daN) or 10%.</td>
<td>Cruise; or Climb (may use Descent instead of Climb if desired), Augmentation On and Off.</td>
<td>X X X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.3</td>
<td>Dynamic Lateral and Directional Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.d.3.a.</td>
<td>Lateral-Directional Oscillations.</td>
<td>±0.5 sec. or ±10% of period, ±10% of time to ( \frac{1}{2} ) or double amplitude or ±0.02 of damping ratio, ±20% of ±1 sec. of time difference between peaks of bank and sideslip.</td>
<td>Cruise or Climb. Augmentation On/Off.</td>
<td>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 over-shoots after input completed) or that sufficient to determine time to ( \frac{1}{2} ) or double amplitude, whichever is less. For non-periodic response, the time history must be matched.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.3.b.</td>
<td>Spiral Stability.</td>
<td>Correct Trend, ±2° bank or ±10% in 20 sec.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>Record the results of a release from pedal only or cyclic only turns. Results must be recorded from turns in both directions.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.d.3.c.</td>
<td>Adverse/Proverse Yaw.</td>
<td>Correct Trend, ±2° transient sideslip angle.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

2. Handling Qualities.
<table>
<thead>
<tr>
<th>Test</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.a</td>
<td>Control System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Motion System</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>3.a</td>
<td>Motion Envelope</td>
<td></td>
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</tr>
<tr>
<td>3.a.1</td>
<td>Pitch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.a.1.a</td>
<td>Displacement—TBD</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±25°</td>
<td></td>
<td></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.a.1.b</td>
<td>Velocity—TBD/sec</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±20°/sec</td>
<td></td>
<td></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.a.1.c</td>
<td>Acceleration—TBD/sec²</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±100°/sec²</td>
<td></td>
<td></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.a.2</td>
<td>Yaw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.a.2.a</td>
<td>Displacement—TBD</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±25°</td>
<td></td>
<td></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.a.2.b</td>
<td>Velocity—TBD/sec</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±20°/sec</td>
<td></td>
<td></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.a.2.c</td>
<td>Acceleration—TBD/sec²</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±100°/sec²</td>
<td></td>
<td></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.3.1.a</td>
<td>Displacement</td>
<td>±25°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1.b</td>
<td>Velocity</td>
<td>±20°/sec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1.c</td>
<td>Acceleration</td>
<td>±100°/sec²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1.d</td>
<td>Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1.e</td>
<td>Displacement</td>
<td>TBD in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1.f</td>
<td>Velocity</td>
<td>TBD in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1.g</td>
<td>Acceleration</td>
<td>TBD g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.5</td>
<td>Lateral</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.6</td>
<td>Longitudinal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.7</td>
<td>Initial Rotational Acceleration Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All axes: TBD°/sec²/sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All axes: 30°/sec²/sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.8</td>
<td>Initial Linear Acceleration Ratio</td>
<td></td>
<td></td>
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<td></td>
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### TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Title</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Vertical: ±TBD g/sec</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±6g/sec</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Lateral: ±3g/sec</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Longitudinal: ±3g/sec</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3.b</td>
<td>Frequency Response</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Band, Hz Phase, deg.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Amplitude, Ratio, db</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>0.10 to 0.5 − 15 to − 20.</td>
<td>±2</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>0.51 to 1.0 − 15 to − 20.</td>
<td>±4</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3.c</td>
<td>Leg Balance</td>
<td>1.5°</td>
<td></td>
<td>The phase shift between a datum jack and any other jack must be measured using a heave (vertical) signal of 0.5 Hz. at ±0.25 g.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3.d</td>
<td>Turn Around</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Turn Around</td>
<td>0.05 g</td>
<td>The motion base must be driven sinusoidally in heave through a displacement of 6 inches (150mm) peak to peak at a frequency of 0.5 Hz. Deviation from the desired sinusoidal acceleration must be measured.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
</tbody>
</table>

<p>| 4.0 | Visual System Display Tests. |
| 4.a | Field of View. |
| 4.a.1 | Continuous collimated visual field of view. |
| | Minimum continuous collimated field of view providing 75° horizontal and 30° vertical field of view for each pilot simultaneously. |
| | N/A | An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage. |
| | X | A vertical field of view of 30° may be insufficient to meet visual ground segment requirements. 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. The installed alignment should be addressed in the SOC. |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.a.2</td>
<td>Continuous collimated visual field of view.</td>
<td>Minimum continuous collimated field of view providing 150° horizontal and 40° vertical field of view for each pilot simultaneously.</td>
<td>N/A</td>
<td>An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.</td>
<td>X</td>
<td>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. The installed alignment should be addressed in the SOC.</td>
</tr>
<tr>
<td>4.a.3</td>
<td>Continuous collimated visual field of view.</td>
<td>Minimum continuous collimated field of view providing 180° horizontal and 60° vertical field of view for each pilot simultaneously.</td>
<td>N/A</td>
<td>An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.</td>
<td>X</td>
<td>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. The installed alignment should be addressed in the SOC.</td>
</tr>
<tr>
<td>4.c</td>
<td>Surface contrast ratio</td>
<td>Not less than 5:1</td>
<td>N/A</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
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<td>--------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.d</td>
<td>Highlight brightness</td>
<td>Not less than six (6) foot-lamberts (20 cd/m²).</td>
<td>N/A</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Measurements**

- 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.

- 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.
TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Test</th>
<th>Tolerance(s)</th>
<th>Flight condition</th>
<th>Test details</th>
<th>Simulator level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>4.e</td>
<td>Vernier resolution (surface resolution).</td>
<td>Not greater than 3 arc minutes.</td>
<td>N/A</td>
<td>An SOC is required and must include the appropriate calculations and an explanation of those calculations.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
| 4.f | Light point size | Not greater than six (6) 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.
<table>
<thead>
<tr>
<th>4.g</th>
<th>Light point contrast ratio</th>
<th>Not less than 25:1</th>
<th>N/A</th>
<th>An SOC is required and must include the relevant calculations.</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

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.
2. 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 a 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 takeoff, cruise and landing configurations.

b. 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.

c. 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 takeoff, cruise and landing flight conditions and configurations.

d. 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 would satisfy this test requirement.

1. 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:

1. Underdamped Response.
   a. 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 non-uniform 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 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(Af) on Figure C2A is ±5 percent of the initial displacement amplitude Af 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 airplane steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual overshoots.
periods of oscillation. The FFS should show the same number of significant overshoots to within one when compared against the helicopter airplane data. The procedure for evaluating the response is illustrated in Figure C2A.

(2) 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.

(3) The following summarizes the tolerances:

- \( T(P_0) \pm 10\% \text{ of } P_0 \)
- \( T(P_1) \pm 20\% \text{ of } P_1 \)
- \( T(A) \pm 10\% \text{ of } A_1, \pm 20\% \text{ of Subsequent Peaks} \)
- \( T(A_d) \pm 10\% \text{ of } A_d = \text{Residual Band} \)
- Overshoots ±1

(4) In the event the number of cycles completed outside of the residual band, and thereby significant, exceeds the number depicted in figure 1 of this attachment, the following tolerances (T) will apply:

- \( T(P_n) \pm 10\%(n+1)\% \text{ of } P_n, \text{ where } “n” \text{ is the next in sequence.} \)
3. MOTION CUE REPEATABILITY TESTING.

a. The motion system characteristics in the Table C2A address basic system capability, but not pilot cueing capability. Motion systems will continue to be "tuned" subjectively until there is an objective procedure for determining the motion cues necessary to support pilot tasks and stimulate the pilot response that occurs in a helicopter for the same tasks. When a motion system is tuned, it is important to test the system to ensure that it continues to perform as originally qualified. Any motion performance change from the initially qualified baseline can be measured objectively.

b. Motion performance change should be assessed at least annually. An assessment may be conducted as follows:

1. Compare the current performance of the motion system to the initial recorded test data.
2. Record the parameters of the motion drive algorithms and the jack position transducers.
3. Insert the test input signals at an appropriate point prior to the integrations in

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**Figure C2A**
Under-Damped Step Response

**Figure C2B**
Critically-Damped Step Response
the equations of motion (see Figure C2C of this attachment).

(4) Adjust the characteristics of the test signal (see Figure C2D of this attachment) to ensure that the motion is exercised properly. Motion system manufacturers suggest a range of approximately 2/3 of the maximum displacement capability in each axis with a time segment ($T_0-T_1$) of sufficient duration to ensure steady initial conditions.
NOTE: Motion system baseline performance repeatability tests should be rerun if the simulator weight changes for any reason (i.e., visual change, or structural change). The new results should be used for future comparison.

End Information
ATTACHMENT 3 TO APPENDIX C TO PART 60—
SIMULATOR SUBJECTIVE EVALUATION

1. DISCUSSION

BEGIN INFORMATION

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 must not be used to limit or exceed the authorizations for use of a given level of simulator as described on the Statement of Qualification or as may be approved by the TPAA. All items in the following paragraphs are subject to an examination.

b. The tests in Table A3A, Operations Tasks, included in this attachment address pilot functions, including maneuvers and procedures (called flight tasks), and is 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 A3A, Operations Tasks, and Table A3G, Instructor Operating Station, in this attachment addresses 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. The NSPM acknowledges that there are previously qualified simulators with certain, early generation Computer Generated Image (CGI) visual systems, that are limited by either the capability of the Image Generator or the display system used. As a result, the NSPM has agreed to discuss the specific circumstances that may be determined to exist and has agreed to reach a mutually acceptable course of action to address these limitations beyond those that are listed in the QPS requirements of this table. The following are examples:

(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 IV, and including, VITAL III, but not beyond.
   d. Redifusion SP1, SP1T, and SP2.

(2) Early CGI visual systems that are exempt from the necessity of including runway numbers except for those runways used for LOFT training sessions. These LOFT airport models require runway numbers 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.
   d. Previously qualified CGI and/or display systems that are incapable of generating blue lights, and therefore will not be 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

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TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>Preparation For Flight</td>
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<tr>
<td>1.a</td>
<td>Cockpit check: switches, indicators, systems, and equipment</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>APU/Engine start and run-up</td>
<td>X</td>
</tr>
<tr>
<td>2.a</td>
<td>Normal start procedures</td>
<td>X</td>
</tr>
<tr>
<td>2.b</td>
<td>Alternate start procedures</td>
<td>X</td>
</tr>
<tr>
<td>2.c</td>
<td>Abnormal starts and shutdowns (e.g., hot start, hung start)</td>
<td>X</td>
</tr>
<tr>
<td>2.d</td>
<td>Rotor engagement</td>
<td>X</td>
</tr>
<tr>
<td>2.e</td>
<td>System checks</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>(Reserved)</td>
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</tr>
<tr>
<td>4</td>
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</tr>
<tr>
<td>5</td>
<td>(Reserved)</td>
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<tr>
<td>6</td>
<td>Take-off</td>
<td>X</td>
</tr>
<tr>
<td>6.a</td>
<td>Normal</td>
<td>X</td>
</tr>
<tr>
<td>6.a.1</td>
<td>From ground</td>
<td>X</td>
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<td>6.a.2</td>
<td>From hover</td>
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<td>6.a.2.a</td>
<td>Cat A</td>
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<td>Cat B</td>
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<td>6.a.3</td>
<td>Running</td>
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<td>Maximum performance</td>
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<td>Instrument</td>
<td>X</td>
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<td>6.a.7</td>
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<td>6.a.8</td>
<td>(Reserved).</td>
<td></td>
</tr>
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<td>6.a.9</td>
<td>(Reserved).</td>
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<td>6.a.10</td>
<td>(Reserved).</td>
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<td>6.b</td>
<td>Abnormal/emergency procedures</td>
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<td>6.b.1</td>
<td>Takeoff with engine failure after critical decision point (CDP)</td>
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<td>6.c</td>
<td>(Reserved).</td>
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</table>

Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List and/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.
<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
<th>Simulator level</th>
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<td>7.b</td>
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<td>7.c</td>
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<tr>
<td>7.d</td>
<td>One engine inoperative</td>
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<td>8</td>
<td>Cruise</td>
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<tr>
<td>8.a</td>
<td>Performance</td>
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<tr>
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<td>Flying qualities</td>
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<td>8.c</td>
<td>Toms</td>
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<tr>
<td>8.c.1</td>
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<td>Accelerations and decelerations</td>
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<td>High speed vibrations</td>
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<td>8.g</td>
<td>Abnormal/emergency procedures</td>
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<tr>
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<td>One or more engines inoperative</td>
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<td>10.b.3</td>
<td>Approach procedures</td>
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<td>10.b.3.c —Cat II</td>
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<tr>
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<tr>
<td>10.b.4.b</td>
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11. (Reserved)

12. Any Flight Phase

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<tr>
<td>12.a</td>
<td>Helicopter and powerplant systems operation.</td>
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<td>12.a.1</td>
<td>Air conditioning</td>
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<td>Anti-icing/deicing</td>
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<td>12.a.3</td>
<td>Auxiliary power-plant</td>
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<td>12.a.4</td>
<td>Communications</td>
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<td>12.a.5</td>
<td>Electrical</td>
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<td>Fire detection and suppression</td>
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<td>12.a.7</td>
<td>Stabilizer</td>
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<td>Flight controls</td>
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### TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

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<td>12.a.11</td>
<td>Landing gear</td>
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<td>12.a.12</td>
<td>Oxygen</td>
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<td>12.a.13</td>
<td>Pneumatic</td>
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<td>12.a.14</td>
<td>Powerplant</td>
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<td>12.a.15</td>
<td>Flight control computers</td>
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<td>12.a.16</td>
<td>Stability and control augmentation</td>
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<td>12.b</td>
<td>Flight management and guidance system.</td>
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<td>Airborne radar</td>
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<td>12.b.2</td>
<td>Automatic landing aids</td>
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<td>12.b.3</td>
<td>Autopilot</td>
<td>X X X</td>
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<td>12.b.4</td>
<td>Collision avoidance system</td>
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<td>12.b.5</td>
<td>Flight data displays</td>
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<td>12.b.6</td>
<td>Flight management computers</td>
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<td>12.b.7</td>
<td>Heads-up displays</td>
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<td>12.b.8</td>
<td>Navigation systems</td>
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<td>12.c</td>
<td>Airborne procedures</td>
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<td>12.c.1</td>
<td>Holding</td>
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<td>12.c.2</td>
<td>Air hazard avoidance</td>
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<td>12.c.3</td>
<td>Retreating blade stall recovery</td>
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<td>12.c.4</td>
<td>Mast bumping</td>
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<td>13</td>
<td>Engine Shutdown and Parking</td>
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<tr>
<td>13.a</td>
<td>Engine and systems operation</td>
<td>X X X</td>
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<tr>
<td>13.b</td>
<td>Parking brake operation</td>
<td>X X X</td>
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<td>13.c</td>
<td>Rotor brake operation</td>
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<tr>
<td>13.d</td>
<td>Abnormal/emergency procedures</td>
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Table C3B [Reserved]

Table C3C [Reserved]

### TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS

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<tr>
<th>Number</th>
<th>Instructor Operating Station (IOS) (As appropriate)</th>
<th>Simulator level</th>
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<td>A B C D</td>
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<tr>
<td>1.</td>
<td>Simulator Power Switch(es)</td>
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Functions in this table are subject to evaluation only if appropriate for the helicopter and/or the system is installed on the specific simulator.
### TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

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<tr>
<td>2. Helicopter conditions</td>
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<tr>
<td>2.a</td>
<td>Gross weight, center of gravity, fuel loading and allocation</td>
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</tr>
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<td>2.b</td>
<td>Helicopter systems status</td>
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<td>2.c</td>
<td>Ground crew functions</td>
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<td>3. Airports/Heliports</td>
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<tr>
<td>3.a</td>
<td>Number and selection</td>
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<td>3.b</td>
<td>Runway or landing area selection</td>
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<td>3.c</td>
<td>Landing surface conditions (rough, smooth, icy, wet, dry, snow)</td>
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<tr>
<td>3.d</td>
<td>Preset positions</td>
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<td>3.e</td>
<td>Lighting controls</td>
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<td>4. Environmental controls</td>
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<td>4.b</td>
<td>Climate conditions</td>
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<td>4.d</td>
<td>(Reserved)</td>
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<tr>
<td>5. Helicopter system malfunctions (Insertion/deletion)</td>
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<td>6. Locks, Freezes, and Repositioning</td>
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<tr>
<td>6.a</td>
<td>Problem (all) freeze/release</td>
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<tr>
<td>6.b</td>
<td>Position (geographic) freeze/release</td>
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<td>6.c</td>
<td>Repositioning (locations, freezes, and releases)</td>
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<td>6.d</td>
<td>Ground speed control</td>
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<tr>
<td>7. Remote IOS.</td>
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<tr>
<td>8. Sound Controls. On/off/adjustment</td>
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<td>X</td>
</tr>
<tr>
<td>9. Motion/Control Loading System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.a</td>
<td>On/off/emergency stop</td>
<td>X</td>
</tr>
<tr>
<td>10. Observer Seats/Stations, Position/Adjustment/Positive restraint system</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

---

**ATTACHMENT 4 TO APPENDIX C TO PART 60—SAMPLE DOCUMENTS**

**TABLE OF CONTENTS**

**Title of Sample**

- Figure C4A—Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
- Figure C4B—Attachment: FSTD Information Form
- Figure C4C—Sample Qualification Test Guide Cover Page
- Figure C4D—Sample Statement of Qualification—Certificate
- Figure C4E—Sample Statement of Qualification—Configuration List
- Figure C4F—Sample Statement of Qualification—List of Qualified Tasks
- Figure C4G—Sample Continuing Qualification Evaluation Requirements Page
- Figure C4H—Sample MQTG Index of Effective FSTD Directives
ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4A – 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:

The FSTD will be used within the sponsor’s FAA approved training program and placed on the sponsor’s Training/Operations Specifications; or

The FSTD will be used for dry lease only in accordance with Paragraph 3b, FSTD Guidance Bulletin 03-08.

We agree to provide the formal request for the evaluation (Ref: Appendix 4, AC 120-40B) 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 “i3 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:

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.

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: FSTD Information Form
cc: POI/TCPM
ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
Attachment: FSTD Information Form
INFORMATION

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<td>Address:</td>
<td>Physical Address:</td>
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<tr>
<td>City:</td>
<td>City:</td>
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<td>Country:</td>
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<tr>
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<td>ZIP:</td>
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<td>Manager</td>
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<td>(Four Letter FAA Designator)</td>
<td>(Airport Designator)</td>
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<th>Special</th>
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<td>FMS identification and revision level:</td>
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<td>Visual system manufacturer/model:</td>
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<td>Flight control data revision:</td>
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<td>Motion system manufacturer/type:</td>
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<td>NAA Qualification Basis:</td>
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## ATTACHMENT 4 TO APPENDIX C TO PART 60—

**Figure A4B — Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation**

**Attachment: FSTD Information Form**

### INFORMATION

<table>
<thead>
<tr>
<th>Visual System Manufacturer and Name</th>
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### Section 2. Supplementary Information

**FAA Training Program Approval Authority:**
- [ ] PIO
- [ ] TCPM
- Other: [ ]

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### FSTD Scheduling Person:

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### FSTD Technical Contact:

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### Section 3. Training, Testing and Checking Considerations

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<td>Commercial Pilot - Training / Checks: (142)</td>
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</tr>
<tr>
<td>Multi-Engine Rating - Training / Checks: (142)</td>
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<td>Instrument Rating - Training / Checks: (142)</td>
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<td></td>
</tr>
<tr>
<td>Type Rating - Training / Checks: (135/121/142)</td>
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<tr>
<td>Proficiency Checks (135/121/142)</td>
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<td>CAT I: (RVR 2400/1800 ft. DH200 ft)</td>
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233
## ATTACHMENT 4 TO APPENDIX C TO PART 60—
### Figure A4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
### Attachment: FSTD Information Form

<table>
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<th>INFORMATION</th>
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<td>CAT III <em>(lowest minimum)</em> RVR ___ ft.</td>
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<td>* State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (≤ 0 ft.)</td>
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<tr>
<td>Circling Approach</td>
</tr>
<tr>
<td>Windshear Training <em>(FSTD GB 03-05)</em></td>
</tr>
<tr>
<td>Windshear Training IAW 121.409d (121 Turbojets Only) <em>(FSTD GB 03-05)</em></td>
</tr>
<tr>
<td>Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope <em>(FSTD GB 04-03)</em></td>
</tr>
<tr>
<td>Specific Unusual Attitudes Recoveries <em>(HBAT 92-10) (FSTD GB 04-03)</em></td>
</tr>
<tr>
<td>Auto-coupled Approach/Auto Go Around</td>
</tr>
<tr>
<td>Auto-land / Roll Out Guidance</td>
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<tr>
<td>TCAS/ACAS I/II</td>
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<tr>
<td>WX-Radar</td>
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<td>HUD <em>(FSTD GB 03-02)</em></td>
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<td>HGS <em>(FSTD GB 03-02)</em></td>
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<td>EFVS <em>(FSTD GB 03-03)</em></td>
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<td>Future Air Navigation Systems <em>(HBAT 98-16A)</em></td>
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<td>GPWS / EGPWS</td>
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<td>SMGCS</td>
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<td>Helicopter Slope Landings</td>
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<td>Helicopter External Load Operations</td>
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<td>Helicopter Pinnacle Approach to Landings</td>
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<tr>
<td>Helicopter Night Vision Maneuvers</td>
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<tr>
<td>Helicopter Category A Takeoffs</td>
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</table>

234
ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4C – 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 A4D – Sample Statement of Qualification - Certificate

INFORMATION

Federal Aviation Administration
National Simulator Program

Statement 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 found it to meet the standards set forth in
AC 120-63

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 March 30, 2009

Unless sooner rescinded or extended by the National Simulator Program Manager

February 15, 2008
(date)

I. B. Checkin, Jr.
(for the NSPM)
### ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4E – Sample Statement of Qualification; Configuration List

#### INFORMATION

**STATEMENT of QUALIFICATION**  
**CONFIGURATION LIST**

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<td>ZIP:</td>
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<tr>
<td>Manager:</td>
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<td>Upgrade Qualification:</td>
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<td>Level</td>
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<td>Engine model(s) and data revision:</td>
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<td>FMS identification and revision level:</td>
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<td>Visual system manufacturer/model:</td>
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**ATTACHMENT 4 TO APPENDIX C TO PART 60—**

**Figure A4E – Sample Statement of Qualification; Configuration List**

**INFORMATION**

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**Section 2. Supplementary Information**

**FAA Training Program Approval Authority:**

[ ] POI [ ] TCFM [ ] Other: ______

**Name:** ______

**Tel:** ______

**Email:** ______

**FSTD Scheduling Person:**

**Name:** ______

**Address 1:** ______

**City:** ______

**ZIP:** ______

**Tel:** ______

**FSTD Technical Contact:**

**Name:** ______

**Address 1:** ______

**City:** ______

**ZIP:** ______

**Tel:** ______

**Fax:** ______

**Section 3. Training, Testing and Checking Considerations**

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<tr>
<td>CAT III * (lowest minimum) RVR ft. * State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.)</td>
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<tr>
<td>Circling Approach</td>
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<tr>
<td>Windshear Training: (FSTD GB 03-05)</td>
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<tr>
<td>Windshear Training IAW 121.4094 (121 Turbojets Only) (FSTD GB 03-05)</td>
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<tr>
<td>Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB 04-03)</td>
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<tr>
<td>Specific Unusual Attitudes Recoveries (HRAT 98-10) (FSTD GB 04-03)</td>
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<tr>
<td>Auto-coupled Approach/Auto Go Around</td>
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<td>Auto-land / Roll Out Guidance</td>
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<td>TCAS/ACAS I/II</td>
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<td>WX-Radar</td>
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<td>HUD (FSTD GB 03-02)</td>
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<td>HGS (FSTD GB 02-02)</td>
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<td>EFVS (FSTD GB 03-03)</td>
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<td>Future Air Navigation Systems (HRAT 98-16A)</td>
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<td>Helicopter Slope Landings</td>
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<td>Helicopter External Load Operations</td>
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<td>Helicopter Pinnacle Approach to Landings</td>
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<td>Helicopter Night Vision Maneuvers</td>
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<tr>
<td>Helicopter Category A Takeoffs</td>
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</table>
ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4F – 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 FSTD is qualified to perform all of the Maneuvers, Procedures, Tasks, and Functions
Listed in Appendix A, Attachment 1, Table A1B, Minimum FSTD 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:

6.e. Environmental system.
6.f. Fire detection and extinguisher system.
7.b. In-flight fire and smoke removal.
7.d. Ditching.

Additional tasks for which this FSTD is qualified (i.e., in addition to the list in Table C1B)

   Enhanced Visual System
Recurrent Evaluation Requirements

**Completed at conclusion of Initial Evaluation**

Recurrent Evaluations to be conducted each (fill in) months

Recurrent evaluations are due as follows:

(month) and (month) and (month)

(enter or strike out, as appropriate)

Allotting _____ hours of FTD time.

Signed: ____________________________

NSPM / Evaluation Team Leader

Date

---

Revision:

Based on (enter reasoning):

---

Recurrent Evaluations are to be conducted each (fill in) months. Allotting _____ hours.

Recurrent evaluations are due as follows:

(month) and (month) and (month)

(enter or strike out, as appropriate)

Signed: ____________________________

NSPM Evaluation Team Leader

Date

---

Revision:

Based on (enter reasoning):

---

Recurrent Evaluations are to be conducted each (fill in) months. Allotting _____ hours.

Recurrent evaluations are due as follows:

(month) and (month) and (month)

(enter or strike out, as appropriate)

Signed: ____________________________

NSPM Evaluation Team Leader

Date

(Repeat as Necessary)
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, or Level 6. The Flight Standards Service, National Simulator Program Manager (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) and Applicability of sponsor rules to persons who are not sponsors and who are engaged in certain unauthorized activities (§ 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).
15. Logging FTD Discrepancies (§ 60.20).
16. Interim Qualification of FTDs for New Helicopter Types or Models (§ 60.21).
17. Modifications to FTDs (§ 60.22).
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. Levels of FTD.
25. FSTD 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.
1. INTRODUCTION

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. 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 123.
   (7) 14 CFR part 125.
   (8) 14 CFR part 135.
   (9) 14 CFR part 141.
   (11) AC 120–29, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
   (13) AC 120–41, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.
   (14) AC 120–37A, Surface Movement Guidance and Control System (SMGS).
   (15) AC 150/5300–13, Airport Design.
   (16) AC 150/5346–1G, Standards for Airport Markings.
   (17) AC 150/5340–4C, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.
   (18) AC 150/5390–2B, Heliport Design.
   (19) AC 150/5340–19, Taxiway Centerline Lighting System.
   (20) AC 150/5369–24, Runway and Taxiway Edge Lighting System.
   (21) AC 150/5345–28D, Precision Approach Path Indicator (PAPI) Systems.
   (23) AC 27–1A, Flight Test Guide for Certification of Normal Category Rotorcraft.
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.

The following examples describe acceptable operational practices:

(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 in the same manner as in example one.

(b) A device qualified on or after October 30, 2007 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.

(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.

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.

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 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 represent the helicopter (as described in §60.7(d)(2)).
must notify the NSPM when it becomes
requested.

must contain sufficient data and rationale to
in support of the validation data. The report
test, a flight test report must be submitted
desired presentation.

digitized, or otherwise manipulated to fit the
bias; however the data may be re-scaled,

ation provided; and

Attachment 2, Table D2A appendix.

compliance with the tolerances set forth in

annotated correctly and completely;

FTD.

mational material that applies to § 60.11,

FTD Use.

§ 60.11

9. FTD OBJECTIVE DATA REQUIREMENTS

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 pro-
gramming 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, includ-
ing 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 per-
sonnel.

(3) An understanding of the accuracy of the
data to be gathered using appropriate alter-
native data sources, procedures, and instru-
mentation that is traceable to a recognized
standard as described in Attachment 2, Table
D2F.

(4) Appropriate and sufficient data acquisi-
tion equipment or system(s), including ap-
propriate data reduction and analysis meth-
ods and techniques, as would be 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 vali-
dation 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.

(4) With any necessary guidance informa-
tion provided; and

(5) Without alteration, adjustments, or
bias; however the 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 re-
lated data is available if this data is used to
program and operate a qualified FTD. The

data referred to in this sub-section and the
data that are used to validate the perform-
ance, handling qualities, or other character-
istics of the aircraft, including data related to
any relevant changes occurring after the
type certification is issued. This notification
must be made within 10 working days.

END QPS REQUIREMENTS

BEGIN INFORMATION

e. The FTD sponsor is encouraged to main-
tain a liaison with the manufacturer of the
aircraft being simulated (or with the holder
of the aircraft type certificate for the air-
craft 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 facili-
tate the notification described in this para-
graph.

f. 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 doc-
ument (a validation data roadmap) con-
taining 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 perform-
ance or flying qualities of the aircraft. Addi-
tionally, this document should provide other
information such as the rationale or expla-
nation for cases where data or data param-
eters are missing, instances where engineer-
ing simulation data are used, or where flight
test methods require further explanations. It
should also provide a brief narrative describ-
ing the cause and effect of any deviation
from data requirements. The aircraft manu-
facturer may provide this document.

g. 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 in-
experienced data gatherers often provide
data that is irrelevant, improperly marked,
lacking adequate justification for selection.
Other problems include inadequate informa-
tion regarding initial conditions or test ma-
nuvers. 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 sup-
plier 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.

b. 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, Attachment 2 requires the sponsor or other data provider to ensure that a steady state condition exists at the instant of time captured by the “snapshot.” This is often verified by showing that a steady state condition existed from some period of time during which the snapshot is taken. The time period most frequently used is 5 seconds prior through 2 seconds following the instant of time captured by the snapshot. This paragraph is primarily addressing the source data and the method by which the data provider ensures that the steady state condition for the snapshot is representative.

The NSPM will consider, on a case-by-case basis, whether or not 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 FTD (§60.14)

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 FTD users that raise questions regarding 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;

(2) Meet the objective testing requirements listed in Attachment 2 (Level 4 FTDs do not require objective tests); and

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

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 qualification test guide (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 applicable QPS.

(c) The result of FTD subjective tests prescribed in the applicable 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.

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, 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 4G, 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 4DB, 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 engine model(s) and its data revision number or reference.
(e) The flight control data revision number or reference.
(f) The flight management system identification and revision level.
(g) The FTD model and manufacturer.
(h) The date of FTD manufacture.
(i) The FTD computer identification.
(j) The visible system model and manufacturer, including display type.
(k) The motion system type and manufacturer, including degrees of freedom.
(l) A Table of Contents.

4. A log of revisions and a list of effective pages.

5. List of all relevant data references.

6. A glossary of terms and symbols used (including sign conventions and units).

7. Statements of compliance and capability (SOCs) with certain requirements. SOCs must provide references to the sources of information that show the capability of the FTD to comply with the requirement, a rationale explaining how the referenced material is used, mathematical equations and parameter values used, and the conclusions reached; i.e., that the FTD complies with the requirement. Refer to the “General FTD Requirements” column, Table D1A, in Attachment 1, or in the “Alternative Data Sources, Procedures, and Instrumentation” column, Table D2F, in Attachment 2, to see when SOCs are required.

8. Recording procedures or equipment required to accomplish the objective tests.

9. The following information for each objective test designated in Attachment 2, 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).

1. 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 supplemented QTG for each 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 identification.

(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 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 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 October 30, 2013 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. 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 October 30, 2013. A copy of the eMQTG 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.

END QPS REQUIREMENTS

BEGIN INFORMATION

1. 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.

m. 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, the objective tests listed in Attachment 2, 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) Cockpit 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); 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.

n. 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.

o. 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 the data
was gathered and applied) data presentations, and the applicable tolerances for each test.

p. 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.

q. 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.

r. After an FTD is successfully evaluated, the NSPM issues a statement of qualification (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. However, it is the sponsor's responsibility to obtain TPAA approval prior to using the FTD in an FAA-approved flight training program.

s. 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 D4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation.

t. 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.

u. 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).

v. 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

12. ADDITIONAL QUALIFICATIONS FOR CURRENTLY QUALIFIED FTDs (§60.16)

There is no additional regulatory or informational material that applies to §60.16, Additional Qualifications for a Currently Qualified FTD.

13. PREVIOUSLY QUALIFIED FTDs (§60.17)

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 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 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 October 30, 2007, 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.

c. [Reserved]

END QPS REQUIREMENTS

BEGIN INFORMATION

d. 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.

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

f. The intent of the requirement listed in §60.17(b), for each FTD to have a Statement of Qualification 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.

g. Downgrading of an FTD is a permanent change in qualification level and will necessitate the issuance of a revised Statement of Qualification 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 on-going 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.

h. 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.

1. 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.
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.

g. 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

15. LOGGING FTD DISCREPANCIES (§ 60.20).

There is no additional regulatory or informational material that applies to § 60.20, Logging FTD Discrepancies.

16. INTERIM QUALIFICATION OF FTDs FOR NEW HELICOPTER TYPES OR MODELS (§ 60.21).

There is no additional regulatory or informational material that applies to § 60.21, Interim Qualification of FTDs for New Helicopter Types or Models.

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, Figure D4H 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. 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.

c. 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

251
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

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).

There are no additional QPS requirements or informational material that apply to §60.33, Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements.

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 helicopter-specific flight deck area, or an enclosed helicopter-specific cockpit and at least one operating system with air-ground logic (no aerodynamic programming required).

(2) Level 5. A device that may have an open helicopter-specific flight deck area, or an enclosed helicopter-specific cockpit and a generic aerodynamic program with at least one operating system and control loading that is representative of the simulated helicopter only at an approach speed and configuration.

(3) Level 6. A device that has an enclosed helicopter-specific cockpit 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.

END INFORMATION

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

BEGIN INFORMATION

There are no additional QPS requirements or informational material that apply to §60.37, FSTD Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA).

END INFORMATION
Federal Aviation Administration, DOT

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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 and the examination of functions and subjective tests listed in Attachment 3 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 Cockpit 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.

END INFORMATION

**TABLE D1A—MINIMUM FTD REQUIREMENTS**

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4 5 6</td>
<td></td>
</tr>
<tr>
<td>1.a</td>
<td>The FTD must have a cockpit that is a replica of the helicopter, or set purposes, the of helicopters simulated with controls, equipment, observable cockpit 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 helicopters or set of helicopters. Crewmember seats must afford the capability for the occupant to be able to achieve the design &quot;eye position&quot; for specific helicopters, or to approximate such a position for a generic set of helicopters.</td>
<td>X</td>
<td>For FTD purposes, the cockpit 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 crewmember duty stations and those required bulkheads aft of the pilot seats.</td>
</tr>
<tr>
<td>2.b</td>
<td>The FTD must have equipment (i.e., instruments, panels, systems, and controls) simulated sufficiently for the authorized training/checking events to be accomplished. The installed equipment, must be locted in a spatially correct configuration, and may be in a cockpit or an open flight deck area. Actuation of this equipment must replicate the appropriate function in the helicopter.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3.c</td>
<td>Circuit breakers must function accurately when they are involved in operating procedures or malfunctions requiring or involving flight crew response. Level 6 devices must have installed circuit breakers properly located in the FTD cockpit.</td>
<td>X X</td>
<td></td>
</tr>
</tbody>
</table>

4. Programming
### TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

4.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. Level 6 additionally requires the effects of changes in gross weight and center of gravity. Level 5 requires only generic aerodynamic programming.

4.b The FTD must have computer (analog or digital) capability (i.e., capacity, accuracy, resolution, and dynamic response) needed to meet the qualification level sought.

4.c The FTD hardware and programming must be updated within 6 months of any helicopter modifications or data releases (or any such modification or data releases applicable to the set of helicopters) unless, with prior coordination, the NSPM authorizes otherwise.

4.d Related responses of the cockpit instruments (and the visual and motion systems, if installed and training, testing, or checking credits are being sought) must be coupled closely to provide integrated sensory cues. The instruments (and the visual and motion systems, if installed, and training, testing, or checking credits are being sought) must respond to abrupt input at the pilot’s position within the allotted time, but not before the time, when the helicopter or set of helicopters would respond under the same conditions. (If a visual system is installed and training, testing, or checking credits are sought, the visual scene changes from steady state disturbance must occur within the appropriate system dynamic response limit but not before the instrument response and not before the motion system onset if a motion system is installed).

A demonstration is required and must simultaneously record: The analog output from the pilot’s control column, wheel, and pedals; and the output signal to the pilot’s attitude indicator. These recordings must be compared to helicopter response data in the following configurations: Takeoff, cruise, and approach or landing. The results must be recorded in the GTG. Additionally, if a visual system is installed and training, testing, or checking credits are sought, the output signal to the visual system display (including visual system analog delays must be recorded); and if a motion system is installed and training, testing, or checking credits are sought, the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots’ seats is also required.

5. Equipment Operation
<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.a</td>
<td>All relevant instrument indications involved in the simulation of the helicopter (or set of helicopters) must automatically respond to control movement or external disturbances to the simulated helicopter or set of helicopters; e.g., turbulence or winds.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>5.b</td>
<td>Navigation equipment must be installed and operate within the tolerances applicable for the helicopter or set of helicopters. Level 5 only needs that navigation equipment necessary to fly an instrument approach. Level 6 must also include communication equipment (inter-phone and air/ground) like that in the helicopter, or set of helicopters, and, if appropriate to the operation being conducted, an oxygen mask microphone system.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>5.c</td>
<td>Installed systems must simulate the applicable helicopter (or set of helicopters) 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. Level 6 must simulate all applicable helicopter flight, navigation, and systems operation. Level 5 must have functional flight and navigational controls, displays, and instrumentation.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>5.d</td>
<td>The lighting environment for panels and instruments must be sufficient for the operation being conducted.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>5.e</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5.f</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

6. Instructor or Evaluator Facilities

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.a</td>
<td>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).</td>
<td>X X</td>
<td>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.</td>
</tr>
<tr>
<td>6.b</td>
<td>The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions, as may be appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls.</td>
<td>X X</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

<table>
<thead>
<tr>
<th>No.</th>
<th>General FTD requirements</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Motion System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.a</td>
<td>The FTD may have a motion system; if desired, although it is not required. If installed, the motion system operation may not be distracting. The motion system standards set out in QPS FAA–S–120–40C for at least Level A simulators is acceptable.</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>8. Visual System</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 8.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:  
1. Single channel, uncollimated display is acceptable.  
2. Minimum field of view: 18° vertical/24° horizontal for the pilot flying.  
3. Maximum parallax error: 10° per pilot.  
4. Scene content may not be distracting.  
5. 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.  
6. Minimum resolution of 5 arc-min. for both computed and displayed pixel size.  
7. Maximum latency or throughput must not exceed 300 milliseconds. A statement of capability is required. A demonstration of latency or throughput is required. Visual system standards set out in QPS FAA–S–120–40C, for at least Level A simulators is acceptable. However, if additional authorizations (training, testing, or checking credits) are sought that require the use of a visual systems, the Level A simulator visual system standards apply. | X X X | |
| 9. Sound System | | | |
| 9.a | The FTD must simulate significant cockpit sounds resulting from pilot actions that correspond to those heard in the helicopter. | X | |

ATTACHMENT 2 TO APPENDIX D TO PART 60—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

BEGIN QPS REQUIREMENTS

1. Test Requirements

   a. The ground and flight tests required for qualification are listed in Table D2A Objective Evaluation. 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. 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 tolerances are given for a parameter, the less restrictive may be used unless otherwise indicated.

c. Certain tests included in this attachment must be supported with a Statement of Compliance and Capability (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. 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 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; and
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. 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.”

i. 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.

j. 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.

k. Some tests will not be required for helicopters using helicopter hardware in the FTD cockpit (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.
For objective test purposes, “Near maximum” gross weight is a weight chosen by the sponsor or data provider that is not less than the basic operating weight (BOW) of the helicopter 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. “Light” gross weight is a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the helicopter being simulated or as limited by the minimum practical operating weight of the test helicopter. “Medium” gross weight is a weight chosen by the sponsor or data provider that is approximately ±10% of the average of the numerical values of the BOW and the maximum certificated gross weight. (Note: BOW is the empty weight of the aircraft plus the weight of the following: Normal oil quantity; lavatory servicing fluid; potable water; required crew members and their baggage; and emergency equipment. (References: Advisory Circular 120–27, “Aircraft Weight and Balance”; and FAA–H–8083–1, “Aircraft Weight and Balance Handbook.”).
### TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Tolerances</th>
<th>Flight conditions</th>
<th>Test details</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Performance</td>
<td></td>
<td></td>
<td></td>
<td>5 6</td>
<td></td>
</tr>
<tr>
<td>1.a Engine Assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a.1</td>
<td>Start Operations</td>
<td>Light Off Time—10% or ±1 sec</td>
<td>Ground with the Rotor Brake Used and Not Used</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.a.1.a</td>
<td>Engine start and acceleration (transient)</td>
<td>Torque—±5% Rotor Speed—±5% Fuel Flow—±5% Gas Generator</td>
<td>Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.a.1.b</td>
<td>Steady State idle and Operating RPM conditions</td>
<td>Torque—±3% Rotor Speed—±1.5% Fuel Flow—±5% Gas Generator</td>
<td>Ground</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.a.2</td>
<td>Power Turbine Speed Trim</td>
<td>±10% of total change of power turbine speed</td>
<td>Ground</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.a.3</td>
<td>Engine and Rotor Speed Governing</td>
<td>Torque—±5% Rotor Speed—±1.5%</td>
<td>1) Climb</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2) Descent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.b In Flight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.b.1</td>
<td>Performance and Trimmed Flight Control Positions</td>
<td>Torque—±3%</td>
<td>Cruise (Augmentation On and Off)</td>
<td>Record results for two gross weight CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and CM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.c. Climb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Test Description</td>
<td>Tolerances</td>
<td>Flight conditions</td>
<td>Test details</td>
<td>FTD Level</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>Performance and Trimmed Flight Control Positions.</td>
<td>Vertical Velocity—±100 fpm (61m/sec) or ±10% Pitch Attitude—±1.5° Slip Angle—±2° Longitudinal Control Position—±5% Lateral Control Position—±5% Directional Control Position—±5% Collective Control Position—±5%.</td>
<td>All engines operating. One engine inoperative. Augmentation System(s) On and Off.</td>
<td>Record results for two gross weight and CG combinations. May be a series of snapshot tests.</td>
<td>X X</td>
</tr>
<tr>
<td>1.d</td>
<td>Descent Performance and Trimmed Flight Control Positions.</td>
<td>Torque—±3% Pitch Attitude—±1.5° Slip Angle—±2° Longitudinal Control Position—±5%. Lateral Control Position—±5% Directional Control Position—±5%.</td>
<td>At or near 1,000 fpm rate of descent (RoD) at normal approach speed. Augmentation System(s) On and Off.</td>
<td>Record results for two gross weight and CG combinations. May be a series of snapshot tests.</td>
<td>X X</td>
</tr>
<tr>
<td>1.d.2</td>
<td>Autorotation Performance and Trimmed Flight Control Positions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.e. Autorotation
2. Handling Qualities.

| 2. a. | Start [here] Control 1 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: ±10 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 |
| 2.a.2. | Collective and Pedals | Breakout: ±0.5 lb. (0.224 daN) or 25%, Force: ±10 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 |
| 2.a.3. | Brake Pedal Force vs. Position. | ±5 lbs. (2.224 daN) or 10% | Ground; Static conditions. Trim On Friction Off. | The tolerance applies to the recorded value of the trim rate. | X X |
| 2.a.4. | Trim System Rate (all applicable systems). | Rate: ±10% |Ground; Static conditions. Trim On Friction Off. | Results must be recorded for a normal control displacement in both directions in each axis (approximately 25% to 90% of full throw). | X X |
| 2.a.5. | Control Dynamics (all axes) | ±10% of time for first zero crossing and ±10% of amplitude of first overshoot. | Hover/Cruise Trim On Friction Off. | 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. | X |
| 2.a.6 | Freeplay | ±0.10 in | Ground; Static conditions | Record and compare results for all controls. | X X |

2.b. Longitudinal Handling Qualities.
<table>
<thead>
<tr>
<th>No.</th>
<th>Test</th>
<th>Tolerances</th>
<th>Flight conditions</th>
<th>Test details</th>
<th>FTD Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.b.1</td>
<td>Control Response</td>
<td>Pitch Rate: ±10% or ±2/sec. Pitch Attitude Change: ±10% or ±1.5°.</td>
<td>Cruise Augmentation On and Off.</td>
<td>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.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.b.2</td>
<td>Static Stability</td>
<td>Longitudinal Control Position: ±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Force: ±0.5 lb. (2.23 daN) or ±10%.</td>
<td>Cruise or Climb. Autorotation. Augmentation On and Off.</td>
<td>Record results for a minimum of two speeds on each side of the trim speed. May be a series of snapshot tests.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.b.3</td>
<td>Dynamic Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.b.3.a.</td>
<td>Long Term Response</td>
<td>±10% of calculated period, ±10% of time to ½ or double amplitude, or ±0.02 of damping ratio.</td>
<td>Cruise Augmentation On and Off.</td>
<td>Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to ½ double or amplitude, whichever is less. For non-periodic responses, the time history must be matched.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.b.3.b</td>
<td>Short Term Response</td>
<td>±1.5° Pitch or ±2/sec. Pitch Rate, ±0.1 g Normal Acceleration.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>Record results for at least two airspeeds.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.b.4</td>
<td>Maneuvering Stability</td>
<td>Longitudinal Control Position: ±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Forces: ±0.5 lb. (2.23 daN) or ±10%.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>Record results for at least two airspeeds. Record results for Approximately 30°-45° bank angle. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.b.5</td>
<td>Landing Gear Operating Times</td>
<td>±1 sec</td>
<td>Takeoff (Retraction) Approach (Extension).</td>
<td></td>
<td></td>
<td>X X</td>
</tr>
</tbody>
</table>
### 2.c. Lateral and Directional Handling Qualities

<table>
<thead>
<tr>
<th>2.c.1</th>
<th>Control Response</th>
<th>Roll Rate $\leq 10%$ or $\pm 3^\circ$/sec. Roll Attitude Change $\leq 10%$ or $\pm 3^\circ$.</th>
<th>Cruise Augmentation On and Off.</th>
<th>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.</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.c.1a</td>
<td>Lateral</td>
<td></td>
<td></td>
<td>Cruise Augmentation On and Off.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.c.1b</td>
<td>(b) Directional</td>
<td>Yaw Rate $\leq 10%$ or $\pm 2^\circ$/sec. Yaw Attitude Change $\leq 10%$ or $\pm 2^\circ$.</td>
<td>Cruise Augmentation On and Off.</td>
<td>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.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.2</td>
<td>Directional Static Stability</td>
<td>Lateral Control Position $\leq 10%$ of change from trim or $\pm 0.25$ in. (6.3 mm) or Lateral Control Force $\leq 0.5$ lb. (2.23 daN) or $10%$. Roll Attitude $\leq 1.5$. Directional Control Position $\leq 10%$ of change from trim or $\pm 0.25$ in. (6.3 mm) or Directional Control Force $\leq 1$ lb. (4.45 daN) or $10%$. Longitudinal Control Position $\leq 10%$ of change from trim or $\pm 0.25$ in. (6.3 mm) Vertical Velocity $\leq 100$ fpm (0.50 m/sec) or $10%$.</td>
<td></td>
<td>1) Cruise; 2) 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 test.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2.c.3</td>
<td>Dynamic Lateral and Directional Stability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Test Title</td>
<td>Tolerances</td>
<td>Flight conditions</td>
<td>Test details</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>2.c.3.a.</td>
<td>Lateral-Directional Oscillations</td>
<td>±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.</td>
<td>Cruise or Climb. Augmentation On/Off.</td>
<td>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 until sufficient to determine time to ½ or double amplitude, whichever is less. For non-periodic response, the time history must be matched.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>2.c.3.b.</td>
<td>Spiral Stability</td>
<td>Correct Trend: ±2 bank or ±10% in 20 sec.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>Record the results of a release from pedal only or cyclic only turns. Results must be recorded from turns in both directions.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.c.3.c.</td>
<td>Adverse/Proverse Yaw</td>
<td>Correct Trend, ±2 transient sideslip angle.</td>
<td>Cruise or Climb. Augmentation On and Off.</td>
<td>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.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS—Continued**

**<<< QPS Requirements >>>**

- Tolerances
- Flight conditions
- Test details
- FTD Level
- Notes

**<<< Information >>>**

- 5
- 6

- X
- X
3. CONTROL DYNAMICS

BEGIN INFORMATION

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 cockpit 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. In order for an FTD to be representative, it too must present the pilot with the proper feel; that of the respective helicopter.

b. 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 FTD control loading system to the helicopter system 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.

c. For initial and upgrade evaluations, it is required that control dynamic characteristics be measured at and recorded directly from the cockpit 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. Proper pitot-static inputs (if appropriate) must be provided to represent airspeeds typical of those encountered in flight.

d. 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 would then satisfy this test requirement.

e. Control Dynamics Evaluations. The dynamic properties of control systems are often stated in terms of frequency, damping, and a number of other classical measure-

ments 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 interaction of the measurements and the tolerances to be applied. Criteria are needed for both the under-damped 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.

f. 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 discussed below for the under-damped and critically damped cases.

g. Tolerances.

1. Underdamped Response.

(a) 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.

2. 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.

(3)(a) The following summarizes the tolerances, T, for an illustration of the referenced measurements. (See Figures 1 and 2, above)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_0 )</td>
<td>±10% of ( P_0 )</td>
</tr>
<tr>
<td>( P_1 )</td>
<td>±10% of ( P_1 )</td>
</tr>
<tr>
<td>( A_1 )</td>
<td>±10% of ( A_1 ), ±20% of Subsequent Peaks</td>
</tr>
<tr>
<td>( A_d )</td>
<td>±10% of ( A_d ) = Residual Band</td>
</tr>
</tbody>
</table>

(b) In the event the number of cycles completed outside of the residual band, and thereby significant, exceeds the number depicted in figure 1, the following tolerances (T) will apply:

\[ T(P_n) \pm 10(n+1)\% \text{ of } P_n \], where “n” is the next in sequence.

END INFORMATION
Attachment 2 to Appendix D to Part 60—
Figure 1. Under-Damped Step Response

Attachment 2 to Appendix D to Part 60—
Figure 2. Critically-Damped Step Response
ATTACHMENT 3 TO APPENDIX D TO PART 60—FLIGHT TRAINING DEVICE (FTD) SUBJECTIVE EVALUATION

1. DISCUSSION

BEGIN INFORMATION
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 may be approved by the TPAA. All items in the following paragraphs are subject to an examination of function.

b. The List of Operations Tasks 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 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.

END INFORMATION

TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD

<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.a</td>
<td>Preflight Inspection (Cockpit Only) switches, indicators, systems, and equipment.</td>
</tr>
<tr>
<td>1.b</td>
<td>APU/Engine start and run-up.</td>
</tr>
<tr>
<td>1.b.1</td>
<td>Normal start procedures.</td>
</tr>
<tr>
<td>1.b.2</td>
<td>Alternate start procedures.</td>
</tr>
<tr>
<td>1.b.3</td>
<td>Abnormal starts and shutdowns.</td>
</tr>
<tr>
<td>1.b.4</td>
<td>Rotor engagement.</td>
</tr>
<tr>
<td>1.b.5</td>
<td>System checks.</td>
</tr>
<tr>
<td>2.a</td>
<td>instrument</td>
</tr>
<tr>
<td>2.b</td>
<td>Takeoff with engine failure after critical decision point (CDP).</td>
</tr>
<tr>
<td>3.a</td>
<td>Normal.</td>
</tr>
<tr>
<td>3.b</td>
<td>One engine inoperative.</td>
</tr>
<tr>
<td>4</td>
<td>Performance.</td>
</tr>
<tr>
<td>4.b</td>
<td>Flying qualities.</td>
</tr>
<tr>
<td>4.c</td>
<td>Turns.</td>
</tr>
<tr>
<td>4.c.1</td>
<td>Timed.</td>
</tr>
<tr>
<td>4.c.2</td>
<td>Normal.</td>
</tr>
<tr>
<td>4.c.3</td>
<td>Steep.</td>
</tr>
<tr>
<td>4.d</td>
<td>Accelerations and decelerations.</td>
</tr>
<tr>
<td>4.e</td>
<td>Abnormal/emergency procedures.</td>
</tr>
</tbody>
</table>
### TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

#### No. Operations tasks

<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.e.1</td>
<td>Engine fire.</td>
</tr>
<tr>
<td>4.e.2</td>
<td>Engine failure.</td>
</tr>
<tr>
<td>4.e.3</td>
<td>In-flight engine shutdown (and restart, if applicable).</td>
</tr>
<tr>
<td>4.e.4</td>
<td>Fuel governing system failures (e.g., FADEC malfunction).</td>
</tr>
<tr>
<td>4.e.5</td>
<td>Directional control malfunction (restricted to the extent that the maneuver may not terminate in a landing).</td>
</tr>
<tr>
<td>4.e.6</td>
<td>Hydraulic failure.</td>
</tr>
<tr>
<td>4.e.7</td>
<td>Stability augmentation system failure.</td>
</tr>
</tbody>
</table>

#### 5. Instrument Procedures

<table>
<thead>
<tr>
<th>No.</th>
<th>Operations tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.a</td>
<td>Holding.</td>
</tr>
<tr>
<td>5.b</td>
<td>Precision Instrument Approach.</td>
</tr>
<tr>
<td>5.b.1</td>
<td>All engines operating.</td>
</tr>
<tr>
<td>5.b.2</td>
<td>One or more engines inoperative.</td>
</tr>
<tr>
<td>5.b.3</td>
<td>Approach procedures:</td>
</tr>
<tr>
<td>5.b.4</td>
<td>PAR.</td>
</tr>
<tr>
<td>5.b.5</td>
<td>ILS.</td>
</tr>
<tr>
<td>5.b.6</td>
<td>Manual (raw data).</td>
</tr>
<tr>
<td>5.b.7</td>
<td>Flight director only.</td>
</tr>
<tr>
<td>5.b.8</td>
<td>Autopilot* and flight director (if appropriate) coupled.</td>
</tr>
<tr>
<td>5.c</td>
<td>Non-precision Instrument Approach.</td>
</tr>
<tr>
<td>5.c.1</td>
<td>All engines operating.</td>
</tr>
<tr>
<td>5.c.2</td>
<td>One or more engines inoperative.</td>
</tr>
<tr>
<td>5.d</td>
<td>Approach procedures:</td>
</tr>
<tr>
<td>5.d.1</td>
<td>NDB.</td>
</tr>
<tr>
<td>5.d.2</td>
<td>VOR, RNAV, TACAN, GPS.</td>
</tr>
<tr>
<td>5.d.3</td>
<td>Manual (raw data).</td>
</tr>
<tr>
<td>5.d.4</td>
<td>Flight director only.</td>
</tr>
<tr>
<td>5.d.5</td>
<td>Missed Approach.</td>
</tr>
<tr>
<td>5.d.6</td>
<td>All engines operating.</td>
</tr>
<tr>
<td>5.d.7</td>
<td>One or more engines inoperative.</td>
</tr>
<tr>
<td>5.d.8</td>
<td>Stability augmentation system failure.</td>
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#### 6. Normal and Abnormal Procedures (any phase of flight)

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<tr>
<td>6.a</td>
<td>Helicopter and powerplant systems operation (as applicable).</td>
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<td>6.a.1</td>
<td>Anti-icing/deicing systems.</td>
</tr>
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<td>6.a.2</td>
<td>Auxiliary power-plant.</td>
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<td>Environmental system.</td>
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<td>Fire detection and suppression.</td>
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<td>Flight control system.</td>
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<td>6.a.8</td>
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<td>6.a.9</td>
<td>Engine oil system.</td>
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<td>Hydraulic system.</td>
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<td>Landing gear.</td>
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<td>6.a.12</td>
<td>Oxygen.</td>
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<td>Pneumatic.</td>
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<td>6.a.15</td>
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<td>Stability augmentation and control augmentation system(s).</td>
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<td>6.b</td>
<td>Flight management and guidance system (as applicable).</td>
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<td>6.b.1</td>
<td>Airborne radar.</td>
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<td>Automatic landing aids.</td>
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<td>Autopilot*.</td>
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<td>6.b.4</td>
<td>Collision avoidance system.</td>
</tr>
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<td>6.b.5</td>
<td>Flight data displays.</td>
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<td>6.b.6</td>
<td>Flight management computers.</td>
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<td>6.b.7</td>
<td>Navigation systems.</td>
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#### 7. Postflight Procedures

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<td>7.a</td>
<td>Parking and Securing.</td>
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<td>7.b</td>
<td>Engine and systems operation.</td>
</tr>
<tr>
<td>7.c</td>
<td>Parking brake operation.</td>
</tr>
<tr>
<td>7.d</td>
<td>Rotor brake operation.</td>
</tr>
<tr>
<td>7.e</td>
<td>Abnormal/emergency procedures.</td>
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#### 8. Instructor Operating Station (IOS), as appropriate
### TABLE D3A—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS LEVEL 6 FTD—Continued

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<td>8.b.1</td>
<td>Helicopter conditions.</td>
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<td>8.b.2</td>
<td>Gross weight, center of gravity, fuel loading and allocation, etc.</td>
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<td>8.b.3</td>
<td>Helicopter system status.</td>
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<tr>
<td>8.b.4</td>
<td>Ground crew functions (e.g., ext. power).</td>
</tr>
<tr>
<td>8.c</td>
<td>Airports and landing areas.</td>
</tr>
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<td>8.c.1</td>
<td>Number and selection.</td>
</tr>
<tr>
<td>8.c.2</td>
<td>Runway or landing area selection.</td>
</tr>
<tr>
<td>8.c.3</td>
<td>Preset positions (e.g., ramp, over FAF).</td>
</tr>
<tr>
<td>8.c.4</td>
<td>Lighting controls.</td>
</tr>
<tr>
<td>8.d</td>
<td>Environmental controls.</td>
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<tr>
<td>8.d.1</td>
<td>Temperature.</td>
</tr>
<tr>
<td>8.d.2</td>
<td>Climate conditions (e.g., ice, rain).</td>
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<tr>
<td>8.d.3</td>
<td>Wind speed and direction.</td>
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<tr>
<td>8.e</td>
<td>Helicopter system malfunctions.</td>
</tr>
<tr>
<td>8.e.1</td>
<td>Insertion/deletion.</td>
</tr>
<tr>
<td>8.e.2</td>
<td>Problem clear.</td>
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<tr>
<td>8.f</td>
<td>Locks, Freezes, and Repositioning.</td>
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<td>Problem (all) freeze/release.</td>
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<td>8.f.2</td>
<td>Position (geographic) freeze/release.</td>
</tr>
<tr>
<td>8.f.3</td>
<td>Repositioning (locations, freezes, and releases).</td>
</tr>
<tr>
<td>8.f.4</td>
<td>Ground speed control.</td>
</tr>
<tr>
<td>8.g</td>
<td>Sound Controls. On/off / adjustment.</td>
</tr>
<tr>
<td>8.h</td>
<td>Control Loading System (as applicable On/off/emergency stop).</td>
</tr>
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<td>8.i</td>
<td>Observer Stations.</td>
</tr>
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<td>8.i.1</td>
<td>Position.</td>
</tr>
<tr>
<td>8.i.2</td>
<td>Adjustments.</td>
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* "Autopilot" means attitude retention mode of operation.

### TABLE D3B—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS Level 5 FTD

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<thead>
<tr>
<th>Item No.</th>
<th>Operations tasks</th>
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<tr>
<td>1. Preflight Procedures</td>
<td>Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List and/or for a Level 5 FTD. Items not installed or not functional on the FTD and, therefore, not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ.</td>
</tr>
<tr>
<td>1.a</td>
<td>Preflight Inspection (Cockpit Only) switches, indicators, systems, and equipment.</td>
</tr>
<tr>
<td>1.b</td>
<td>APU/Engine start and run-up.</td>
</tr>
<tr>
<td>1.b.1</td>
<td>Normal start procedures.</td>
</tr>
<tr>
<td>1.b.2</td>
<td>Alternate start procedures.</td>
</tr>
<tr>
<td>1.b.3</td>
<td>Abnormal starts and shutdowns.</td>
</tr>
<tr>
<td>2. Climb</td>
<td>Normal.</td>
</tr>
<tr>
<td>3. Inflight Maneuvers</td>
<td>Performance.</td>
</tr>
<tr>
<td>3.b</td>
<td>Turns, Normal.</td>
</tr>
<tr>
<td>4. Instrument Procedures</td>
<td>Coupled instrument approach maneuvers (as applicable for the systems installed).</td>
</tr>
<tr>
<td>5. Normal and Abnormal Procedures</td>
<td>Any phase of flight.</td>
</tr>
<tr>
<td>5.a</td>
<td>Normal system operation (Installed systems).</td>
</tr>
<tr>
<td>5.b</td>
<td>Abnormal/Emergency system operation (installed systems).</td>
</tr>
<tr>
<td>6.a</td>
<td>Engine and systems operation.</td>
</tr>
<tr>
<td>6.b</td>
<td>Parking brake operation.</td>
</tr>
<tr>
<td>6.c</td>
<td>Rotor brake operation.</td>
</tr>
<tr>
<td>6.d</td>
<td>Abnormal/emergency procedures.</td>
</tr>
<tr>
<td>7. Instructor Operating Station (IOS), as appropriate</td>
<td>Power Switch(es).</td>
</tr>
<tr>
<td>7.a</td>
<td>Insertion / deletion.</td>
</tr>
<tr>
<td>7.c</td>
<td>Problem clear.</td>
</tr>
<tr>
<td>7.d</td>
<td>Control Loading System (as applicable On / off / emergency stop).</td>
</tr>
</tbody>
</table>

VerDate Aug<31>2005 09:03 Feb 07, 2008 Jkt 214044 PO 00000 Frm 00280 Fmt 8010 Sfmt 8002 Y:\SGML\214044.XXX 214044yshivers on PROD1PC62 with CFR
### Federal Aviation Administration, DOT

**TABLE D3B**—**TABLE OF FUNCTIONS AND SUBJECTIVE TESTS**—Continued

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<tr>
<th>Item No.</th>
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<td>7.e.</td>
<td>Observer Stations.</td>
</tr>
<tr>
<td>7.e1.</td>
<td>Position.</td>
</tr>
<tr>
<td>7.e2.</td>
<td>Adjustments.</td>
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**TABLE D3C**—**TABLE OF FUNCTIONS AND SUBJECTIVE TESTS**—Continued

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<td>3.b.</td>
<td>Engine and systems operation.</td>
</tr>
<tr>
<td>3.c.</td>
<td>Parking brake operation.</td>
</tr>
<tr>
<td>4.</td>
<td>Instructor Operating Station (IOS), as appropriate.</td>
</tr>
<tr>
<td>4.a.</td>
<td>Power Switch(es).</td>
</tr>
<tr>
<td>4.b.</td>
<td>Preset positions (ground; air)</td>
</tr>
<tr>
<td>4.c.</td>
<td>Helicopter system malfunctions.</td>
</tr>
<tr>
<td>4.c.1.</td>
<td>Insertion / deletion.</td>
</tr>
<tr>
<td>4.c.2.</td>
<td>Problem clear.</td>
</tr>
</tbody>
</table>

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**ATTACHMENT 4 TO APPENDIX D TO PART 60—SAMPLE DOCUMENTS**

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- Figure D4A—Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
- Figure D4B—Attachment: FSTD Information Form
- Figure D4C—Sample Qualification Test Guide Cover Page
- Figure D4D—Sample Statement of Qualification—Certificate
- Figure D4E—Sample Statement of Qualification—Configuration List
- Figure D4F—Sample Statement of Qualification—List of Qualified Tasks
- Figure D4G—Sample Continuing Qualification Evaluation Requirements Page
- Figure D4H—Sample MQTG Index of Effective FSTD Directives
Date

Mr. Charles A. Spillner  
Manager, National Simulator Program  
Federal Aviation Administration  
100 Hartfield 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 (FSTD Manufacturer), (Aircraft Type/Level) Flight Simulation Training Device (FSTD), (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 FSTD will be sponsored by (Name of Training Center/Air Carrier), FAA Designator (4 Letter Code). The FSTD will be sponsored under the following options: (Select One)

☐ The FSTD will be used within the sponsor’s FAA approved training program and placed on the sponsor’s Training/Operations Specifications; or

☐ The FSTD will be used for dry lease only in accordance with Paragraph 3b, FSTD Guidance Bulletin 03-08.

We agree to provide the formal request for the evaluation (Ref: Appendix A, AC 120-40B) to your staff as follows: (check one)

☐ For QTG runs at the factory, not later, than 45 days prior to the proposed evaluation date with the additional “U3 on-site” tests provided not later than 14 days prior to the proposed evaluation date.

☐ For QTG runs on-site, not later than 30 days prior to the proposed evaluation date.

We understand that the formal request will contain the following documents:

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: FSTD 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**

<table>
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#### Section 1: FSTD Information and Characteristics

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<th>Visual system display:</th>
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<th>Motion system manufacturer/type:</th>
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<th>NAA Qualification Basis:</th>
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ATTACHMENT 4 TO APPENDIX D TO PART 60—
Figure D4B – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
Attachment: FSTD Information Form

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<td>Visual System Manufacturer and Type:</td>
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<th>3.6.1 Airport Designator</th>
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<th>3.6.3 Airport Designator</th>
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<tbody>
<tr>
<td>Circle to Land:</td>
<td>3.7.1 Airport Designator</td>
<td>3.7.2 Approach</td>
<td>3.7.3 Landing Runway</td>
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<tr>
<td>Visual Ground Segment</td>
<td>3.8.1 Airport Designator</td>
<td>3.8.2 Approach</td>
<td>3.8.3 Landing Runway</td>
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Section 2. Supplementary Information

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<td>Tel:</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Area/Function/Maneuver</th>
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<th>Remarks</th>
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<td>Private Pilot - Training / Checks: (142)</td>
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<td>CAT I: (RVR 2400/1800 ft, DH 200 ft)</td>
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<td>CAT II: (RVR 1200 ft, DH 100 ft)</td>
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<td>CAT III * (lowest minimum)</td>
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<td>RVR</td>
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<tr>
<td>* State CAT III (≤ 700 ft), CAT IIIb (≤ 150 ft), or CAT IIIc (0 ft).</td>
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<td>Circling Approach</td>
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<td>Windshear Training:</td>
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<tr>
<td>(FSTD GB 03-05)</td>
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<td>Windshear Training (AW 121.409d (121 Turboprops Only))</td>
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<td>(FSTD GB 03-05)</td>
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<td>Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB 04-03)</td>
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<td>Specific Unusual Attitudes Recoveries (HBAAT 04-10) (FSTD GB 04-03)</td>
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<td>Auto-coupled Approach/Auto Go Around</td>
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<td>—</td>
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<td>Auto-land / Roll Out Guidance</td>
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<td>TCAS/ACAS I / II</td>
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</tr>
<tr>
<td>WX-Radar</td>
<td>☐</td>
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<td>HUD (FSTD GB 03-02)</td>
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<td>HGS (FSTD GB 01-03)</td>
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<td>EFVS (FSTD GB 01-03)</td>
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<td>Future Air Navigation Systems (HBAAT 04-16A)</td>
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<td>GPWS / EGPRS</td>
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<tr>
<td>ETOPS Capability</td>
<td>☐</td>
<td>—</td>
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<tr>
<td>GPS</td>
<td>☐</td>
<td>—</td>
</tr>
<tr>
<td>SMGCS</td>
<td>☐</td>
<td>—</td>
</tr>
<tr>
<td>Helicopter Slope Landings</td>
<td>☐</td>
<td>—</td>
</tr>
<tr>
<td>Helicopter External Load Operations</td>
<td>☐</td>
<td>—</td>
</tr>
<tr>
<td>Helicopter Pinnacle Approach to Landings</td>
<td>☐</td>
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</tr>
<tr>
<td>Helicopter Night Vision Maneuvers</td>
<td>☐</td>
<td>—</td>
</tr>
<tr>
<td>Helicopter Category A Takeoffs</td>
<td>☐</td>
<td>—</td>
</tr>
</tbody>
</table>
Attachment 4 to Appendix D to Part 60—
Figure D4C – 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
Federal Aviation Administration
National Simulator Program

Statement 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
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 December 31, 2008

Unless sooner rescinded or extended by the National Simulator Program Manager

November 15, 2007
(date)

J. B. Cheakin, Jr.
(for the NSPM)
## Attachment 4 to Appendix D to Part 60—
### Figure D4E – Sample Statement of Qualification – Configuration List

### INFORMATION

#### Section 1. FSTD Information and Characteristics

<table>
<thead>
<tr>
<th>Date:</th>
<th></th>
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<table>
<thead>
<tr>
<th>Sponsor Name:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td></td>
</tr>
<tr>
<td>Physical Address:</td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td></td>
</tr>
<tr>
<td>State:</td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td></td>
</tr>
<tr>
<td>ZIP:</td>
<td></td>
</tr>
<tr>
<td>Manager:</td>
<td></td>
</tr>
<tr>
<td>Sponsor ID No: (Four Letter FAA Designator)</td>
<td></td>
</tr>
</tbody>
</table>

| Nearest Airport: (Airport Designator) |   |

#### Type of Evaluation Requested:

- [ ] Initial
- [ ] Upgrade
- [ ] Recurrent
- [ ] Special
- [ ] Reinstatement

<table>
<thead>
<tr>
<th>Qualification Basis:</th>
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<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
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<td>Interim C</td>
<td></td>
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<tr>
<td>7</td>
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<table>
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<tr>
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<th>Date:</th>
<th>Level</th>
<th>Manufacturer's Identification/Serial No:</th>
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<table>
<thead>
<tr>
<th>Upgrade Qualification: (If Applicable)</th>
<th>Date:</th>
<th>Level</th>
<th>eQTG</th>
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#### Other Technical Information:

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<thead>
<tr>
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<tr>
<td>FSTD Manufacturer:</td>
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<table>
<thead>
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<th>Convertible FSTD:</th>
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<table>
<thead>
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<th>Related FAA ID No. (If Applicable)</th>
<th>Sponsor FSTD ID No:</th>
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</table>

<table>
<thead>
<tr>
<th>Aircraft model/series:</th>
<th>Source of aerodynamic model:</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Engine model(s) and data revision:</th>
<th>Source of aerodynamic coefficient data:</th>
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</thead>
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<table>
<thead>
<tr>
<th>FMS identification and revision level:</th>
<th>Aerodynamic data revision number:</th>
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</table>

<table>
<thead>
<tr>
<th>Visual system manufacturer/model:</th>
<th>Visual system display:</th>
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<table>
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<tr>
<th>Flight control data revision:</th>
<th>FSTD computer(s) identification:</th>
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<table>
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<th>Motion system manufacturer/type:</th>
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### National Aviation Authority (NAA):

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<table>
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| NAA Qualification Basis: |   |
### Attachment 4 to Appendix D to Part 60—

**Figure D.6E—Sample Statement of Qualification—Configuration List**

#### INFORMATION

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<th>ENGINE TYPE(S):</th>
<th>Flight Instrumentation:</th>
<th>Engine Instrumentation:</th>
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<td>EFIS</td>
<td>HUD</td>
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<td></td>
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<td>WX Radar</td>
<td>Other:</td>
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<table>
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<th>3.6.2</th>
<th>3.6.3</th>
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<td>Airport Designator</td>
<td>Airport Designator</td>
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<td>3.7.2</td>
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<td>Airport Designator</td>
<td>Approach</td>
<td>Landing Runway</td>
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<td>Visual Ground Segment</td>
<td>3.8.1</td>
<td>3.8.2</td>
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<td>Approach</td>
<td>Landing Runway</td>
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#### Section 2. Supplementary Information

**FAA Training Program Approval Authority:**

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<th>□ Other:</th>
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<table>
<thead>
<tr>
<th>Name:</th>
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<tbody>
<tr>
<td>Tel:</td>
<td>Fax:</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td></td>
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</tbody>
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**FSTD Scheduling Person:**

<table>
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</thead>
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<tr>
<td>City:</td>
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<td>Tel:</td>
<td>Fax:</td>
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**FSTD Technical Contact:**

<table>
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<tbody>
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#### Section 3. Training, Testing and Checking Considerations

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<th>Area/Function/Maneuver</th>
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<th>Remarks</th>
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<tr>
<td>Private Pilot - Training / Checks: (142)</td>
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<tr>
<td>Commercial Pilot - Training / Checks: (142)</td>
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<td>Multi-Engine Rating - Training / Checks: (142)</td>
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<tr>
<td>Instrument Rating - Training / Checks: (142)</td>
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<td></td>
</tr>
<tr>
<td>Type Rating - Training / Checks: (135/121/142)</td>
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<tr>
<td>Proficiency Checks (135/121/142)</td>
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<tr>
<td>CAT I: (RVR 2400/1800 ft, DH200 ft)</td>
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<td>Description</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>----------------------------------------------------------------------------</td>
<td>-----</td>
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<tr>
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<td></td>
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<tr>
<td>Circling Approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windshear Training: (FSTD GB 03-05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windshear Training IAW 121.409d (121 Turbojets Only) (FSTD GB 03-05)</td>
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<tr>
<td>Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB 04-03)</td>
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<tr>
<td>Specific Unusual Attitudes Recoveries (HBAT 95-10) (FSTD GB 04-03)</td>
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<td>Auto-coupled Approach/Auto Go Around</td>
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<td></td>
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<td>Auto-land / Roll Out Guidance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCAS/ACAS I/II</td>
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<tr>
<td>WX-Radar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUD (FSTD GB 01-02)</td>
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<tr>
<td>HGS (FSTD GB 02-02)</td>
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<td>Future Air Navigation Systems (HBAT 98-16A)</td>
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<td>ETPS Capability</td>
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<tr>
<td>GPS</td>
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<td>SMGCS</td>
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<td>Helicopter Slope Landings</td>
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<td>Helicopter External Load Operations</td>
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<tr>
<td>Helicopter Pinnacle Approach to Landings</td>
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<tr>
<td>Helicopter Night Vision Maneuvers</td>
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<tr>
<td>Helicopter Category A Takeoffs</td>
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</tbody>
</table>
**Federal Aviation Administration, DOT**

**Pt. 60, App. D**

Attachment 4 to Appendix D to Part 60—

Figure D4F — 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.

<table>
<thead>
<tr>
<th>(Example)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excepted Tasks:</strong></td>
</tr>
<tr>
<td>7.d Ditching.</td>
</tr>
</tbody>
</table>

| **Excepted Simulator Systems:** |
| Remote IOS |

| **Additional Qualified Tasks or Functions in addition to those listed in appendix D, Attachment 3, Table D1B, Minimum FTD Requirements.** |
| (None) |
### Recurrent Evaluation Requirements

**Completed at conclusion of Initial Evaluation**

<table>
<thead>
<tr>
<th>Recurrent Evaluations to be conducted each</th>
<th>Recurrent evaluations are due as follows:</th>
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</thead>
<tbody>
<tr>
<td>(fill in) months</td>
<td>(month) and (month) and (month)</td>
</tr>
<tr>
<td>Allotting _____ hours of FTD time.</td>
<td>(enter or strike out, as appropriate)</td>
</tr>
<tr>
<td>Signed:</td>
<td></td>
</tr>
<tr>
<td>NSPM / Evaluation Team Leader</td>
<td>Date</td>
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</tbody>
</table>

### Revision:

Based on (enter reasoning):

<table>
<thead>
<tr>
<th>Recurrent Evaluations are to be conducted each</th>
<th>Recurrent evaluations are due as follows:</th>
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</thead>
<tbody>
<tr>
<td>(fill in) months. Allotting _____ hours.</td>
<td>(month) and (month) and (month)</td>
</tr>
<tr>
<td>Signed:</td>
<td>(enter or strike out, as appropriate)</td>
</tr>
<tr>
<td>NSPM Evaluation Team Leader</td>
<td>Date</td>
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(Repeat as Necessary)

### Index of Effective FSD Directives

Filed in this Section

<table>
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<th>Date of Notification</th>
<th>Date of Modification Completion</th>
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Continue as Necessary...

---

**APPENDIX E to PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR QUALITY MANAGEMENT SYSTEMS FOR FLIGHT SIMULATION TRAINING DEVICES**

**BEGIN QPS REQUIREMENTS**

a. Not later than October 30, 2008 each current sponsor of an FSTD must submit to the NSPM a proposed Quality Management System (QMS) program as described in this QPS
appendix. The NSPM will review the program in order of receipt and notify the sponsor within 90 days of beginning the review regarding 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 audit(s), make any required program adjustments as a result of any internal audit, and have the NSPM initial audit scheduled.

b. For first-time FSTD sponsors, not later than 120 days prior to the date scheduled for the initial FSTD evaluation, the sponsor must submit to the NSPM the proposed QMS program as described in this QPS appendix. The NSPM will review the program and notify the sponsor within 90 days of beginning the review regarding 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 audit(s), make any required program adjustments as a result of any internal audit, and have the NSPM initial audit scheduled.

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 who has the responsibility and authority to establish and modify the sponsor’s policies, practices, and procedures regarding the QMS program for the recurring qualification and the day-to-day use of each FSTD.

d. The minimum content required for an acceptable QMS is found in Table E1. The policies, processes, and/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 on-going periodic assessments;
2. The NSPM-conducted initial and on-going 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.

END QPS REQUIREMENTS

BEGIN INFORMATION

Table E1—Minimum Requirements for Satisfactory FSTD Quality Management System

<table>
<thead>
<tr>
<th>Number</th>
<th>QPS Requirement</th>
<th>Information (Reference)</th>
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<tr>
<td>E1.1</td>
<td>A QMS manual that sets out the policies, processes, and/or procedures outlined in this table.</td>
<td>§60.5(a).</td>
</tr>
<tr>
<td>E1.2</td>
<td>A policy, process, and/or procedure specifying how the sponsor will identify deficiencies in the QMS.</td>
<td>§60.5(b).</td>
</tr>
<tr>
<td>E1.3</td>
<td>A policy, process, and/or procedure specifying how the sponsor will document how the QMS program will be changed to address deficiencies when found.</td>
<td>§60.5(b).</td>
</tr>
<tr>
<td>E1.4</td>
<td>A policy, process, and/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.</td>
<td>§60.5(c).</td>
</tr>
<tr>
<td>E1.5</td>
<td>A policy, process, and/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/upgrade evaluation conducted by the NSP and at least once within each subsequent 12-month period thereafter.</td>
<td>§60.7(b)(5).</td>
</tr>
<tr>
<td>E1.6</td>
<td>A policy, process, and/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.</td>
<td>§60.7(b)(6).</td>
</tr>
</tbody>
</table>
### Table E1—Minimum Requirements for Satisfactory FSTD Quality Management System—Continued

<table>
<thead>
<tr>
<th>Number</th>
<th>QPS requirement</th>
<th>Information (Reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1.11.a</td>
<td>Monitoring the on-going qualification of assigned FSTDs to ensure all matters regarding FSTD qualification are being carried out as provided for in 14 CFR part 60.</td>
<td>§60.9(b)(2).</td>
</tr>
<tr>
<td>E1.11.b</td>
<td>Ensuring that the QMS is properly established, implemented, and maintained by overseeing the QMS policies, practices, and/or procedures and by and modifying when and where necessary.</td>
<td>§60.9(c)(2), (3), and (4).</td>
</tr>
<tr>
<td>E1.11.c</td>
<td>Regularly briefing sponsor’s management on the status of the on-going FSTD qualification program and the effectiveness and efficiency of the QMS.</td>
<td>§60.13: QPS appendices A, B, C, and D.</td>
</tr>
<tr>
<td>E1.11.d</td>
<td>Serving as the primary contact point for all matters between the sponsor and the NSPM regarding the qualification of assigned FSTDs.</td>
<td>§60.14.</td>
</tr>
<tr>
<td>E1.12.a</td>
<td>A policy, process, and/or procedure specifying how the sponsor will:</td>
<td></td>
</tr>
<tr>
<td>E1.12.b</td>
<td>Ensure that the data made available to the NSPM 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 such data results from a change in performance, handling qualities, functions, or other characteristics of the aircraft that must be considered for flight crew-member training, evaluation, or for meeting experience requirements of this chapter;</td>
<td>§60.5(b)(7) and §60.7(d)(2).</td>
</tr>
<tr>
<td>E1.12.c</td>
<td>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 and/or operate a qualified FSTD; and</td>
<td></td>
</tr>
<tr>
<td>E1.12.d</td>
<td>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 for the purposes of receiving notification of data package changes.</td>
<td>§60.9(b)(1).</td>
</tr>
<tr>
<td>E1.13</td>
<td>A policy, process, and/or procedure specifying how the sponsor will make available all special equipment and qualified personnel needed to accomplish or assist in the accomplishment of tests during initial, continuing qualification, or special evaluations.</td>
<td>§60.15(a)–(d); §60.15(b)(i); §60.15(b)(ii); §60.15(b)(iii).</td>
</tr>
<tr>
<td>E1.14.a</td>
<td>A policy, process, and/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:</td>
<td></td>
</tr>
<tr>
<td>E1.14.b</td>
<td>That the performance and handling qualities of the FSTD represents those of the aircraft or set of aircraft within the normal operating envelope;</td>
<td></td>
</tr>
<tr>
<td>E1.14.c</td>
<td>The FSTD systems and sub-systems (including the simulated aircraft systems) functionally represent those in the aircraft or set of aircraft; and</td>
<td></td>
</tr>
<tr>
<td>E1.14.d</td>
<td>The cockpit represents the configuration of the specific type or aircraft make, model, and series aircraft being simulated, as appropriate.</td>
<td></td>
</tr>
<tr>
<td>E1.15</td>
<td>A policy, process, and/or procedure specifying how, for an initial evaluation, all of the subjective tests and all of the objective tests are accomplished at the sponsor’s training facility, except as provided for in the applicable QPS.</td>
<td>§60.15(e).</td>
</tr>
</tbody>
</table>
### TABLE E1—MINIMUM REQUIREMENTS FOR SATISFACTORY FSTD QUALITY MANAGEMENT SYSTEM—Continued

<table>
<thead>
<tr>
<th>Number</th>
<th>QPS requirement</th>
<th>Information (Reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1.16</td>
<td>A policy, process, and/or procedure specifying how, after the NSPM completes the evaluation for initial qualification, the sponsor will update the QTG with the results of the FAA-witnessed tests and demonstrations together with the results of all the objective tests and demonstrations described in the applicable QPS.</td>
<td>§60.15(h).</td>
</tr>
<tr>
<td>E1.17</td>
<td>A policy, process, and/or procedure specifying how the sponsor will make the QTG available to the NSPM upon request.</td>
<td>§60.15(i).</td>
</tr>
<tr>
<td>E1.18</td>
<td>A policy, process, and/or procedure specifying how the sponsor will and apply to the NSPM for additional qualification(s) to the Statement of Qualification.</td>
<td>§60.16(a); §60.16(a)(1)(i); §60.16(a)(1)(ii).</td>
</tr>
<tr>
<td>E1.19</td>
<td>A policy, process, and/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.</td>
<td>§60.19(a)(2) QPS appendices A, B, C, or D.</td>
</tr>
<tr>
<td>E1.20</td>
<td>A policy, process, and/or procedure specifying how the sponsor schedules with the NSPM continuing qualification evaluations not later than 60 days before the evaluation is due.</td>
<td>§60.19(b)(2).</td>
</tr>
<tr>
<td>E1.21</td>
<td>A policy, process, and/or procedure specifying how the sponsor maintains a log of all discrepancies noted in the FSTD during any functional preflight evaluation, including any corrective actions taken for each discrepancy and the results of all FAA-witnessed tests and demonstrations described in the applicable QPS.</td>
<td>§60.19(b)(5)–(6).</td>
</tr>
<tr>
<td>E1.22</td>
<td>A policy, process, and/or procedure describing that when a discrepancy is discovered, the NSPM is notified of the discrepancy in the FSTD discrepancy log.</td>
<td>§60.19(c); §60.19(c)(2)(i); §60.19(c)(2)(ii).</td>
</tr>
<tr>
<td>E1.23</td>
<td>A policy, process, and/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.</td>
<td>§60.19(c)(2)(iii).</td>
</tr>
<tr>
<td>E1.24</td>
<td>A policy, process, and/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.</td>
<td>§60.20.</td>
</tr>
<tr>
<td>E1.25</td>
<td>A policy, process, and/or procedure specifying how the sponsorship is determined, whether an FSTD change qualifies as a modification as described in 14 CFR part 60.</td>
<td>§60.21(c).</td>
</tr>
<tr>
<td>E1.26</td>
<td>A policy, process, and/or procedure specifying how the sponsorship is determined, whether an FSTD change qualifies as a modification as described in 14 CFR part 60.</td>
<td>§60.23(a)(1)–(2).</td>
</tr>
<tr>
<td>E1.27</td>
<td>A policy, process, and/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.</td>
<td>§60.23(b).</td>
</tr>
<tr>
<td>E1.28</td>
<td>A policy, process, and/or procedure specifying how the sponsor determines whether an FSTD change qualifies as a modification as described in 14 CFR part 60.</td>
<td>§60.23(c)(1)(i), (ii), and (iv).</td>
</tr>
<tr>
<td>E1.29</td>
<td>A policy, process, and/or procedure specifying how, if an FSTD modification and the sponsor has not received any response from either the NSPM or the TPAA; or 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 the NSPM or the TPAA; or Twenty-one days since the sponsor notified the NSPM and the TPAA of the proposed modification and the other has not responded; or 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.</td>
<td>§60.23(d)–(e).</td>
</tr>
<tr>
<td>E1.30</td>
<td>A policy, process, and/or procedure specifying how, after an FSTD modification is approved by the NSPM, the sponsor will:</td>
<td>§60.23(d)–(e).</td>
</tr>
<tr>
<td>E1.30.a</td>
<td>Post an addendum to the Statement of Qualification until such time as a permanent, updated statement is received from the NSPM and posted;</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE E1—Minimum Requirements for Satisfactory FSTD Quality Management System—Continued

<table>
<thead>
<tr>
<th>Number</th>
<th>QPS requirement</th>
<th>Information (Reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1.30.b</td>
<td>Update the MQTG with current objective test results and appropriate objective data for each affected objective test or other MQTG section that is affected by the modification; and</td>
<td>§60.25(b)–(c), and QPS appendices A, B, C, or D.</td>
</tr>
<tr>
<td>E1.30.c</td>
<td>File in the MQTG the location to make the modification and the record of the modification completion.</td>
<td>§60.27(a)(3).</td>
</tr>
<tr>
<td>E1.31</td>
<td>A policy, process, and/or procedure specifying how the sponsor will track the length of time each component has been missing, malfunctioning, or inoperative (MMI), including:</td>
<td>§60.31.</td>
</tr>
<tr>
<td>E1.31.a</td>
<td>How the sponsor will post a list of MMI components in or adjacent to the FSTD; and</td>
<td></td>
</tr>
<tr>
<td>E1.31.b</td>
<td>How the sponsor will notify the NSPM if the MMI has not been repaired or replaced within 36 days.*</td>
<td></td>
</tr>
<tr>
<td>E1.32</td>
<td>A policy, process, and/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.</td>
<td></td>
</tr>
<tr>
<td>E1.33</td>
<td>A policy, process, and/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.)</td>
<td></td>
</tr>
<tr>
<td>E1.33.a</td>
<td>The MQTG and each amendment thereto;</td>
<td></td>
</tr>
<tr>
<td>E1.33.b</td>
<td>A record of all FSTD modifications required by this part since the issuance of the original Statement of Qualification;</td>
<td></td>
</tr>
<tr>
<td>E1.33.c</td>
<td>Results of the qualification evaluations (initial and each upgrade) since the issuance of the original Statement of Qualification;</td>
<td></td>
</tr>
<tr>
<td>E1.33.d</td>
<td>Results of the objective tests conducted in accordance with this part for a period of 2 years;</td>
<td></td>
</tr>
<tr>
<td>E1.33.e</td>
<td>Results of the previous three continuing qualification evaluations, or the continuing qualification evaluations from the previous 2 years, whichever covers a longer period;</td>
<td></td>
</tr>
<tr>
<td>E1.33.f</td>
<td>Comments obtained in accordance with Section 60.9(b);</td>
<td></td>
</tr>
<tr>
<td>E1.33.g</td>
<td>A record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following:</td>
<td></td>
</tr>
<tr>
<td>E1.33.g.1</td>
<td>A list of the components or equipment that were or are missing, malfunctioning, or inoperative;</td>
<td></td>
</tr>
<tr>
<td>E1.33.g.2</td>
<td>The action taken to correct the discrepancy;</td>
<td></td>
</tr>
<tr>
<td>E1.33.g.3</td>
<td>The date the corrective action was taken; and</td>
<td></td>
</tr>
<tr>
<td>E1.33.g.4</td>
<td>The identity of the person determining that the discrepancy has been corrected.</td>
<td></td>
</tr>
</tbody>
</table>

*Note 1. 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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**END QPS REQUIREMENTS**

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**BEGIN INFORMATION**

f. Table E2 contains a sample Assessment Tool that the NSPM will use when conducting the desk assessment of a sponsor’s request for initial evaluation of the required elements of a QMS program.

g. Table E3 contains a sample Assessment Tool that the NSPM will use when conducting the on-site practical evaluation of a sponsor’s request for initial and continuing evaluation of the required elements of a QMS program.

h. Table E4 contains a sample Assessment Tool that the NSPM will use when conducting the desk assessment of a sponsor’s request for initial evaluation of the voluntary elements of a QMS program.

i. Table E5 contains a sample Assessment Tool that will be used by the NSPM when conducting the on-site practical evaluation of a sponsor’s request for initial and continuing evaluation of the voluntary elements of a QMS program.

j. 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, through the MR, may delegate duties associated with maintaining the qualification of the FSTD (e.g., corrective and preventive maintenance, scheduling for
and the conducting of tests and/or inspections, functional preflight checks) but retains the responsibility and authority for the day-to-day qualification of the FSTD. One person may serve in this capacity for more than one FSTD, but one FSTD would not have more than one person serving in this capacity.

(3) The QMS requirements should not be interpreted to preclude a given QMS program from being applicable to more than one certificate holder (e.g., part 119 and part 142 or two part 119 certificate holders) and should not be interpreted to preclude an individual from being a Management Representative (MR) for more than one certificate holder (e.g., part 119 and part 142 or two part 119 certificate holders) as long as the other QMS program requirements and the other MR requirements are respectively met for each such certificate holder.


(6) The NSPM will use the results of the assessment(s) of the voluntary portions of the QMS program (as described in Tables E4 and E5) to determine whether or not a sponsor or a FSTD may have the interval between NSPM-conducted evaluations extended and what the extension might be.

k. While the FAA does not mandate any specific QMS program format, the following subparagraphs outline those factors that would be typically found in an acceptable QMS program.

(1) Establishment of 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) The selected MR should be someone who has overall authority and responsibility for monitoring the on-going qualification of assigned FSTDs to ensure that all matters regarding FSTD qualification are being carried out as required by this part and ensuring that the QMS program is properly established, implemented, and maintained. The MR should regularly:

(i) Brief the sponsor’s management regarding the status of on-going qualification processes;

(ii) Serve as the primary contact point for all matters between the sponsor and the NSPM regarding the qualification of the assigned FSTDs.

(iii) 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.

(4) A QMS program, together with a statement acknowledging completion of a periodic review by the MR, should include the following:

(i) A maintenance facility that provides suitable FSTD hardware and software tests and maintenance capability.

(ii) 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.

(iii) Routine maintenance of the FSTD and performance of the QTG tests with adequate staffing to cover FSTD operating periods.

(iv) 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 appropriate Quality System training and brief other personnel on the procedures.

<table>
<thead>
<tr>
<th>TABLE E2—INFORMATION SIMULATION QUALITY MANAGEMENT SYSTEM (SQMS) ASSESSMENT TOOL—INITIAL (DESK)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Element No.</strong></td>
</tr>
<tr>
<td>E.2.1</td>
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<tr>
<td>E.2.2</td>
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<tr>
<td>E.2.3</td>
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<tr>
<td>E.2.4</td>
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<tr>
<td>Element No.</td>
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<tr>
<td>E.2.5</td>
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<td>E.2.6</td>
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<td>E.2.7</td>
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<td>E.2.9</td>
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<td>E.2.10</td>
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<tr>
<td>E.2.11</td>
</tr>
<tr>
<td>E.2.11.a</td>
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<tr>
<td>E.2.11.b</td>
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<tr>
<td>E.2.11.c</td>
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<tr>
<td>E.2.11.d</td>
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<tr>
<td>E.2.11.e</td>
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<tr>
<td>E.2.12</td>
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<tr>
<td>Element No.</td>
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<td>-------------</td>
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<tr>
<td>E.2.12.a</td>
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<tr>
<td>E.2.12.b</td>
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<td>E.2.20</td>
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<td>Element No.</td>
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<td>E.2.21</td>
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<td>E.2.29.b</td>
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<td>E.2.29.c</td>
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</tbody>
</table>

N: Not required, P: Required, Y: Yes
<table>
<thead>
<tr>
<th>Element No.</th>
<th>Basic (Part 60 required) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.2.30</td>
<td>A policy, process, and/or procedure specifying how, after a FSTD modification is approved by the NSPM, the sponsor will:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.2.30.a</td>
<td>Post an addendum to the Statement of Qualification until such time as a permanent, updated statement is received from the NSPM and posted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.2.30.b</td>
<td>Update the MQTG with current objective test results and appropriate objective data for each affected objective test or other MQTG section that is affected by the modification.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.2.30.c</td>
<td>File in the MQTG the direction to make the modification and the record of the modification completion.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| E.2.31     | A policy, process, and/or procedure specifying how the sponsor will track the length of time a component has been missing, malfunctioning, or inoperative (MMI), including:  
E.2.31.a   | How the sponsor will post a list of MMI components in or adjacent to the FSTD.                                                                                                                                                                                                                                                                                                                  |                                  |          |
| E.2.31.b   | How the sponsor will notify the NSPM if the MMI has not been repaired or replaced within 30 days; or if the sponsor has a discrepancy prioritization system, describe how discrepancies are prioritized and how the sponsor will notify the NSPM if the MMI has not been repaired or replaced within the specified timeframe.                                                                                           |                                  |          |
| E.2.32     | A policy, process, and/or procedure specifying how the sponsor will notify the NSPM and how the sponsor will seek re-qualification of the FSTD if the FSTD is moved and reinstalled in a different location.                                                                                                                                                                                                                                                                  |                                  |          |
| E.2.33     | A policy, process, and/or procedure specifying how the sponsor will maintain control of the following documents: [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.]                                                                                         |                                  |          |
| E.2.33.a   | The MQTG and each amendment thereto.                                                                                                                                                                                                                                                                                                                                                       |                                  |          |
| E.2.33.b   | A record of all FSTD modifications required by this part since the issuance of the original Statement of Qualification.                                                                                                                                                                                                                                                                                                                                   |                                  |          |
| E.2.33.c   | Results of the qualification evaluations (initial and each upgrade) since the issuance of the original Statement of Qualification.                                                                                                                                                                                                                                                                                                                          |                                  |          |
| E.2.33.d   | Results of the objective tests conducted in accordance with this part for a period of 2 years.                                                                                                                                                                                                                                                                                                                                                           |                                  |          |
| E.2.33.e   | Results of the previous three continuing qualification evaluations, or the continuing qualification evaluations from the previous 2 years, whichever covers a longer period.                                                                                                                                                                                                                                                                            |                                  |          |
| E.2.33.f   | Comments obtained in accordance with this part for a period of at least 90 days.                                                                                                                                                                                                                                                                                                                                                                             |                                  |          |
| E.2.33.g   | A record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following:  
E.2.33.g.1 | A list of the components or equipment that were or are missing, malfunctioning, or inoperative.                                                                                                                                                                                                                                                                                                 |                                  |          |
<p>| E.2.33.g.2 | The action taken to correct the discrepancy.                                                                                                                                                                                                                                                                                                                                                     |                                  |          |
| E.2.33.g.3 | The date the corrective action was taken.                                                                                                                                                                                                                                                                                                                                                     |                                  |          |
| E.2.33.g.4 | The identity of the person determining that the discrepancy has been corrected.                                                                                                                                                                                                                                                                                                                                                                             |                                  |          |</p>
<table>
<thead>
<tr>
<th>Element number</th>
<th>Basic (Part 60 Required) Elements</th>
<th>Rating See Element Assessment Table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.3.1. ..........</td>
<td>The Quality Management System Manual sets our current QMS policies, processes and/or procedures.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.2. ..........</td>
<td>The policy, process, and/or procedure specifying how the sponsor will identify deficiencies in the QMS.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.3. ..........</td>
<td>The policy, process, and/or procedure specifying how the sponsor will document how the QMS program will be changed to address deficiencies when found.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.4. ..........</td>
<td>The policy, process, and/or procedure specifying how the sponsor will propose program changes to the NSPM and receive approval prior to their implementation.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.5. ..........</td>
<td>The policy, process, and/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/upgrade evaluation conducted by the NSP and at least once within each subsequent 12-month period thereafter.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.6. ..........</td>
<td>The policy, process, and/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.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.7. ..........</td>
<td>The policy, process, and/or procedure specifying how the sponsor will obtain an annual written statement from a qualified pilot (after having 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.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.8. ..........</td>
<td>A policy, process, and/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.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.9. ..........</td>
<td>The policy, process, and/or procedure specifying how and where the FSTD Statement of Qualification will be posted, or accessed by an appropriate terminal or display, in or adjacent to the FSTD.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.10. ..........</td>
<td>The policy, process, and/or procedure specifying how the sponsor’s management representative (MR) is selected and identified by name to the NSPM.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.11. ..........</td>
<td>The policy, process, and/or procedure specifying the MR’s authority and responsibility for the following:</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.11.a. ......</td>
<td>Monitoring the on-going qualification of assigned FSTDs to ensure all matters regarding FSTD qualification are being carried out as provided for in 14 CFR part 60.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.11.b. ......</td>
<td>Ensuring that the QMS is properly established, implemented, and maintained by overseeing the QMS policies, practices, and/or procedures and by and modifying when and where necessary.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.11.c. ......</td>
<td>Regularly briefing sponsor’s management on the status of the on-going FSTD qualification program and the effectiveness and efficiency of the QMS. (Designate maximum interval).</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.11.d. ......</td>
<td>Serving as the primary contact point for all matters between the sponsor and the NSPM regarding the qualification of assigned FSTDs.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.11.e. ......</td>
<td>Delegating the MR assigned duties to an individual at each of the sponsor’s locations, when/if/where appropriate.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>E.3.12. ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will:</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Element number</td>
<td>Basic (Part 60 Required) Elements</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>E.3.12.a</td>
<td>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 such data results from a change in performance, handling qualities, functions, or other characteristics of the aircraft that must be considered for flight crew member training, evaluation, or for meeting experience requirements of this chapter.</td>
<td>N P Y</td>
<td>See Element Assessment Table</td>
</tr>
<tr>
<td>E.3.12.b</td>
<td>Immediately notify the NSPM when 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/or operate a qualified FFS, including technical information about this data to the NSPM relative to the data’s significance for training, evaluation, or flight experience activities in the FFS.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.12.c</td>
<td>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/or, if appropriate, with the person having supplied the aircraft data package for the FFS for the purposes of receiving notification of data package changes.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.13</td>
<td>A policy, process, and/or procedure specifying how the sponsor will make available all special equipment and qualified personnel needed to accomplish or assist in the accomplishment of tests during initial, continuing qualification, or special evaluations.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.14</td>
<td>A policy, process, and/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:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.14.a</td>
<td>That the performance and handling qualities of the FSTD represent those of the aircraft or set of aircraft within the normal operating envelope.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.14.b</td>
<td>The FSTD systems and sub-systems (including the simulated aircraft systems) functionally represent those in the aircraft or set of aircraft.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.14.c</td>
<td>The cockpit represents the configuration of the specific type; or aircraft make, model, and series aircraft being simulated, as appropriate.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.15</td>
<td>A policy, process, and/or procedure specifying how, for an initial evaluation, all of the subjective tests and all of the objective tests are accomplished at the sponsor’s training facility, except as provided for in the applicable QPS.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.16</td>
<td>A policy, process, and/or procedure specifying how, after the NSPM completes the evaluation for initial qualification, the sponsor will update the QTG with the results of the FAA-witnessed tests and demonstrations together with the results of all the objective tests and demonstrations described in the applicable QPS.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.17</td>
<td>A policy, process, and/or procedure specifying how the sponsor will make the MQTG available to the NSPM upon request.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.18</td>
<td>A policy, process, and/or procedure specifying how the sponsor will apply to the NSPM to add (an) additional qualification(s) to the Statement of Qualification.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.19</td>
<td>A policy, process, and/or procedure specifying how the sponsor accomplishes all applicable QPS Attachment 2 objective tests each year in a minimum of four evenly spaced inspections as specified in the applicable QPS.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.20</td>
<td>A policy, process, and/or procedure specifying how the sponsor completes a functional preflight check of the FSTD within the preceding 24 hours of FSTD use.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.21</td>
<td>A policy, process, and/or procedure specifying how the sponsor schedules with the NSPM continuing qualification evaluations not later than 60 days before the evaluation is due.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.22</td>
<td>A policy, process, and/or procedure specifying how the sponsor ensures that the FSTD has received a continuing qualification evaluation at the interval as described in the respective MQTG, allowing for the 1-month grace period before or after the calendar month required.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.23</td>
<td>A policy, process, and/or procedure describing that when a discrepancy is discovered the following is recorded in the FSTD discrepancy log:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.23.a</td>
<td>A description of each discrepancy is entered and remains in the log until the discrepancy is corrected.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.23.b</td>
<td>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.</td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE E.3—INFORMATION (SQMS) ASSESSMENT TOOL—ON-SITE—Continued

<table>
<thead>
<tr>
<th>Element number</th>
<th>Basic (Part 60 Required) Elements</th>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.3.24 ..........</td>
<td>A policy, process, and/or procedure specifying how 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.).</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.25 ..........</td>
<td>A policy, process, and/or procedure that requires each instructor, check airman, or representative of the Administrator conducting training, evaluation, or flight experience for flight crew members, 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.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.26 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will (if operating an FSTD based on an interim qualification), 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) apply for initial qualification based on the final aircraft data package approved by the aircraft manufacturer.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.27 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor determines whether an FSTD change qualifies as a modification as described in 14 CFR part 60.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.28 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will ensure the FSTD is modified in accordance with any FSTD Directive regardless of the original qualification basis.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.29 ..........</td>
<td>A policy, process, and/or procedure specifying how, if an FSTD change is determined to be a modification as defined in 14 CFR part 60, the sponsor will notify the NSPM and TPAA of their intent to use the modified FSTD and to ensure that the modified FSTD will not be used prior to:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.29.a .........</td>
<td>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.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.29.b .........</td>
<td>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.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.29.c .........</td>
<td>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.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.30 ..........</td>
<td>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.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.30.a .........</td>
<td>A policy, process, and/or procedure specifying how, after a FSTD modification is approved by the NSPM, the sponsor will:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.30.b .........</td>
<td>Post an addendum to the Statement of Qualification until such time as a permanent, updated statement is received from the NSPM and posted.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.30.c .........</td>
<td>Update the MQTG with current objective test results and appropriate objective data for each affected objective test or other MQTG section that is affected by the modification.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.31 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will track the length of time a component has been missing, malfunctioning, or inoperative (MMI), including:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.31.a .........</td>
<td>How the sponsor will post a list of MMI components in or adjacent to the FSTD.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.31.b .........</td>
<td>How the sponsor will notify the NSPM if the MMI has not been repaired or replaced within 30 days; or if the sponsor has a discrepancy prioritization system, describe how discrepancies are prioritized and how the sponsor will notify the NSPM if the MMI has not been repaired or replaced within the specified timeframe.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.32 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will notify the NSPM and how the sponsor will seek re-qualification of the FSTD if the FSTD is moved and reinstalled in a different location.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will maintain control of the following documents: 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.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.a ..........</td>
<td>The MQTG and each amendment thereto.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.b ..........</td>
<td>A record of all FSTD modifications required by this part since the issuance of the original Statement of Qualification.</td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE E.3—INFORMATION (SQMS) ASSESSMENT TOOL—ON-SITE—Continued

<table>
<thead>
<tr>
<th>Element number</th>
<th>Basic (Part 60 Required) Elements</th>
<th>Rating See Element Assessment Table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.3.33.c.</td>
<td>Results of the qualification evaluations (initial and each upgrade) since the issuance of the original Statement of Qualification.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.d.</td>
<td>Results of the objective tests conducted in accordance with this part for a period of 2 years.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.e.</td>
<td>Results of the previous three continuing qualification evaluations, or the continuing qualification evaluations from the previous 2 years, whichever covers a longer period.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.f.</td>
<td>Comments obtained in accordance with this part for a period of at least 90 days.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.g.1</td>
<td>A list of the components or equipment that were or are missing, malfunctioning, or inoperable.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.g.2</td>
<td>The action taken to correct the discrepancy.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.g.3</td>
<td>The date the corrective action was taken.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>E.3.33.g.4</td>
<td>The identity of the person determining that the discrepancy has been corrected.</td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE E.4—INFORMATION SQMS ASSESSMENT TOOL—INITIAL (DESK)

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (voluntary) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALITY MANAGEMENT SYSTEM MANUAL:</td>
<td>Does the sponsor have . . .</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.4.1.</td>
<td>Quality Management System Manual documentation includes:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.4.1.a</td>
<td>The scope of the SQMS, including:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.4.1.a.1</td>
<td>Responsibilities Matrix, or the equivalent, designating responsibility, by position, name or title, for approval and control of SQMS functions/elements.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.4.1.a.2</td>
<td>Documented SQMS policies, processes and procedures listed in V.4.10, or reference to them.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.4.1.a.3</td>
<td>A description of the sequence and interaction of the documented SQMS processes.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.4.2</td>
<td>Quality Management System Manual established as a controlled document that includes provision for identification of current revision status and the date of last revision imprinted on each page concerned.</td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>

| QUALITY POLICY AND QUALITY OBJECTIVES: | | | |
| V.4.3           | A quality policy that: | N P Y |          |
| V.4.3.a         | Is appropriate to the purpose of the organization. | N P Y |          |
| V.4.3.b         | Includes the concept of continual SQMS improvement. | N P Y |          |
| V.4.3.c         | Provides a framework for establishing and reviewing quality objectives. | N P Y |          |
| V.4.4           | Quality objectives that: | N P Y |          |
| V.4.4.a         | Have been established for relevant SQMS functions at relevant levels within the organization. | N P Y |          |
| V.4.4.b         | Include the ultimate objective of providing the continuous presentation of a qualified FSTD, or FSTDs, for credible flight training, evaluation and/or meeting experience requirements. | N P Y |          |
| V.4.4.c         | Are measurable and consistent with the Quality Policy. | N P Y |          |

<p>| MANAGEMENT COMMITMENT: | | | |
| V.4.5           | A policy, process, and/or procedure that specifies how management will: | N P Y |          |
| V.4.5.a         | Ensure that the quality policy is communicated and understood at appropriate levels of the organization. | N P Y |          |
| V.4.5.b         | Ensure that employees are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives. | N P Y |          |
| V.4.5.c         | Ensure that the resources (human and financial) necessary to achieve the quality objectives are identified, planned and available. | N P Y |          |
| V.4.5.d         | Document management resource planning output. | N P Y |          |
| V.4.5.e         | Conduct and record periodic management reviews (stated minimum interval required) to: | N P Y |          |
| (1) Evaluate planned resource allocation and .................................................. | | | |
| (2) Take action to ensure continuing suitability and effectiveness of the: | | | |</p>
<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (voluntary) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.4.5.e.1.</td>
<td>Quality policy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.5.e.2.</td>
<td>Quality objectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.5.f.</td>
<td>Verify implementation of proper corrective action/managed change on assessment deficiencies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.5.g.</td>
<td>Record the results of corrective action/managed change on assessment deficiencies and report the results to the NSPM.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.6.</td>
<td>A Master List of internal and external documents that are actively utilized in the SQMS to ensure effective operation and control of the processes (identified, as applicable, by publisher/originator, title/description, volume no./form no., revision no./version, effective date). Note: By implementing a policy, process or procedure that categorizes inactive/unused documents as “archived,” these documents: (1) May be left off the Master List, (2) Must be controlled and (3) Must be added to the Master List if/when they are subsequently activated [re: V.4.7.h.].</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.</td>
<td>A policy, process, and/or procedure that specifies how the sponsor will provide for:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.a.</td>
<td>Approval of documents for adequacy prior to use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.b.</td>
<td>Periodic review, updating, re-approval of documents (where necessary).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.c.</td>
<td>Identification of current document revision status including the date of last revision on each page concerned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.d.</td>
<td>Ensuring that current relevant versions of applicable documents are available at point-of-use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.e.</td>
<td>Suitable identification of obsolete documents if they are retained for any purpose.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.f.</td>
<td>Preventing the unintended use of obsolete documents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.g.</td>
<td>Ensuring that external-origin documents are identified &amp; their distribution/accessibility controlled.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.7.h.</td>
<td>Protection and storage/archiving of records/documents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.8.</td>
<td>A policy, process, and/or procedure specifying how the sponsor will retain the following for a period of two years (The sponsor must specify whether these records are maintained in plain language form or in coded form. If the coded form is used, the sponsor must specify how the preservation retrieval of information will be conducted):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.8.a.</td>
<td>A record of training time lost due to FSTD discrepancies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.8.b.</td>
<td>A record of the two most recent NSPM assessments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.8.c.</td>
<td>A record of the two most recent Sponsor assessments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.8.d.</td>
<td>SQMS Corrective Action records and/or Managed Change documentation (including change pertaining to assessment findings).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ASSIGNMENT of PERSONNEL/TRAINING**

**POLICY, PROCESS and/or PROCEDURE CONTROL**

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (voluntary) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.4.9.</td>
<td>A policy, process or procedure specifying how the sponsor will, for those performing inspection, testing, engineering and normal, preventative and corrective maintenance on FSTDs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.9.a.</td>
<td>Identify the necessary skill requirements.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.9.b.</td>
<td>Assign personnel that satisfy the identified skill requirements based upon experience, skills, education or training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.9.c.</td>
<td>Maintain appropriate ongoing records of skill, experience, education and/or training qualifications for assigned personnel.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.9.d.</td>
<td>Evaluate the adequacy/appropriateness of the skill requirements and the effectiveness of sponsor-provided training, referencing, in part, the criteria for workmanship specified in V.4.11.d.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.10.</td>
<td>Documented policies, processes and/or procedures for essential QMS functions that directly affect quality, including the relevant/essential sequence and interaction of these processes (Supported by diagrams/flow charts/maps at sponsor’s discretion) to include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.10.a.</td>
<td>Scheduling and tracking inspection, testing, engineering and normal and preventative maintenance on FSTDs to verify that the specified qualification requirements for the FSTD are met.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.10.b.</td>
<td>A policy, process, and/or procedure specifying how the sponsor will determine FSTD training, evaluation, and/or flight experience restrictions, including: (1) Implementation, status notification and coordination with the sponsor’s training organization, other users and TPAA and (2) Removal of the restrictions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE E.4—INFORMATION SQMS ASSESSMENT TOOL—INITIAL (DESK)—Continued

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (voluntary) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.4.11 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will implement controlled conditions to provide:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.11.a .......</td>
<td>A suitable work environment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.11.b .......</td>
<td>Approval of equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.11.c .......</td>
<td>Availability of suitable equipment and suitable equipment maintenance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.11.d .......</td>
<td>Compliance with documented procedures and/or reference standards/codes set out in the Quality Management System Manual.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.11.e .......</td>
<td>Criteria for workmanship (e.g., written standards, representative samples or illustrations).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.12 ..........</td>
<td>A policy, process, and/or procedure specifying how the sponsor will ensure use of current, valid measuring and monitoring devices, including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.12.a .......</td>
<td>Recording the basis for their periodic, or prior to use, calibration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.12.b .......</td>
<td>Protecting them from damage and safeguarding them from adjustments that would invalidate their calibration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.13 ..........</td>
<td>A policy, process, and/or procedure that specifies how the sponsor will record NSPM assessments.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### INTERNAL ASSESSMENT

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.4.14 ..........</td>
<td>A policy, process, and/or procedure that specifies how the sponsor will conduct internal assessments to determine that the SQMS: (1) Has been effectively implemented and maintained, (2) Conforms to regulatory standards and (3) Conforms to SQMS requirements in accordance with documented procedures, as follows:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.14.a .......</td>
<td>Responsibilities and requirements for conducting assessments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.14.b .......</td>
<td>Assessment frequency (at least annually).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.14.c .......</td>
<td>Assessment scope.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.14.d .......</td>
<td>How assessments are conducted and recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.14.e .......</td>
<td>Personnel other than those who control/perform the activity, process, procedure or practice being assessed conduct the assessment (Authorization to deviate from this standard may be approved by the NSPM for those sponsors that have limited personnel resources).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.14.f .......</td>
<td>When, how and by whom the results of such assessments and the associated corrective action/managed change are reported to Responsible Management and the NSPM.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### CORRECTIVE ACTION/MANAGED CHANGE (For Other Than FSTD Operational Discrepancies)

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.4.15 ..........</td>
<td>A policy, process, and/or procedure that specifies how a perceived need for change will:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.15.a .......</td>
<td>Be validated (determined), and if valid, be activated as a Change Initiative. If processed as a Corrective Action:</td>
<td></td>
<td></td>
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<tr>
<td>V.4.15.b .......</td>
<td>Determine the cause.</td>
<td></td>
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</tr>
<tr>
<td>V.4.15.c .......</td>
<td>Determine and implement corrective action.</td>
<td></td>
<td></td>
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<tr>
<td>V.4.15.d .......</td>
<td>Record the action taken.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.15.e .......</td>
<td>Evaluate the effectiveness of the action taken.</td>
<td></td>
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</tr>
<tr>
<td>V.4.15.f .......</td>
<td>Record the results of this evaluation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.15.g .......</td>
<td>Evaluate the need for further action to prevent recurrence. If processed as a Managed Change:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.15.h .......</td>
<td>Analyze and determine action on the Change Initiative.</td>
<td></td>
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</tr>
<tr>
<td>V.4.15.i .......</td>
<td>Establish the Scope of Change.</td>
<td></td>
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<tr>
<td>V.4.15.j .......</td>
<td>Develop a Change Plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.15.k .......</td>
<td>Review the Change Plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.4.15.l .......</td>
<td>Implement the Approved Change Plan.</td>
<td></td>
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</tr>
<tr>
<td>V.4.15.m .......</td>
<td>Evaluate the implemented change.</td>
<td></td>
<td></td>
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<tr>
<td>V.4.15.n .......</td>
<td>Review the evaluation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE E.5—INFORMATION—SQMS ASSESSMENT TOOL—ON-SITE

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) Elements</th>
<th>Rating see element assessment table</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE E.5—INFORMATION—SQMS ASSESSMENT TOOL—ON-SITE—Continued

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) Elements</th>
<th>Rating—See Element Assessment Table</th>
<th>Comments (Designate N/A Elements)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>P</td>
</tr>
<tr>
<td>(4) (2)</td>
<td>Being utilized/applied as stated/specification/defined in the QMS; (4) Achieving/producing effective results.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### QUALITY MANAGEMENT SYSTEM MANUAL:

- **V.5.1.** Quality Management System Manual contains current:
  - **V.5.1.a.** Responsibilities Matrix, or the equivalent, designating responsibilities by position, name or title for approval and/or control of essential QMS functions/elements.
  - **V.5.1.b.** Documented SQMS processes and procedures listed in V.5.10, or reference to them.
  - **V.5.1.c.** Descriptions of the sequence and interaction of the documented SQMS processes.

- **V.5.2.** The Quality Management System Manual is being properly controlled and includes identification of the current revision status and the date of last revision imprinted on each page concerned.

#### QUALITY POLICY AND QUALITY OBJECTIVES:

- **V.5.3.** Currently stated quality policy:
  - **V.5.3.a.** Is appropriate for the organization.
  - **V.5.3.b.** Includes the concept of continual SQMS improvement.

- **V.5.4.** Current written quality objectives:
  - **V.5.4.a.** Exist for relevant QMS functions at relevant levels within the organization.
  - **V.5.4.b.** Include the "ultimate objective" of providing continuous presentation of a qualified FSTD, or FSTDs, for credible flight training, evaluation and/or meeting experience requirements.
  - **V.5.4.c.** Are measurable and consistent with the Quality Policy.

#### MANAGEMENT COMMITMENT:

- **V.5.5.** Management is using their stated SQMS method(s) to:
  - **V.5.5.a.** Communicate and ensure that the quality policy is understood at appropriate levels of the organization.
  - **V.5.5.b.** Ensure that employees are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives.
  - **V.5.5.c.** Allocate resources (human and financial), using documented resource planning output, and implement action necessary to achieve planned operational results/quality objectives.
  - **V.5.5.d.** Document resource planning output.
  - **V.5.5.e.** Conduct periodic recorded management reviews (in compliance with stated minimum interval) to evaluate and take action (corrective action/managed change) to ensure continuing suitability and effectiveness of the:
    - **v.5.5.e.1.** Quality policy.
    - **v.5.5.e.2.** Quality objectives.
  - **V.5.5.f.** Verify implementation of proper corrective action/managed change on assessment deficiencies.
  - **V.5.5.g.** Record the results of corrective action/managed change on assessment deficiencies and report the results to the NSPM.

#### DOCUMENT/RECORD CONTROL:

- **V.5.6.** Internal and external documents:
  - **V.5.6.a.** That are actively utilized in the SQMS to ensure effective operation and control of the processes are:
    - **v.5.6.a.1.** On the Master List of Documents, including documents originally categorized as "archived" that have been activated.
    - **v.5.6.a.2.** Adequately identified by publisher/originator, title/description, volume no., form no., revision no./version, or effective date.
  - **V.5.6.b.** That are inactive/unused are being controlled according to the approved "archiving" policy [re: V.5.7.h.].
  - **V.5.7.** Stated SQMS method(s) for:
    - **V.5.7.a.** Approval of documents for adequacy prior to issue.
    - **V.5.7.b.** Periodically (where necessary) reviewing documents and records and updating/re-approving them.
### Table E.5—Information—SQMS Assessment Tool—On-Site—Continued

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) Elements</th>
<th>Rating—See Element Assessment Table</th>
<th>Comments (Designate N/A Elements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.5.7.c.</td>
<td>Maintaining current revision(s) and entering revision status and the date of last revision on each page concerned.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.7.d.</td>
<td>Maintaining current relevant versions of applicable documents at point-of-use.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.7.e.</td>
<td>Suitably identifying and designating obsolete documents if they are retained for any purpose.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.7.f.</td>
<td>Preventing unintended use of obsolete documents.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.7.g.</td>
<td>Identifying and controlling distribution/accessibility of documents of external origin.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.7.h.</td>
<td>Adequately protecting and storing/archiving records/documents.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.8.</td>
<td>Documents/records have been retained for two years, in plain language form or in coded form, as follows:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.8.a.</td>
<td>Training time lost due to FSTD discrepancies.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.8.b.</td>
<td>Two most recent NSPM assessments.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.8.c.</td>
<td>Two most recent Sponsor assessments.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.8.d.</td>
<td>SQMS Corrective Action records and/or Managed Change documentation (including change pertaining to assessment findings).</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.8.e.</td>
<td>Documented Management Resource Planning output and review.</td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>

#### Assignment of Personnel/Training

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) Elements</th>
<th>Rating—See Element Assessment Table</th>
<th>Comments (Designate N/A Elements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.5.9.</td>
<td>Stated SQMS method(s) for:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.9.a.</td>
<td>Assignment of personnel to perform inspection, testing, engineering and normal, preventative and corrective maintenance on FSTDs based upon experience, skills, education or training that satisfies the identified skill requirements.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.9.b.</td>
<td>Maintaining appropriate records of experience, skills, education or training to indicate that the qualifications of the assigned personnel satisfy the stated skill requirements.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.9.c.</td>
<td>Evaluating the: (1) Adequacy/appropriateness of the identified skill requirements and (2) Effectiveness of sponsor-provided training, utilizing, in part, the criteria for workmanship specified in V.5.11.d.</td>
<td>N P Y</td>
<td></td>
</tr>
</tbody>
</table>

#### Policy, Process and/or Procedure Control

<table>
<thead>
<tr>
<th>Element number</th>
<th>EXPANDED (Voluntary) Elements</th>
<th>Rating—See Element Assessment Table</th>
<th>Comments (Designate N/A Elements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.5.10.</td>
<td>Documented policies, processes and/or procedures for essential SQMS functions, including the relevant/essential sequence and interaction of these processes (Supported by diagrams/flow charts/maps at sponsor's discretion) to include:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.10.a.</td>
<td>Scheduling and tracking inspection, testing, engineering and normal and preventative maintenance on FSTDs to verify that the specified qualification requirements for the FSTD are met.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.10.b.</td>
<td>Determination of FSTD training, evaluation, and/or flight experience restrictions, including their implementation, status notification, and coordination with the sponsor's training organization, other users and TPAA and removal of the restrictions.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.11.</td>
<td>Implementation of controlled conditions that provide:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.11.a.</td>
<td>A suitable work environment.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.11.b.</td>
<td>Approval of equipment.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.11.c.</td>
<td>Availability of suitable equipment and suitable equipment maintenance.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.11.d.</td>
<td>Compliance with documented procedures and/or reference standards/codes as set out in the Quality Management System Manual.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.11.e.</td>
<td>Utilization of criteria for workmanship (e.g., written standards, representative samples/illustrations).</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.12.</td>
<td>Implementation of controlled conditions that provide availability of current, valid measuring/monitoring devices that are consistent with measurement requirements, including:</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.12.a.</td>
<td>Recording the basis for the periodic, or prior to use, calibration of measurement devices.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>Element number</td>
<td>EXPANDED (Voluntary) Elements</td>
<td>Rating—See Element Assessment Table</td>
<td>Comments (Designate N/A Elements)</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>V.5.12.b.</td>
<td>Protection of measurement devices from damage and safeguarding them from adjustments that would invalidate their calibration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.13.</td>
<td>The method used to record NSPM assessments, including all recommendations and corrective action/managed change taken.</td>
<td>N P Y</td>
<td></td>
</tr>
<tr>
<td>V.5.14.</td>
<td>Internal assessments have been conducted to determine that: (1) The SQMS has been effectively implemented and maintained, (2) Conforms to regulatory standards and (3) Conforms to SQMS requirements in accordance with documented procedures, including:.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.14.a.</td>
<td>Assignment of responsibilities and requirements for conducting assessments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.14.e.</td>
<td>Personnel, other than those who control/perform the activity, process, procedure or practice being assessed, conducted the assessment (Note any NSPM approved authorization to deviate from this requirement for sponsors that have limited personnel resources).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.14.f.</td>
<td>Reporting assessment results to Responsible Management and the NSPM.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.15.</td>
<td>The policy, process, and/or procedure that specifies how a perceived need for change will be validated (determined), and if valid, be activated as a Change Initiative.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.15.a.</td>
<td>Be validated (determined), and if valid, be activated as a Change Initiative.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.15.b.</td>
<td>Determine the cause.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.5.15.c.</td>
<td>Determine and implement corrective action.</td>
<td></td>
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**Criteria:** Complete, adequate, appropriate, accurate, clearly defined – flow chart, diagram, description

- **C. Identification, definition, documentation (flow chart, diagram, description)**
  - (a) Identified/defined inadequately, or
  - (b) Documented inadequately.

- **D. Implementation of a process or procedure.**
  - (a) Implemented inadequately/inappropriately, or
  - (b) Not current as defined/documented.

- **E. Effectiveness of a process or procedure.**
  - (a) Of inadequate or partial effectiveness of a process or procedure, or
  - (b) Current as defined/documented.
APPENDIX F TO PART 60—DEFINITIONS AND ABBREVIATIONS FOR FLIGHT SIMULATION TRAINING DEVICES

BEGIN INFORMATION

1. The definitions presented below in italic type face are repeated from the regulatory definitions found in part 1 or part 60, as indicated. In the event that a discrepancy exists between a definition found here, and one found in part 1 or part 60, the part 1 or part 60 definition prevails.

END INFORMATION

BEGIN QPS REQUIREMENTS

2. Definitions.

1st Segment—is that portion of the takeoff profile from liftoff to gear retraction.

2nd Segment—is that portion of the takeoff profile from after gear retraction to initial flap/slat retraction.

3rd Segment—is that portion of the takeoff profile after flap/slat retraction is complete.

Aircraft data package—is a combination of the various types of data used to design, program, manufacture, modify, and test the FSTD.

Airspeed—is calibrated airspeed unless otherwise specified and is expressed in terms of nautical miles per hour (knots).

Altitude—is pressure altitude (meters or feet) unless specified otherwise.

Angle of attack—is the angle between the airplane longitudinal axis and the relative wind vector projected onto the airplane plane of symmetry.

Automatic Testing—is FSTD testing wherein all stimuli are under computer control.

Bank—is the airplane attitude with respect to or around the longitudinal axis, or roll angle (degrees).

Breakout—is 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. (Part 60)

Closed Loop Testing—is a test method for which the input stimuli are generated by controllers, which drive the FSTD to follow a pre-defined target response.

Computer Controlled Airplane—is an airplane where all pilot inputs to the control surfaces are transferred and augmented by computers.

Control Sweep—is 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—is 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, cockpit shell, motion system, visual system, computers, and necessary peripheral equipment can thus be used in more than one simulation.

Critical Engine Parameter—is the parameter, which is the most accurate measure of propulsive force.

Deadband—is 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—is the length of space between two points and is expressed in terms of nautical miles unless specified otherwise.

Discrepancy—as used in this part, means an aspect of the FSTD that is not correct with respect to the aircraft being simulated. This includes missing, malfunctioning, and/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., errors in, or information missing from, the MQTG, required statements from appropriately qualified personnel).

Downgrade—is a permanent change in the qualification level of an FSTD to a lower level.

Drives—is a test method where the input stimulus or variable is positioned by automatic means, generally a computer input.

Electronic Copy of the MQTG—an electronic copy of the MQTG provided by an electronic scan presented in a Portable Document File (PDF), or similar format, acceptable to the NSPM.

Electronic Master Qualification Test Guide—is 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, means 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 (e.g., the objective and subjective tests, the inspections, or the continuing qualification evaluations) associated with the requirements of this part. (Part 60)

**Fictional Airport**—is 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**—Flight experience means recency of flight experience for landing credit purposes. (Part 60)

**Flight simulation training device (FSTD)** means 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 supplier of data that are acceptable to the NTFM) during an aircraft flight test program. (Part 60)

**Flight training device (FTD)** means a replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft cockpit 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 standards (QPS) for a specific FTD qualification level. (Part 1)

**Free Response**—is the response of the FSTD after completion of a control input or disturbance.

**Frozen**—is a test condition where one or more variables are held constant with time.

**FSTD Approval**—is the extent to which an FSTD may be used by a certificate holder as authorized by the FAA. It takes into account aircraft to FSTD differences and the training ability of the organization.

**FSTD Directive**—A document issued by the FAA to an FSTD sponsor, requiring a modification to the FSTD due to a recognized safety-of-flight issue and amending the qualification basis for the FSTD. (Part 60)

**FSTD Latency**—is the additional time beyond that of the response time of the aircraft due to the response of the FSTD.

**FSTD Performance**—The overall performance of the FSTD includes aircraft performance (e.g., thrust/drag relationships, climb, range) as well as flight and ground handling. (Part 60)

**Full flight simulator (FFS)** means a replica of a specific type; or make, model, and series aircraft cockpit. It includes the assemblage of equipment and computer programs necessary to represent aircraft operations in ground and flight conditions, a visual system providing an out-of-the-cockpit 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 qualification performance standards (QPS) for a specific FFS qualification level. (Part 1)

**Generic Airport**—is a Class III visual model that combines correct navigation aids for a real world airport with a visual model which does not correctly depict that same airport.

**Grandfathering**—as used in this part, means 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 is “held to the standards” that are, or were, in effect during that time period. The grandfathered standards remain applicable to each FSTD manufactured during the stated period, regardless of any subsequent modification to those standards and regardless of the sponsor, as long as the FSTD remains continuously qualified and is maintained in a non-qualified status in accordance with the specific requirements and time periods set out in this part. Each FSTD manufactured prior to the beginning date (or manufactured after the ending date) of a designated grandfather time period would have as its qualification basis, the standards in effect during the time period prior to, or subsequent to, the designated period.

**Gross Weight**—For objective test purposes:

**Basic Operating Weight**—(BOW) is the empty weight of the aircraft plus the weight of the following: normal oil quantity; lavalatory servicing fluid; potable water; required crewmembers and their baggage; and emergency equipment.

**Near Maximum Gross Weight**—is a weight chosen by the sponsor or data provider that is not less than the basic operating weight (BOW) of the airplane 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.

**Light Gross Weight**—is a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the airplane being simulated or as limited by the minimum practical operating weight of the test airplane.
Federal Aviation Administration, DOT

Medium Gross Weight—is a weight chosen by the sponsor or data provider that is approximately ±10% of the average of the numerical values of the BOW and the maximum certificated gross weight.

Ground Effect—is the change in aero-dynamic characteristics due to modification of the airflow past the aircraft caused by the proximity of the Earth’s surface to the airplane.

Hands Off—is a test maneuver conducted without pilot control inputs.

Hands On—is a test maneuver conducted with pilot control inputs as required.

Heave—is FSTD movement with respect to or along the vertical axis.

Height—is the height above ground level (or AGL) expressed in meters or feet.

“In Use” Runway—as used in this part, means the runway that is “active,” (is currently “selected” and able to be used for takeoffs and landings) and has the surface lighting and markings required by this part.

Integrated Testing—is testing of the FSTD such that all aircraft system models are active and contribute appropriately to the results where none of the models used are substituted with models or other algorithms intended for testing only.

Irreversible Control System—is a control system in which movement of the control surface will not backdrive the pilot’s control in the cockpit.

Locked—is a test condition where one or more variables are held constant with time.

Manual Testing—is 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. (Part 60)

Medium—is 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. (Part 60)

Nominal—is the normal operating configuration, atmospheric conditions, and flight parameters for the flight segment specified.

Non-Normal Control—is a term used in reference to Computer Controlled Airplanes and 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—is a term used in reference to Computer Controlled Airplanes and 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. (Part 60)

Pitch—is the airplane attitude with respect to, or around, the lateral axis expressed in degrees.

Power Lever Angle (PLA)—is the angle of the pilot’s primary engine control lever(s) in the cockpit. This may also be referred to as THROTTLE or POWER LEVER.

Predicted data—Estimations or extrapolations of either existing flight test data or data from other simulation models using engineering analyses, engineering simulations, design data, and/or wind tunnel data. (Part 60)

Protection Functions—are systems functions designed to protect an airplane from exceeding its flight maneuver limitations.

Pulse Input—is 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 set out in this part. (Part 60)

Qualification Performance Standard (QPS)—The collection of procedures and criteria published by the FAA to be used when conducting objective tests and subjective tests, including general FSTD requirements, for establishing 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. (Part 60)

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. (Part 60)

Quality Management System (QMS)—the aviation standard for flight simulation quality-systems that can be used for external quality-assurance purposes. It is a collection of generic and independent requirements unrelated to any specific industry or economic sector. It is not designed to enforce uniformity of quality systems, but to identify the processes needed, determine the sequence and interaction of these processes,
determine criteria and methods required to ensure the effective operation and control of these processes, ensure the availability of information necessary to support the operation and monitoring of these processes, measure, monitor and analyze these processes, and implement the actions necessary to achieve planned results. The design and implementation of a flight quality management system is influenced by the varying needs of the individual sponsor, their particular objectives, the flight simulation products and services supplied, and the processes and specific practices employed.

Real-World Airport—As used in this part in reference to airport visual models, means a computer-generated visual depiction of an airport that exists in reality.

Representative—When used as an adjective in this part, means typical, demonstrative, or characteristic of, or with respect to, the feature being described. For example: 1. “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 would provide the evaluator a typical, or overall, understanding of the performance and/or handling characteristics of the FSTD.

2. “Representative airport model” (or “ground/airborne traffic,” “lights,” “runway/taxiway markings,” “terrain,” “weather phenomena”) means a computer-generated visual depiction of a real-world or fictional airport (or traffic, lights, markings, terrain, weather phenomena) that is typical or characteristic of an airport (or traffic, lights, markings, terrain, weather phenomena) regularly used or seen by the sponsor, or the sponsor’s client using the FSTD, in normal operations.

Reversible Control System—Is a control system in which movement of the control surface will backdrive the pilot’s control in the cockpit.

Roll—Is 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 and similar operating envelopes and have the same number and type of engines or power plants. (Part 60)

Sideslip Angle—Is 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)—Consists of the required and voluntary elements of a quality management system for FSTD continuing qualification.

Snapshot—is a presentation of one or more variables at a given instant of time.

Special Evaluation—is an evaluation of the FSTD for purposes other than initial, upgrade, or continuing qualification. Circumstances that might indicate the need for a special evaluation would include, but not necessarily be limited to, the following: after the FSTD is moved and reinstalled at another location; after an update to FSTD software or hardware that might affect performance or flying qualities; after a substantial update to FSTD avionics packages (e.g., autopilot, flight management systems); after substantial modifications to FSTD configuration; after a complaint is received from a credible source indicating that the FSTD does not perform or handle like the aircraft it simulates.

Sponsor—A certificate holder who seeks or maintains FSTD qualification and is responsible for the prescribed actions as set out in this part and the QPS for the appropriate FSTD and qualification level. (Part 60)

Statement of Compliance and Capability (SOC)—Is a declaration that specific requirements have been met. It must declare that compliance with the requirement is achieved and explain how the requirement is met (e.g., gear modeling approach, coefficient of friction sources). It must also describe the capability of the FSTD to meet the requirement (e.g., computer speed, visual system refresh rate). In doing this, the statement must provide references to needed 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—is an aircraft control input input held at a constant value.

Subjective test—A qualitative assessment of the performance and operation of the FSTD. (Part 60)

Surge—is FSTD movement with respect to or along the longitudinal axis.

Sway—is FSTD movement with respect to or along the lateral axis.

Time History—is 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. (Part 60)

Training Restriction—is a temporary condition where, due to a Missing, Malfunctioning, or Inoperative (MMI) Component condition, the FSTD may continue to be used at the qualification level indicated on its SOQ but restricted from accomplishing the task for which the correct function of the MMI component is required.

Transport Delay or “Throughput”—Is 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 until output response. It does not include the characteristic delay of the airplane simulated.
Upgrade—The improvement or enhancement of an FSTD for the purpose of achieving a higher qualification level. (Part 60)

Validation Data—Objective data used to determine if the FSTD performance is within the tolerances prescribed in the QPS.

Validation Test—An objective test whereby 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 visual models.

Visual Model—is a collection of one or more visual scenes of an airport or portion(s) of an airport.

Visual System Response Time—is 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—is airplane attitude with respect to, or around, the vertical axis expressed in degrees.

3. ABBREVIATIONS.

AFM Approved Flight Manual.

AIL Above Ground Level (meters or feet).

AOA Angle of Attack (degrees).

APD Aircrew Program Designee.

CCA Computer Controlled Airplane.

cd/m² candela/meter², 3.4263 candela/m² = 1 ft-Lambert.

cf/m² 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.).

ft feet/feet, 1 foot = 0.304801 meters.

ft-Lambert foot-Lambert, 1 ft-Lambert = 3.4263 candela/m².

g Acceleration due to Gravity (meters or feet/sec²); 1 g = 9.81 m/sec² or 32.2 feet/sec².

G/S Glideslope.

IATA International Airline Transport Association.

ICAO International Civil Aviation Organization.

IGE In ground effect.

ILS Instrument Landing System.

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 = 0.5149 m/sec or 1.889 ft/sec.

lb(s) pound(s), one (1) pound = 0.44 decaNewton.

LDP Landing decision point.

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 Airplanes.

nm Nautical Mile(s) 1 Nautical Mile = 6,080 feet.

NN NON-NORMAL CONTROL Used in reference to Computer Controlled Airplanes.

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.

NWA Nosewheel Angle (degrees).

OGE Out of ground effect.

PAP Precision Approach Path Indicator System.

Pf Impact or Feel Pressure, often expressed as “q.”

PLA Power Lever Angle.

PLF Power for Level Flight.

psf pounds per square inch.

QPS Qualification Performance Standard.

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.

SOC Statement of Compliance and Capability.

Tf Total time of the flare maneuver duration.

Tt Total time from Ti to a 90% increase or decrease in the power level specified.

VASI Visual Approach Slope Indicator System.

VGS Visual Ground Segment.

V1 Decision speed.

V2 Takeoff speed.

Vmc Minimum Control Speed.

Vmcg Minimum Control Speed in the air.

Vmcg Minimum Control Speed on the ground.

Vmc Landing.

Vms The speed at which the last main landing gear leaves the ground.

Vr Rotate Speed.

Vs Stall Speed or minimum speed in the stall.
WAT  Weight, Altitude, Temperature.

End QPS Requirements

PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

Special Federal Aviation Regulation No. 73
Special Federal Aviation Regulation No. 93
Special Federal Aviation Regulation No. 100–1

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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 after April 26, 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.

(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 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:

(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 of which were in the Robinson R-22 and has received 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 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.

(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 instruction has been given in those maneuvers and procedures 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.

(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.

(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.
§ 61.57 in an R–22 or R–44, as appropriate.

3. Extension of Time to Fulfill Certain Qualification Requirements. Persons identified in paragraph 1 of this SFAR who had until the end of September 2001 to complete the specified qualification requirements in September 2001 will be deemed to have completed those requirements in September 2001 if they satisfactorily complete those requirements by November 30, 2001. For those persons identified in paragraph 1, who are qualified for the first time to be a check airmen (simulator), flight instructor (simulator), aircraft dispatcher, or training center instructor, they must fulfill the applicable qualification requirements before they may serve as a check airmen (simulator), flight instructor (simulator), aircraft dispatcher, or training center instructor, as appropriate.

This extension does not change the 12-calendar-month requirement for aircraft dispatchers or the anniversary month for check airmen, flight instructors and training center instructors. Therefore, if you were due for qualification in September 2001 you will be due for qualification September 2002, regardless of this extension for 2001.

4. Termination Date. This Special Federal Aviation Regulation expires November 30, 2001.


SPECIAL FEDERAL AVIATION REGULATION
NO. 100–1—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 1 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 §§61.33 and 63.35 to take a practical test; and

(b) An expired written test report to show eligibility to take a practical test under part 61 to take a practical test; and

(c) An expired written test report to show eligibility to take a practical test required under part 63 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, through June 30, 2010;
§ 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:

(1) **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.

(2) **Authorized instructor** means—

(i) A person who holds a valid ground instructor certificate issued under part 61 or part 143 of this chapter when conducting ground training in accordance with the privileges and limitations of his or her ground instructor certificate;

(ii) A person who holds a current flight instructor certificate issued under part 61 of this chapter 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 SFAR No. 58, or part 61, 121, 135, or 142 of this chapter when conducting ground training or flight training in accordance with that authority.

(3) **Cross-country time** means—

(i) Except as provided in paragraphs (b)(3)(ii) through (b)(3)(vi) of this section, 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 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.

(4) 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.

(5) Flight simulator means a device that—

(i) Is a full-size aircraft cockpit replica of a specific type of aircraft, or make, model, and series of aircraft;
(ii) Includes the hardware and software necessary to represent the aircraft in ground operations and flight operations;
(iii) Uses a force cueing system that provides cues at least equivalent to those cues provided by a 3 degree freedom of motion system;
(iv) Uses a visual system that provides at least a 45 degree horizontal field of view and a 30 degree vertical field of view simultaneously for each pilot; and
(v) Has been evaluated, qualified, and approved by the Administrator.
(6) **Flight training** means that training, other than ground training, received from an authorized instructor in flight in an aircraft.
(7) **Flight training device** means a device that—
   (i) Is a full-size replica of the instruments, equipment, panels, and controls of an aircraft, or set of aircraft, in an open flight deck area or in an enclosed cockpit, including the hardware and software for the systems installed, that is necessary to simulate the aircraft in ground and flight operations;
   (ii) Need not have a force (motion) cueing or visual system; and
   (iii) Has been evaluated, qualified, and approved by the Administrator.
(8) **Ground training** means that training, other than flight training, received from an authorized instructor.
(9) **Instrument approach** means an approach procedure defined in part 97 of this chapter.
(10) **Instrument training** means that time in which instrument training is received from an authorized instructor under actual or simulated instrument conditions.
(11) **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.
(12) **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.
(13) **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.
(14) **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.
(15) **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.
(16) **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.

§61.3 Requirement for certificates, ratings, and authorizations.
(a) **Pilot certificate.** A person may not act as pilot in command or in any other capacity as a required pilot flight crewmember of a civil aircraft of U.S. registry, unless that person—
   (1) Has a valid pilot certificate or special purpose pilot authorization issued under this part in that person’s physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization. However, when the aircraft is operated within a foreign country, a current pilot license issued by the country in which the aircraft is operated may be used; and
   (2) Has a photo identification that is in that person’s physical possession or readily accessible in the aircraft when
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exercising the privileges of that pilot certificate or authorization. The photo identification must be a:

(i) Valid 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. A person may not act as pilot in command or in any other capacity as a required pilot flight crewmember of a civil aircraft of foreign registry within the United States, unless that person’s pilot certificate:

(1) Is valid and 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 under this part, or has been issued or validated by the country in which the aircraft is registered.

(c) Medical certificate. (1) Except as provided for in paragraph (c)(2) of this section, a person may not act as pilot in command or in any other capacity as a required pilot flight crewmember of an aircraft, under a certificate issued to that person under this part, unless that person has a current and appropriate medical certificate that has been issued under part 67 of this chapter, or other documentation acceptable to the Administrator, which is in that person’s physical possession or readily accessible in the aircraft.

(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 current and valid 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 current and valid 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 current and valid 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 current and valid 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 of this part, and holds a current 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.

(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), 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 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 current 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—
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(i) Holds a valid pilot certificate with category and class ratings for that aircraft; and a current 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 current 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 valid pilot certificate with category and class ratings for that aircraft and a current 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 pilot 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 or part 143 must have that certificate 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
§ 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.
§ 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:

(i) Pilot certificates—
(ii) Sport pilot.
(iii) Recreational pilot.
(iv) Private pilot.
(v) Commercial pilot.
(vi) Airline transport pilot.

(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:

(i) Aircraft category ratings—
(ii) Rotorcraft.
(iii) Glider.
(iv) Lighter-than-air.
(v) 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:

(i) Aircraft category ratings—
(ii) Rotorcraft.
(iii) Glider.
(iv) Powered-lift.

(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:

(i) Basic.
(ii) Advanced.

§ 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 reissuance.

(a) No person who holds an expired pilot certificate or rating may:
   (1) Exercise the privileges of that pilot certificate or rating; or
   (2) Act as pilot in command or as a required pilot flight crewmember of an aircraft of the same category and class specified on the 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; and
   (3) A pilot certificate with a lighter-than-air or free-balloon rating issued before July 1, 1945.

(c) A pilot certificate issued on the basis of a foreign pilot license will expire on the date the foreign license expires unless otherwise specified on the U.S. pilot certificate. A certificate without an expiration date is issued to the holder of the expired certificate only if that person meets the requirements of §61.75 for the issuance of a pilot certificate based on a foreign pilot license.

(d) An airline transport pilot certificate issued after April 30, 1949, that bears an expiration date but does not contain a horsepower limitation may be reissued without an expiration date.

(e) A private or commercial pilot certificate issued after June 30, 1945, that bears an expiration date may be reissued without an expiration date.

(f) A pilot certificate with a lighter-than-air or free-balloon rating issued after June 30, 1945, that bears an expiration date may be reissued without an expiration date.

§ 61.14 Refusal to submit to a drug or alcohol test.

(a) This section applies to an individual who holds a certificate under this part and is subject to the types of testing required under appendix I to part 121 or appendix J to part 121 of this chapter.

(b) Refusal by the holder of a certificate issued under this part to take a drug test required under the provisions of appendix I to part 121 or an alcohol test required under the provisions of appendix J to part 121 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 such refusal; and

(2) Suspension or revocation of any certificate, rating, or authorization issued under this part.


§ 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;

(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.

§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.


§ 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. A student pilot certificate expires 24 calendar months from the month in which it is issued.

(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. A flight instructor certificate:

(1) Is effective only while the holder has a current pilot certificate; and

(2) Except as specified in § 61.197(b) of this part, expires 24 calendar months from the month in which it was issued or renewed.

(e) Ground instructor certificate. A ground instructor certificate issued under this part is issued without a specific expiration date.

(f) Surrender, suspension, or revocation. Any certificate issued under this part ceases to be effective if it is surrendered, suspended, or revoked.

(g) Return of certificates. The holder of any certificate issued under this part that has been suspended or revoked must return that certificate to the FAA when requested to do so by the Administrator.

§ 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 when exercising the privileges of an airline transport pilot certificate;

(2) Must hold at least a second-class medical certificate when exercising the 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, except for a flight instructor certificate with a glider category rating or sport pilot rating, if the person is acting as pilot in command or is serving as a required flight crewmember; or
   (v) Except for a glider category rating or a balloon class rating, prior to taking a practical test that is performed in an aircraft for a certificate or rating at the recreational, private, commercial, or airline transport pilot certificate level.

(b) Operations not requiring a medical certificate. A person is not required to hold a valid 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 or balloon class rating;

(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 during the administration of a test or check for a certificate, rating, or authorization conducted in a flight simulator or flight training device;

(8) When taking a test or check for a certificate, rating, or authorization conducted in a flight simulator or flight training device.

(c) Operations requiring either a medical certificate or U.S. driver’s license. (1) A person must hold and possess either a valid medical certificate issued under part 67 of this chapter or a current and valid U.S. driver’s license when exercising the privileges of—

   (i) A student pilot certificate while seeking sport pilot privileges in a light-sport aircraft other than a glider or balloon;
   (ii) A sport pilot certificate in a light-sport aircraft other than a glider or balloon;
   (iii) 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.

(2) A person using a current and valid 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. (1) A first-class medical certificate expires at the end of the last day of—

   (i) The sixth month after the month of the date of examination shown on
§ 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) Current 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.

§ 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 by letter to the Department of Transportation, FAA, Airman 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.

(b) A request for the replacement of a lost or destroyed medical certificate must be made by letter to the Department of Transportation, FAA, Aeromedical 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.

(c) A request for the replacement of a lost or destroyed knowledge test report must be made by letter to the Department of Transportation, FAA, Airman 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.

(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 social security number;

(4) The date and place of birth of the certificate holder; and

(5) Any available information regarding the—

(i) Grade, number, and date of issuance of the certificate, and the ratings, if applicable;

(ii) Date of the medical examination, if applicable; and

(iii) Date the knowledge test was taken, if applicable.

(e) A person who has lost an airman certificate, medical certificate, or knowledge test report may obtain a facsimile from the FAA Aeromedical Certification Branch or the Airman Certification Branch, as appropriate, confirming that it was issued and the:

(1) Facsimile 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 facsimile must include the date on which a duplicate certificate or knowledge test report was previously requested.

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 rating and type rating are required) for the aircraft to be flown;

(2) Be receiving training for the purpose of obtaining an additional pilot certificate and rating that are appropriate to that aircraft, and be under the supervision of an authorized instructor; or

(3) Have received training required by this part that is appropriate to the aircraft category, class, and type rating (if a class or type rating is required) for the aircraft to be flown, and have received the required endorsements from an instructor who is authorized to provide the required endorsements for solo flight in that aircraft.

(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 (an airplane that has a retractable landing gear, flaps, and a controllable pitch propeller; or, in the case of a seaplane, flaps and a controllable pitch propeller), 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
§ 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; and

2. Proper identification at the time of application that contains the applicant’s—

   (i) Photograph;
   (ii) Signature;
   (iii) Date of birth, which shows 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; and
   (iv) Actual residential address, if different from the applicant’s mailing address.

(b) The Administrator shall specify the minimum passing grade for the knowledge test.

§ 61.39 Prerequisites for practical tests.

(a) Except as provided in paragraphs (b) and (c) 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 within the 24-calendar-month period preceding the month the applicant completes the practical test, if a knowledge test is required;

(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 current 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 60 days preceding the date 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 airmen knowledge test; and

(7) Have a completed and signed application form.

(b) Notwithstanding the provisions of paragraphs (a)(1) and (2) of this section, an applicant for an airline transport pilot certificate or an additional rating to an airline transport certificate may take the practical test for that certificate or rating with an expired knowledge test report, provided that the applicant:

(1) Is employed as a flight crewmember by a certificate holder under part 121, 125, or 135 of this chapter at the time of the practical test and has satisfactorily accomplished that operator’s approved—

(i) Pilot in command aircraft qualification training program that is appropriate to the certificate and rating sought; and

(ii) Qualification training requirements appropriate to the certificate and rating sought; or

(2) Is employed as a flight crewmember in scheduled U.S. military air transport operations at the time of the practical test, and has accomplished the pilot in command aircraft qualification training program that is appropriate to the certificate and rating sought.

(c) 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 pilot privileges of the airman certificate sought;

(2) Is applying for a type rating only, or a class rating with an associated 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.

(d) If all increments of the practical test for a certificate or rating are not completed on one date, all remaining increments of the test must be satisfactorily completed not more than 60 calendar days after the date on which the applicant began the test.

(e) If all increments of the practical test for a certificate or a rating are not satisfactorily completed within 60 calendar days after the date on which the applicant began the test, the applicant must retake the entire practical test.
§ 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) Except as provided in paragraph (b) of this section, the ability of an applicant for a certificate or rating issued under this part to perform the required tasks on the practical test is based on that applicant’s ability to safely:

(1) Perform the tasks specified in the areas of operation for the certificate or rating sought within the approved standards;

(2) Demonstrate mastery of the aircraft with the successful outcome of each task performed never seriously in doubt;

(3) Demonstrate satisfactory proficiency and competency within the approved standards;

(4) Demonstrate sound judgment; and

(5) Demonstrate single-pilot competence if the aircraft is type certificated for single-pilot operations.

(b) If an applicant does not demonstrate single pilot proficiency, as required in paragraph (a)(5) of this section, a limitation of “Second in Command Required” will be placed on the applicant’s airman certificate. The limitation may be removed if the applicant passes the appropriate practical test by demonstrating single-pilot competency 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.

§ 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—
§ 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

(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 current 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 a current 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 certified by the country of registry; or

(iii) A military aircraft of the same category, class, and type, if applicable, for which the applicant is applying for a certificate or rating.

(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. An aircraft (other than a lighter-than-air 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 being easily reached.

(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.’’

§ 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 certified 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, or flight training device, as appropriate.

(v) The name of a safety pilot, if required by §91.109(b) 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 or flight 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, or 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
§61.51 Logging pilot-in-command flight time. (1) A sport, recreational, private, or commercial pilot may log pilot-in-command time only for that flight time during which that person—
(i) Is the sole manipulator of the controls of an aircraft for which the pilot is rated or has privileges;
(ii) Is the sole occupant of the aircraft; or
(iii) Except for a recreational pilot, is acting as pilot in command of an aircraft on which more than one pilot is required under the type certification of the aircraft or the regulations under which the flight is conducted.
(2) An airline transport pilot may log as pilot-in-command time all of the flight time while acting as pilot-in-command of an operation requiring an airline transport pilot certificate.
(3) An authorized instructor may log as pilot-in-command time all flight time while acting as an authorized instructor.
(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 current 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 flight 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 flight 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 flight simulator or approved flight training device may be used by a person to log instrument time, provided an authorized instructor is present during the simulated flight.

(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.
§ 61.52 Use of aeronautical experience obtained in ultralight vehicles.

(a) 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) A person may use aeronautical experience obtained in an ultralight vehicle to meet the provisions of §§ 61.69 and 61.415(e).

(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 provisions for logging pilot time in aircraft as specified in § 61.51; and

(3) Obtain the experience in a category and class of vehicle corresponding to the rating or privileges sought.


§ 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, a person who holds a current medical certificate issued under part 67 of this chapter shall not 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 valid medical certificate issued under part 67 of this chapter and does not hold a current and valid U.S. driver’s license.

(2) Paragraph (b) of this section if that person holds a current and valid U.S. driver’s license.

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§ 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 current 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) The appropriate pilot type rating for the aircraft unless the flight will be conducted as domestic flight operations within 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.
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(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 121, 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 to sign the applicant’s training records or logbook and make the required endorsement.

(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 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.

(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(b) of this chapter.

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§ 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 a pilot proficiency check conducted by an examiner, an approved pilot check airman, or a U.S. Armed Force, for a pilot certificate, rating, or operating privilege need not accomplish the flight review required by this section.

(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 current flight instructor certificate 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 §61.397 need not accomplish the 1 hour of ground training specified in paragraph (a) of this section.

(g) A student pilot need not accomplish the flight review required by this
§ 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 crew-member 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, no person may act as pilot in command under IFR or in weather conditions less than the minimums prescribed for VFR, unless within the preceding 6 calendar months, that person has:
   (1) For the purpose of obtaining instrument experience in an aircraft (other than a glider), performed and
logged under actual or simulated instrument conditions, either in flight in the appropriate category of aircraft for the instrument privileges sought or in a flight simulator or flight training device that is representative of the aircraft category for the instrument privileges sought—

(i) At least six instrument approaches;
(ii) Holding procedures; and
(iii) Intercepting and tracking courses through the use of navigation systems.

(2) For the purpose of obtaining instrument experience in a glider, performed and logged under actual or simulated instrument conditions—

(i) At least 3 hours of instrument time in flight, of which 1½ hours may be acquired in an airplane or a glider if no passengers are to be carried; or
(ii) 3 hours of instrument time in flight in a glider if a passenger is to be carried.

(d) Instrument proficiency check. Except as provided in paragraph (e) of this section, a person who does not meet the instrument experience requirements of paragraph (c) of this section within the prescribed time, or within 6 calendar months after the prescribed time, may not serve as pilot in command under IFR or in weather conditions—

(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 certificate holder under part 125 and engaged in a flight operation for that certificate holder if the pilot 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 an air carrier certificated under part 121 or 135 and is engaged in a flight operation under part 91, 121, or 135 for that air carrier if the pilot is in compliance with §§121.437 and 121.439, or §§135.243 and 135.247 of this chapter, as appropriate.

(3) 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)(3)(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
§ 61.58 Pilot-in-command proficiency check: Operation of aircraft requiring more than one pilot flight crewmember.

(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, 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; 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.

(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, 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 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 maneuvers and procedures required for a type rating, in an aircraft type certificated for more than one required pilot flight crewmember;

(2) The practical test required for a type rating, in an aircraft type certificated for more than one required pilot flight crewmember;

(3) The initial or periodic practical test required for the issuance of a pilot certificate in the type of aircraft in which the pilot seeks to operate under this alternative; and

(4) The pilot-in-command proficiency check required by paragraph (a) of this section may be accomplished by satisfactory completion of one of the following:

(A) That pilot must have 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 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.
§ 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.

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examiner or check airman designation, in an aircraft type certificated for more than one required pilot flight crewmember; or

(4) A military flight check required for a pilot in command with instrument privileges, in an aircraft that the military requires to be operated by more than one pilot flight crewmember.

(e) A check or test described in paragraphs (d)(1) through (d)(4) 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 (e)(2) and (e)(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—

(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 (e) 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 (e) 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.

(f) 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.

(g) 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.

§ 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, and the requirements for and limitations of pilot authorizations issued by the Administrator.

§ 61.63 Additional aircraft ratings (other than on an airline transport pilot certificate).

(a) General. To be eligible for an additional aircraft rating to a pilot certificate, for other than an airline transport pilot certificate, an applicant must meet the appropriate requirements of this section for the additional aircraft rating sought.

(b) Additional category rating. An applicant who holds a pilot certificate and applies to add a category rating to that pilot certificate:

(1) Must have received the required training and possess the aeronautical experience prescribed by this part that applies to the pilot certificate for the aircraft category and, if applicable, class rating sought;

(2) Must have an endorsement in his or her logbook or training record from an authorized instructor, and that endorsement must attest that the applicant has been found competent in the aeronautical knowledge areas appropriate to the pilot certificate for the aircraft category and, if applicable, class rating sought;

(3) Must have an endorsement in his or her logbook or training record from an authorized instructor, and that endorsement must attest that the applicant has been found proficient on the areas of operation that are appropriate to the pilot certificate for the aircraft category and, if applicable, class rating sought;

(4) Must pass the required practical test that is appropriate to the pilot certificate for the aircraft category and, if applicable, class rating sought; and

(5) Need not take an additional knowledge test, provided the applicant holds an airplane, rotorcraft, powered-lift, or airship rating at that pilot certificate level.

(c) Additional class rating. Any person who applies for an additional class rating to be added on a pilot certificate:

(1) Must have an endorsement in his or her logbook or training record from an authorized instructor and that endorsement must attest that the applicant has been found competent in the aeronautical knowledge areas appropriate to the pilot certificate for the aircraft class rating sought;

(2) Must have an endorsement in his or her logbook or training record from an authorized instructor, and that endorsement must attest that the applicant has been found proficient in the areas of operation appropriate to the pilot certificate for the aircraft class rating sought;

(3) Must pass the required practical test that is appropriate to the pilot certificate for the aircraft class rating sought;

(4) 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 holds a lighter-than-air category rating with a balloon class rating and is seeking an airship class rating and

(5) Need not take an additional knowledge test, provided the applicant holds an airplane, rotorcraft, powered-lift, or airship rating at that pilot certificate level.

(d) Additional type rating. Except as specified in paragraph (d)(7) of this section, a person who applies for an additional aircraft type rating to be added on a pilot certificate, or the addition of
an aircraft type rating that is accomplished concurrently with an additional aircraft category or class rating:

(1) Must hold or concurrently obtain an instrument rating that is appropriate to the aircraft category, class, or type rating sought;

(2) Must have an endorsement in his or her logbook or training record from an authorized instructor, and that endorsement must attest that the applicant has been found competent in the aeronautical knowledge areas appropriate to the pilot certificate for the aircraft category, class, or type rating sought;

(3) Must have an endorsement in his or her logbook, or training record from an authorized instructor, and that endorsement must attest that the applicant has been found proficient in the areas of operation required for the issuance of an airline transport pilot certificate for the aircraft category, class, and type rating sought;

(4) Must pass the required practical test appropriate to the airline transport pilot certificate for the aircraft category, class, and type rating sought;

(5) Must perform the practical test in actual or simulated instrument conditions, unless the aircraft’s type certificate makes the aircraft incapable of operating under instrument flight rules. If the practical test cannot be accomplished for this reason, the person may obtain a type rating limited to “VFR only.” The “VFR only” limitation may be removed for that aircraft type when the person passes the practical test in actual or simulated instrument conditions. When an instrument rating is issued to a person who holds one or more type ratings, the type ratings on the amended pilot certificate shall bear the “VFR only” limitation for which the person has not demonstrated instrument competency;

(6) Need not take an additional knowledge test, provided the applicant holds an airplane, rotorcraft, powered-lift, or airship rating on their pilot certificate; and

(7) In the case of a pilot employee of a certificate holder operating under subpart K of part 91 of this chapter, must have—

(i) Met the appropriate requirements of paragraphs (d)(1), (d)(4), and (d)(5) of this section for the aircraft type rating sought; and

(ii) Received an endorsement in his or her flight training record from the certificate holder or program manager attesting that the applicant has completed the certificate holder’s or program manager’s approved ground and flight training program appropriate to the aircraft type rating sought;

(e) Use of a flight simulator or flight training device for an additional rating in an airplane.

The areas of operation required to be performed by paragraphs (b), (c), and (d) of this section shall be performed as follows:

(1) Except as provided in paragraph (e)(2) of this section, the areas of operation must be performed in an airplane of the same category, class, and type, if applicable, as the airplane for which the additional rating is sought.

(2) Subject to the limitations of paragraphs (e)(3) through (e)(12) of this section, the areas of operation may be performed in a flight simulator or flight training device that represents the airplane for which the additional rating is sought.

(3) The use of a flight simulator or flight training device permitted by paragraph (e)(2) of this section shall be conducted in accordance with an approved course at a training center certified under part 142 of this chapter.

(4) To complete all training and testing (except preflight inspection) for an additional airplane rating without limitations when using a flight simulator—

(i) The flight simulator must be qualified and approved as Level C or Level D; and

(ii) The applicant must meet at least one of the following:

(A) Hold a type rating for a turbojet airplane of the same class of airplane for which the type rating is sought, or have been appointed by a military service as a pilot in command of an airplane of the same class of airplane for which the type rating is sought, if a type rating in a turbojet airplane is sought.
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(B) Hold a type rating for a turbojet airplane of the same class of airplane for which the type rating is sought, or have been designated by a military service as a pilot in command of an airplane of the same class of airplane for which the type rating is sought, if a type rating in a turbopropeller airplane is sought.

(C) Have at least 2,000 hours of flight time, of which 500 hours is in turbine-powered airplanes of the same class of airplane for which the type rating is sought.

(D) Have at least 500 hours of flight time in the same type airplane as the airplane for which the rating is sought.

(E) Have at least 1,000 hours of flight time in at least two different airplanes requiring a type rating.

(5) Subject to the limitation of paragraph (e)(6) of this section, an applicant who does not meet the requirements of paragraph (e)(4) of this section may complete all training and testing (except for preflight inspection) for an additional rating when using a flight simulator if—

(i) The flight simulator is qualified and approved as a Level C or Level D; and

(ii) The applicant meets at least one of the following:

(A) Holds a type rating in a propeller-driven airplane if a type rating in a turboprop airplane is sought, or holds a type rating in a turboprop airplane if a type rating in a propeller-driven airplane is sought; or

(B) Since the beginning of the 12th calendar month before the month in which the applicant completes the practical test for an additional airplane rating, has logged:

(I) At least 100 hours of flight time in airframes of the same class for which the type rating is sought and which requires a type rating; and

(2) At least 25 hours of flight time in airplanes of the same type for which the rating is sought.

(6) An applicant meeting only the requirements of paragraph (e)(5) of this section will be issued an additional rating with a limitation.

(7) The limitation on a certificate issued under the provisions of paragraph (e)(6) of this section shall state, “This certificate is subject to pilot-in-command limitations for the additional rating.”

(8) An applicant who has been issued a pilot certificate with the limitation specified in paragraph (e)(7) of this section—

(i) May not act as pilot in command of that airplane for which the additional rating was obtained under the provisions of this section until the limitation is removed from the pilot certificate; and

(ii) May have the limitation removed by accomplishing 15 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in the same type of airplane to which the limitation applies.

(9) An applicant who does not meet the requirements of paragraph (e)(4) or paragraph (e)(5) of this section may be issued an additional rating after successful completion of one of the following requirements:

(i) Compliance with paragraphs (e)(2) and (e)(3) of this section and the following tasks, which must be successfully completed on a static airplane or in flight, as appropriate:

(A) Preflight inspection;

(B) Normal takeoff;

(C) Normal ILS approach;

(D) Missed approach; and

(E) Normal landing.

(ii) Compliance with paragraphs (e)(2), (e)(3), and (e)(10) through (e)(12) of this section.

(10) An applicant meeting only the requirements of paragraph (e)(9)(i) of this section will be issued an additional rating with a limitation.

(11) The limitation on a certificate issued under the provisions of paragraph (e)(10) of this section shall state, “This certificate is subject to pilot-in-command limitations for the additional rating.”

(12) An applicant who has been issued a pilot certificate with the limitation specified in paragraph (e)(11) of this section—

(i) May not act as pilot in command of that airplane for which the additional rating was obtained under the
provisions of this section until the limitation is removed from the pilot certificate; and

(ii) May have the limitation removed by accomplishing 25 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in that airplane of the same type to which the limitation applies.

(f) Use of a flight simulator or flight training device for an additional rating in a helicopter. The areas of operation required to be performed by paragraphs (b), (c), and (d) of this section shall be performed as follows:

(1) Except as provided in paragraph (f)(2) of this section, the areas of operation must be performed in a helicopter of the same type for the additional rating sought.

(2) Subject to the limitations of paragraph (f)(3) through (f)(12) of this section, the areas of operation may be performed in a flight simulator or flight training device that represents that helicopter for the additional rating sought.

(3) The use of a flight simulator or flight training device permitted by paragraph (f)(2) of this section shall be conducted in accordance with an approved course at a training center certified under part 142 of this chapter.

(4) To complete all training and testing (except preflight inspection) for an additional helicopter rating without limitations when using a flight simulator—

(i) The flight simulator must be qualified and approved as Level C or Level D; and

(ii) The applicant must meet at least one of the following if a type rating in a turbine-powered helicopter is sought:

(A) Hold a type rating in a turbine-powered helicopter if a type rating in a turbine-powered helicopter is sought;

(B) Have at least 2,000 hours of flight time that includes at least 500 hours in turbine-powered helicopters.

(C) Have at least 500 hours of flight time in turbine-powered helicopters.

(D) Have at least 1,000 hours of flight time in at least two different turbine-powered helicopters.

(5) Subject to the limitation of paragraph (f)(6) of this section, an applicant who does not meet the requirements of paragraph (f)(4) of this section may complete all training and testing (except for preflight inspection) for an additional rating when using a flight simulator if—

(i) The flight simulator is qualified and approved as Level C or Level D; and

(ii) The applicant meets at least one of the following:

(A) Holds a type rating in a turbine-powered helicopter if a type rating in a turbine-powered helicopter is sought; or

(B) Since the beginning of the 12th calendar month before the month in which the applicant completes the practical test for an additional helicopter rating, has logged at least 25 hours of flight time in helicopters of the same type for which the rating is sought.

(6) An applicant meeting only the requirements of paragraph (f)(5) of this section will be issued an additional rating with a limitation.

(7) The limitation on a certificate issued under the provisions of paragraph (f)(6) of this section shall state, “This certificate is subject to pilot-in-command limitations for the additional rating.”

(8) An applicant who is issued a pilot certificate with the limitation specified in paragraph (f)(7) of this section—

(i) May not act as pilot in command of that helicopter for which the additional rating was obtained under the provisions of this section until the limitation is removed from the pilot certificate; and

(ii) May have the limitation removed by accomplishing 15 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in the same type of helicopter to which the limitation applies.

(9) An applicant who does not meet the requirements of paragraph (f)(4) or paragraph (f)(5) of this section may be
issued an additional rating after successful completion of one of the following requirements:

(i) Compliance with paragraphs (f)(2) and (f)(3) of this section and the following tasks, which must be successfully completed on a static helicopter or in flight, as appropriate:

(A) Preflight inspection;
(B) Normal takeoff;
(C) Normal ILS approach;
(D) Missed approach; and
(E) Normal landing.

(ii) Compliance with paragraphs (f)(2), (f)(3), and (f)(10) through (f)(12) of this section.

(10) A applicant meeting only the requirements of paragraph (f)(9)(ii) of this section will be issued an additional rating with a limitation.

(11) The limitation on a certificate issued under the provisions of paragraph (f)(10) of this section shall state, “This certificate is subject to pilot-in-command limitations for the additional rating.”

(12) An applicant who has been issued a pilot certificate with the limitation specified in paragraph (f)(11) of this section—

(i) May not act as pilot in command of that helicopter for which the additional rating was obtained under the provisions of this section until the limitation is removed from the pilot certificate; and

(ii) May have the limitation removed by accomplishing 25 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in that helicopter of the same type as to which the limitation applies.

(g) Use of a flight simulator or flight training device for an additional rating in a powered-lift. The areas of operation required to be performed by paragraphs (b), (c), and (d) of this section shall be performed as follows:

(1) Except as provided in paragraph (g)(2) of this section, the areas of operation must be performed in a flight simulator or flight training device that represents that powered-lift for the additional rating sought.

(2) Subject to the limitations of paragraphs (g)(3) through (g)(12) of this section, the areas of operation may be performed in a flight simulator or flight training device that represents that powered-lift for the additional rating sought.

(3) The use of a flight simulator or flight training device permitted by paragraph (g)(2) of this section shall be conducted in accordance with an approved course at a training center certified under part 142 of this chapter.

(4) To complete all training and testing (except preflight inspection) for an additional powered-lift rating without limitations when using a flight simulator—

(i) The flight simulator must be qualified and approved as Level C or Level D; and

(ii) The applicant must meet at least one of the following if a type rating is sought in a turbine powered-lift:

(A) Hold a type rating in a turbine powered-lift or have been appointed by a military service as a pilot in command of a turbine powered-lift.

(B) Have at least 2,000 hours of flight time that includes at least 500 hours in turbine powered-lifts.

(C) Have at least 500 hours of flight time in turbine powered-lifts.

(D) Have at least 1,000 hours of flight time in at least two different turbine powered-lifts.

(5) Subject to the limitation of paragraph (g)(6) of this section, an applicant who does not meet the requirements of paragraph (g)(4) of this section may complete all training and testing (except for preflight inspection) for an additional rating when using a flight simulator if—

(i) The flight simulator is qualified and approved as Level C or Level D; and

(ii) The applicant meets at least one of the following:

(A) Holds a type rating in a turbine powered-lift if a type rating in a turbine powered-lift is sought; or

(B) Since the beginning of the 12th calendar month before the month in which the applicant completes the practical test for an additional powered-lift rating, has logged at least 25 hours of flight time in powered-lifts of the same type for which the rating is sought.

(6) An applicant meeting only the requirements of paragraph (g)(5) of this
(7) The limitation on a certificate issued under the provisions of paragraph (g)(6) of this section shall state, "This certificate is subject to pilot-in-command limitations for the additional rating."

(8) An applicant who is issued a pilot certificate with the limitation specified in paragraph (g)(7) of this section—

(i) May not act as pilot in command of that powered-lift for which the additional rating was obtained under the provisions of this section until the limitation is removed from the pilot certificate; and

(ii) May have the limitation removed by accomplishing 15 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in the same type of powered-lift to which the limitation applies.

(9) An applicant who does not meet the requirements of paragraph (g)(4) or paragraph (g)(5) of this section may be issued an additional rating after successful completion of one of the following requirements:

(i) Compliance with paragraphs (g)(2) and (g)(3) of this section and the following tasks, which must be successfully completed on a static powered-lift or in flight, as appropriate:

(A) Preflight inspection;

(B) Normal takeoff;

(C) Normal ILS approach;

(D) Missed approach; and

(E) Normal landing.

(ii) Compliance with paragraphs (g)(2), (g)(3), and (g)(10) through (g)(12) of this section.

(10) An applicant meeting only the requirements of paragraph (g)(9)(ii) of this section will be issued an additional rating with a limitation.

(i) May not act as pilot in command of that powered-lift for which the additional rating was obtained under the provisions of this section until the limitation is removed from the pilot certificate; and

(ii) May have the limitation removed by accomplishing 25 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in that powered-lift of the same type as to which the limitation applies.

(b) Aircraft not capable of instrument maneuvers and procedures. An applicant for a type rating who provides an aircraft not capable of the instrument maneuvers and procedures required by the appropriate requirements contained in §61.157 of this part for the practical test may—

(1) Obtain a type rating limited to "VFR only"; and

(2) Remove the "VFR only" limitation for each aircraft type in which the applicant demonstrates compliance with the appropriate instrument requirements contained in §61.157 or §61.73 of this part.

(i) Multiengine, single-pilot station airplane. An applicant for a type rating in a multiengine, single-pilot station airplane may meet the requirements of this part in a multiseat version of that multiengine airplane.

(ii) Single-engine, single-pilot station airplane. An applicant for a type rating in a single-engine, single-pilot station airplane may meet the requirements of this part in a multiseat version of that single-engine airplane.

(k) Category class ratings for the operation of aircraft with experimental certificates: Notwithstanding the provisions of paragraphs (b) and (c) of this section, a person holding at least a recreational pilot 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;
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(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 (k)(1) of this section must be logged between September 1, 2004 and August 31, 2005.

(1) Waivers. Unless the Administrator requires certain or all tasks to be performed, the examiner who conducts the practical test may waive any of the tasks for which the Administrator approves waiver authority.

§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 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;

(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 (e) 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. A person who applies for an instrument rating must have logged the following:  

(1) At least 50 hours of cross-country flight time as pilot in command, of which at least 10 hours must be in airplanes for an instrument—airplane rating; and  
(2) A total of 40 hours of actual or simulated instrument time on the areas of operation of this section, to include—  

(i) At least 15 hours of instrument flight training from an authorized instructor in the aircraft category for which the instrument rating is sought;  
(ii) At least 3 hours of instrument training that is appropriate to the instrument rating sought from an authorized instructor in preparation for the practical test within the 60 days preceding the date of the test;  
(iii) For an instrument—airplane rating, instrument training on cross-country flight procedures specific to airplanes that includes at least one cross-country flight in an airplane that is performed under IFR, and consists of—  
(A) A distance of at least 250 nautical miles along airways or ATC-directed routing;  
(B) An instrument approach at each airport; and  
(C) Three different kinds of approaches with the use of navigation systems;  
(iv) For an instrument—helicopter rating, instrument training specific to helicopters on cross-country flight procedures that includes at least one cross-country flight in a helicopter that is performed under IFR, and consists of—  
(A) A distance of at least 100 nautical miles along airways or ATC-directed routing;  
(B) An instrument approach at each airport; and  
(C) Three different kinds of approaches with the use of navigation systems; and  
(v) For an instrument—powered-lift rating, instrument training specific to a powered-lift on cross-country flight procedures that includes at least one cross-country flight in a powered-lift that is performed under IFR and consists of—  
(A) A distance of at least 250 nautical miles along airways or ATC-directed routing;  
(B) An instrument approach at each airport; and  
(C) Three different kinds of approaches with the use of navigation systems.  

(e) Use of flight simulators or flight training devices. If the instrument training 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 training was accomplished 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 training was not accomplished in accordance with part 142 of this chapter.  

§ 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 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;
§ 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 certified 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.

§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 at least a private 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 towing a glider or unpowered ultralight vehicle simulating towing flight procedures 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 the preceding 12 months 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.


§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 of this part for that certificate and rating, if that person has:

(1) Satisfactorily accomplished an approved training program and the pilot-in-command proficiency check for that airplane type, in accordance with the pilot-in-command requirements under subparts N and O of part 121 of this chapter; and

(2) Applied for the airline transport pilot certificate, type rating, or both within the 60-day period from the date the person satisfactorily accomplished the approved training program and pilot-in-command proficiency check for that airplane type.


§61.73 Military pilots or former military pilots: Special rules.

(a) General. Except for a rated military pilot or former rated military pilot who has been removed from flying status for lack of proficiency, or because of disciplinary action involving aircraft operations, a rated military pilot or former rated military pilot who meets the applicable requirements of this section may apply, on the basis of his or her military training, for:

(1) A commercial pilot certificate;
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(2) An aircraft rating in the category and class of aircraft for which that military pilot is qualified;
(3) An instrument rating with the appropriate aircraft rating for which that military pilot is qualified; or
(4) A type rating, if appropriate.

(b) Military pilots on active flying status within the past 12 months. A rated military pilot or former rated military pilot who has been on active flying status within the 12 months before applying must:

(1) Pass a knowledge test on the appropriate parts of this chapter that apply to pilot privileges and limitations, air traffic and general operating rules, and accident reporting rules;
(2) Present documentation showing compliance with the requirements of paragraph (d) of this section for at least one aircraft category rating; and
(3) Present documentation showing that the applicant is or was, at any time during the 12 calendar months before the month of application—
   (i) A rated military pilot on active flying status in an armed force of the United States; or
   (ii) A rated military pilot of an armed force of a foreign contracting State to the Convention on International Civil Aviation, assigned to pilot duties (other than flight training) with an armed force of the United States and holds, at the time of application, a current civil pilot license issued by that contracting State authorizing at least the privileges of the pilot certificate sought.

(c) Military pilots not on active flying status during the 12 calendar months before the month of application. A rated military pilot or former rated military pilot who has not been on active flying status within the 12 calendar months before the month of application must:

(1) Pass the appropriate knowledge and practical tests prescribed in this part for the certificate or rating sought; and
(2) Present documentation showing that the applicant was, before the beginning of the 12th calendar month before the month of application, a rated military pilot as prescribed by paragraph (b)(3)(i) or paragraph (b)(3)(ii) of this section.

(d) Aircraft category, class, and type ratings. A rated military pilot or former rated military pilot who applies for an aircraft category, class, or type rating, if applicable, is issued that rating at the commercial pilot certificate level if the pilot presents documentary evidence that shows satisfactory accomplishment of:

(1) An official U.S. military pilot check and instrument proficiency check in that aircraft category, class, or type. If applicable, as pilot in command during the 12 calendar months before the month of application; or
(2) At least 10 hours of pilot-in-command time in that aircraft category, class, or type. If applicable, during the 12 calendar months before the month of application; or
(3) An FAA practical test in that aircraft after—
   (i) Meeting the requirements of paragraphs (b)(1) and (b)(2) of this section; and
   (ii) Having received an endorsement from an authorized instructor who certifies that the pilot is proficient to take the required practical test, and that endorsement is made within the 60-day period preceding the date of the practical test.

(e) Instrument rating. A rated military pilot or former rated military pilot who applies for an airplane instrument rating, a helicopter instrument rating, or a powered-lift instrument rating to be added to his or her commercial pilot certificate may apply for an instrument rating if the pilot has, within the 12 calendar months preceding the month of application:

(1) Passed an instrument proficiency check by a U.S. Armed Force in the aircraft category for the instrument rating sought; and
(2) Received authorization from a U.S. Armed Force to conduct IFR flights on Federal airways in that aircraft category and class for the instrument rating sought.

(f) Aircraft type rating. An aircraft type rating is issued only for aircraft types that the Administrator has certified for civil operations.

(g) Aircraft type rating placed on an airline transport pilot certificate. A rated military pilot or former rated military pilot who holds an airline transport...
§ 61.75 Private pilot certificate issued on the basis of a foreign pilot license.

(a) General. A person who holds a current foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may apply for and be issued a private pilot certificate with the appropriate ratings when the application is based on the foreign pilot license that meets the requirements of this section.

(b) Certificate issued. A U.S. private pilot certificate that is issued under this section shall specify the person’s foreign license number and country of issuance. A person who holds a current foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may be issued a 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 that—
   (i) Is not under an order of revocation or suspension by the foreign country that issued the foreign pilot license; and
   (ii) Does not contain an endorsement stating that the applicant has not met all of the standards of ICAO for that license;
(3) Does not currently hold a U.S. pilot certificate;
(4) Holds a current medical certificate issued under part 67 of this chapter or a current medical certificate 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 certificate and who requests an aircraft type rating to be placed on that person’s airline transport pilot certificate may be issued that aircraft type rating at the airline transport pilot certificate level, provided that person:

(1) Holds a category and class rating for that type of aircraft at the airline transport pilot certificate level; and
(2) Passed an official U.S. military pilot check and instrument proficiency check in that type of aircraft as pilot in command during the 12 calendar months before the month of application.

(h) Evidentiary documents. The following documents are satisfactory evidence for the purposes indicated:

(1) An official identification card issued to the pilot by an armed force may be used to demonstrate membership in the armed forces.
(2) An original or a copy of a certificate of discharge or release may be used to demonstrate discharge or release from an armed force or former membership in an armed force.
(3) Current or previous status as a rated military pilot with a U.S. Armed Force may be demonstrated by—
   (i) An official U.S. Armed Force order to flight status as a military pilot;
   (ii) An official U.S. Armed Force form or logbook showing military pilot status; or
   (iii) An official order showing that the rated military pilot graduated from a U.S. military pilot school and received a rating as a military pilot.
(4) A certified U.S. Armed Force logbook or an appropriate official U.S. Armed Force form or summary may be used to demonstrate flight time in military aircraft as a member of a U.S. Armed Force.
(5) An official U.S. Armed Force record of a military checkout as pilot in command may be used to demonstrate pilot in command status.
(6) A current instrument grade slip that is issued by a U.S. Armed Force, or an official record of satisfactory accomplishment of an instrument proficiency check during the 12 calendar months preceding the month of the application may be used to demonstrate instrument pilot qualification.

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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.

(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. private 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 a pilot of a civil aircraft of U.S. registry in accordance with the private pilot privileges authorized by this part;

(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

(4) Shall not exercise the privileges of that U.S. private pilot certificate when the person’s foreign pilot license has been revoked or suspended.

(f) Limitation on licenses used as the basis for a U.S. certificate. Only one foreign pilot license may be used as a basis for issuing a U.S. private pilot certificate. The foreign pilot license and medical certification used as a basis for issuing a U.S. private pilot certificate under this section must be in the English language or accompanied by an English language 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. private pilot certificate. A U.S. private pilot certificate issued under this section is valid only when the holder has the foreign pilot license upon which the issuance of the U.S. private pilot certificate was based in the holder’s personal possession or readily accessible in the aircraft.

§61.77 Special purpose pilot authorization: Operation of U.S.-registered civil aircraft leased by a person who is not a 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 on that aircraft.

(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 current foreign pilot license that has been issued by the aeronautical authority of a contracting State to the Convention on International Civil Aviation from which the person holds citizenship or resident status and that contains the appropriate aircraft category, class, instrument rating, and type rating, if appropriate, for the aircraft to be flown;

(2) A current 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.

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(3) Documentation showing when the applicant will reach the age of 60 years (an official copy of the applicant’s birth certificate or other official document); (4) Documentation that the applicant meets the medical standards for the issuance of the foreign pilot license from the aeronautical authority of the contracting State to the Convention on International Civil Aviation where the applicant holds citizenship or resident status; (5) Documentation that the applicant meets the recent flight experience requirements of this part (a logbook or flight record); and (6) 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 is valid 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; and

(5) If the holder has only one special purpose pilot authorization as provided in paragraph (b)(6) of this section.

(e) Age limitation. Except as provided in paragraph (g) of this section, no person who holds a special purpose pilot authorization issued under this part, and no person who holds a special purpose pilot certificate issued under this part before August 4, 1997, shall serve as a pilot on a civil airplane of U.S. registry if the person has reached his or her 60th birthday, in the following operations:

(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 transportation for compensation or hire in airplanes having a payload capacity of more than 3,700 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) Delayed pilot age limitations for certain operations. Until December 20, 1999,
a person may serve as a pilot in the operations specified in paragraph (e) of this section after that person has reached his or her 60th birthday, if, on March 20, 1997, that person was employed as a pilot in any of the following operations:

1. Scheduled international air services carrying passengers in nontransport category turbopropeller-powered airplanes type certificated after December 31, 1964, that have a passenger-seat configuration of 10 to 19 seats;
2. Scheduled international air services carrying passengers in transport category turbopropeller-powered airplanes that have a passenger-seat configuration of 20 to 30 seats; or
3. Scheduled international air services carrying passengers in turbojet-powered airplanes having a passenger-seat configuration of 1 to 30 seats.

(h) 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.

(i) 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.

(j) 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.


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 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 pre-solo 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 pre-solo 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. 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.

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.

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.

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 pre-solo 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 pre-solo 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 pre-solo 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 go-arounds 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. (1) No instructor may authorize a student pilot to perform a solo flight unless that instructor has—
(i) 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;
(ii) Determined the student pilot is proficient in the maneuvers and procedures prescribed in this section;
(iii) Determined the student pilot is proficient in the make and model of aircraft to be flown;
(iv) 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
(v) Endorsed the student pilot’s logbook for the specific make and model aircraft to be flown, and that endorsement remains current for solo flight.
§ 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 aircraft, 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; and
(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.


§ 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 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 applicable to the aircraft to be flown.

(b) Authorization to perform certain solo flights and cross-country flights.
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 current solo flight endorsements 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 who gave the training has endorsed the student pilot’s logbook authorizing the flight;

(ii) The authorized instructor who gave the training has endorsed the student pilot’s logbook certifying that the student is proficient to make such flights;

(iii) The student pilot has current solo flight endorsements in accordance with §61.87 of this part;

(iv) The student pilot has current solo cross-country flight endorsements 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 endorsement is 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
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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 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.

(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,
§ 61.93 Maneuvers and procedures for cross-country flight training. A student pilot who is receiving training for cross-country flight must receive and log flight training in the following maneuvers and procedures:

(a) Maintenance of altitude.

(b) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning, including recognition of critical weather situations and estimating visibility while in flight;

(c) Use of aircraft performance charts;

(d) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(e) Emergency procedures;

(f) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(g) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(h) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(i) 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;

(j) Use of radios for VFR navigation and two-way communications; and

(k) Takeoff, approach, and landing procedures, including short-field and soft-field takeoffs, approaches, and landings.

(l) 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:

(m) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning with the aid of a magnetic compass;

(n) Use of aircraft performance charts pertaining to cross-country flight;

(o) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(p) Emergency procedures;

(q) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(r) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(s) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(t) 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;

(u) Use of radios for VFR navigation and two-way communications; and

(v) Takeoff, approach, and landing procedures, including short-field and soft-field takeoffs, approaches, and landings.

(w) 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:

(x) Use of aeronautical charts for VFR navigation using pilotage and dead reckoning, including recognition of critical weather situations and estimating visibility while in flight;

(y) Use of aircraft performance charts;

(z) Procurement and analysis of aeronautical weather reports and forecasts, including recognition of critical weather situations and estimating visibility while in flight;

(aa) Emergency procedures;

(bb) Traffic pattern procedures that include area departure, area arrival, entry into the traffic pattern, and approach;

(cc) Procedures and operating practices for collision avoidance, wake turbulence precautions, and windshear avoidance;

(dd) Recognition, avoidance, and operational restrictions of hazardous terrain features in the geographical area where the cross-country flight will be flown;

(ee) 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;

(ff) Use of radios for VFR navigation and two-way communications; and

(gg) Takeoff, approach, and landing procedures, including short-field and soft-field takeoffs, approaches, and landings; and

(hh) 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. Use of radios for VFR navigation and two-way communications;
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; and
12. Recognition of weather and upper air conditions conducive for the direction of cross-country flight.

(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 communications;
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; 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.

§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.
§ 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 operations at that specific airport.

(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.


§ 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; 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—

   (1) 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

§ 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) 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.


§ 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
§ 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) 3 hours of flight training in the aircraft for the rating sought in preparation for the practical test within the 60 days preceding the date of the practical 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.

§ 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 current and valid 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 current and valid 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 current and valid 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; 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
§ 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 category and class rating sought.
(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.

Subpart E—Private Pilots

§ 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
§ 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;
§ 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.
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(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 in preparation for the practical test in a single-engine airplane, which must have been performed within 60 days preceding the date 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 at least 150 nautical miles total distance, with full-stop landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 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 airplane category and multiengine class rating must log 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 in preparation for the practical test in a multi-engine airplane, which must have been performed within the 60-day period preceding the date 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 at least 150 nautical miles total distance, with full-stop landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 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 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 in preparation for the practical test in a helicopter, which must have been performed within 60 days preceding the date of the test; and
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(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 at least 75 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 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 preparation for the practical test in a powered-lift, which must have been performed within the 60-day period preceding the date of the test; and
   (4) 10 hours of solo flight time in an airplane or powered-lift consisting of at least—
      (i) 5 hours cross-country time;
      (ii) One cross-country flight of at least 150 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 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 in a glider with an authorized instructor in preparation for the practical test that must have been performed within the 60-day period preceding the date 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 in a glider with an authorized instructor in preparation for the practical test that must have been performed within the 60-day period preceding the date 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) 3 hours of flight training in an airship in preparation for the practical test within the 60 days preceding the date 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 within 60 days prior to application for the rating on the areas of operation for a gas balloon;

(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) Two flights of 1 hour each within 60 days prior to application for the rating on the areas of operation appropriate to a balloon with an airborne heater;

(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
§61.110 Night flying exceptions.

(a) Subject to the limitations of paragraph (b) of this section, a person

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 in preparation for the practical test in a powered parachute, which must have been performed within the 60-day period preceding the date of the test; and

(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 the traffic pattern) at an airport, with at least 3 takeoffs and landings 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 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 over 75 nautical miles total distance; 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 in preparation for the practical test in a weight-shift-control aircraft, which must have been performed within the 60-day period preceding the date of the test; and

(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;

(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

(iii) Three takeoffs and landings (with each landing involving a flight in the traffic pattern) 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 certified 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 certified under part 142 of this chapter, need only have a total of 35 hours of aeronautical experience to meet the requirements of this section.

§ 61.113 Private pilot privileges and limitations: Pilot in command.

(a) Except as provided in paragraphs (b) through (g) 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

$b$ 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.

§ 61.109(d)(2), (i)(2), or (j)(2), as appropriate.

§ 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 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.

(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.


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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;
§ 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) 10 hours of instrument training of which at least 5 hours 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
applicants seeking a single-engine sea-plane rating, 10 hours of training in a seaplane that has flaps and a controllable pitch propeller;

(iii) One cross-country flight of at least 2 hours in a single-engine airplane in day VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure;

(iv) One cross-country flight of at least 2 hours in a single-engine airplane in night VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure; and

(v) 3 hours in a single-engine airplane in preparation for the practical test within the 60-day period preceding the date of the test.

(4) 10 hours of solo flight in a single-engine airplane on the areas of operation listed in §61.127(b)(1) of this part, which 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 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) 10 hours of instrument training of which at least 5 hours 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 cross-country flight of at least 2 hours in a multiengine airplane in day VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure; and

(iv) One cross-country flight of at least 2 hours in a multiengine airplane in night VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure; and

(v) 3 hours in a multiengine airplane in preparation for the practical test within the 60-day period preceding the date 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 (each landing involving a flight with a traffic pattern) at an airport with an operating control tower.
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) 10 hours of instrument training in an aircraft;
   (ii) One cross-country flight of at least 2 hours in a helicopter in day VFR conditions, consisting of a total straight-line distance of more than 50 nautical miles from the original point of departure;
   (iii) One cross-country flight of at least 2 hours in a helicopter in night VFR conditions, consisting of a total straight-line distance of more than 50 nautical miles from the original point of departure; and
   (iv) 3 hours in a helicopter in preparation for the practical test within the 60-day period preceding the date of the test.
4. 10 hours of solo flight in a helicopter on the areas of operation listed in §61.127(b)(3) 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 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).

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 50 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) 5 hours of instrument training in an aircraft;
   (ii) One cross-country flight of at least 2 hours in a gyroplane in day VFR conditions, consisting of a total straight-line distance of more than 50 nautical miles from the original point of departure;
   (iii) One cross-country flight of at least 2 hours in a gyroplane in night VFR conditions, consisting of a total straight-line distance of more than 50 nautical miles from the original point of departure; and
   (iv) 3 hours in a gyroplane in preparation for the practical test within the 60-day period preceding the date of the test.
4. 10 hours of solo flight in a gyroplane on the areas of operation listed in §61.127(b)(4) 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 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).

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 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) 5 hours of instrument training in an aircraft;
   (ii) One cross-country flight of at least 2 hours in a gyroplane in day VFR conditions, consisting of a total straight-line distance of more than 50 nautical miles from the original point of departure;
   (iii) One cross-country flight of at least 2 hours in a gyroplane in night VFR conditions, consisting of a total straight-line distance of more than 50 nautical miles from the original point of departure; and
   (iv) 3 hours in a gyroplane in preparation for the practical test within the 60-day period preceding the date of the test.
4. 10 hours of solo flight in a gyroplane on the areas of operation listed in §61.127(b)(4) 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 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).
(3) 20 hours of training on the areas of operation listed in §61.127(b)(5) of this part that includes at least—
   (i) 10 hours of instrument training, of which at least 5 hours must be in a powered-lift;
   (ii) One cross-country flight of at least 2 hours in a powered-lift in day VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure;
   (iii) One cross-country flight of at least 2 hours in a powered-lift in night VFR conditions, consisting 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 in preparation for the practical test within the 60-day period preceding the date of the test.

(4) 10 hours of solo flight in a powered-lift on the areas of operation listed in §61.127(b)(5) of this part, which 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 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) 3 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 60-day period preceding the date 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) 3 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 60-day period preceding the date 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) 30 hours of pilot-in-command time in airships, which consists of at least—
      (i) 10 hours of cross-country flight time in airships; and
      (ii) 10 hours of night flight time in airships.
   (3) 40 hours of instrument time, which consists of at least 20 hours in flight, 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) 3 hours in an airship in preparation for the practical test within the 60-day period preceding the date of the test;
      (ii) One cross-country flight of at least 1 hour in duration in an airship in day VFR conditions, consisting of a total straight-line distance of more than 25 nautical miles from the original point of departure; and
      (iii) One cross-country flight of at least 1 hour in duration in an airship in night VFR conditions, consisting of a total straight-line distance of more than 25 nautical miles from the original 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) 2 training flights of 2 hours each with an authorized instructor in a gas balloon on the areas of operation appropriate to a gas balloon within 60 days prior to application for the rating;
         (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) 2 training flights of 1 hour each with an authorized instructor in a balloon with an airborne heater on the areas of operation appropriate to a balloon with an airborne heater within 60 days prior to application for the rating;
         (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 Administrator, an applicant for a commercial pilot certificate
§ 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) 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.

§ 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) Be at least 23 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) Hold at least a commercial pilot certificate and an instrument rating;

(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) Hold either a foreign airline transport pilot or foreign commercial pilot license and an instrument rating, without limitations, issued by a contracting State to the Convention on International Civil Aviation.

(e) Meet the aeronautical experience requirements of this subpart that apply to the aircraft category and class rating sought before applying for the practical test;

(f) 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;

(g) 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

(h) Comply with the sections of this part that apply to the aircraft category and class rating sought.

§ 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.
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§ 61.157 Flight proficiency.

(a) General. (1) The practical test for an airline transport pilot certificate is given for—

(1) An airplane category and single-engine class rating;

(2) An airplane category and multi-engine class rating;

(3) A rotorcraft category and helicopter class rating;

(4) A powered-lift category rating; and

(5) An aircraft type rating for the category and class ratings listed in paragraphs (a)(1)(i) through (a)(1)(iv) of this section.

(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; and

(13) Crew resource management to include crew communication and coordination.

§ 61.157 Flight proficiency.

(a) General. (1) The practical test for an airline transport pilot certificate is given for—

(1) An airplane category and single-engine class rating;

(2) An airplane category and multi-engine class rating;

(3) A rotorcraft category and helicopter class rating;

(4) A powered-lift category rating; and

(5) An aircraft type rating for the category and class ratings listed in paragraphs (a)(1)(i) through (a)(1)(iv) of this section.

(b) Aircraft type rating. Except as provided in paragraph (c) of this section, a person who is applying for an aircraft type rating to be added to an airline transport pilot certificate:

(1) Must receive and log ground and flight training from an authorized instructor on the areas of operation listed in paragraph (e) of this section that apply to the aircraft type rating sought;

(2) Must receive a logbook endorsement from an authorized instructor certifying that the applicant completed the training on the areas of operation listed in paragraph (e) of this section that apply to the aircraft type rating sought; and

(3) Must perform the practical test in actual or simulated instrument conditions, unless the aircraft’s type certificate makes the aircraft incapable of operating under instrument flight rules. If the practical test cannot be accomplished for this reason, the person may obtain a type rating limited to “VFR only.” The “VFR only” limitation may be removed for that aircraft type when the person passes the practical test in actual or simulated instrument conditions.

(c) Exceptions. A person who is applying 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 135 of this chapter or of a fractional ownership program manager operating under subpart K of
part 91 of this chapter, need not comply with the requirements of paragraph (b) of this section if the applicant presents a training record that shows satisfactory completion of that certificate holder’s or program manager’s approved pilot-in-command training program for the aircraft type rating sought.

(d) Upgrading type ratings. Any type rating(s) on the pilot certificate of an applicant who successfully completes an airline transport pilot practical test shall be included on the airline transport pilot certificate with the privileges and limitations of the airline transport pilot certificate, provided the applicant passes the practical test in the same category and class of aircraft for which the applicant holds the type rating(s). However, if a type rating for that category and class of aircraft on the superseded pilot certificate is limited to VFR, that limitation shall be carried forward to the person’s airline transport pilot certificate level.

(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—multi-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.

(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 satisfy the requirements of this section for the appropriate aircraft rating:
   (i) A proficiency check under §121.441 of this chapter.
   (ii) Both a competency check under §135.293 of this chapter and a 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 an authorized designated pilot examiner or FAA aviation safety inspector.

(g) Use of a flight simulator or flight training device for an airplane rating. If a flight simulator or flight training device is used for accomplishing all of the training and the required practical test for an airplane transport pilot certificate with an airplane category, class, and type rating, if applicable, the applicant, flight simulator, and flight training device are subject to the following requirements:

   (1) The flight simulator and flight training device must represent that airplane type if the rating involves a type rating in an airplane, or is representative of an airplane if the applicant is only seeking an airplane class
§ 61.157  

rating and does not require a type rating.  

(2) The flight simulator and flight training device must be used in accordance with an approved course at a training center certificated under part 142 of this chapter.  

(3) All training and testing (except preflight inspection) must be accomplished by the applicant to receive an airplane class rating and type rating, if applicable, without limitations and—  

(i) The flight simulator must be qualified and approved as Level C or Level D; and  

(ii) The applicant must meet the aeronautical experience requirements of § 61.159 of this part and at least one of the following—  

(A) Hold a type rating for a turbojet airplane of the same class of airplane for which the type rating is sought, or have been designated by a military service as a pilot in command of an airplane of the same class for which the type rating is sought, if a turbojet type rating is sought;  

(B) Hold a type rating for a turbopropeller airplane of the same class as the airplane for which the type rating is sought, or have been appointed by a military service as a pilot in command of an airplane of the same class for which the type rating is sought, if a turbopropeller airplane type rating is sought;  

(C) Have at least 2,000 hours of flight time, of which 500 hours must be in turbine-powered airplanes of the same class as the airplane for which the type rating is sought;  

(D) Have at least 500 hours of flight time in the same type of airplane as the airplane for which the type rating is sought; or  

(E) Have at least 1,000 hours of flight time in at least two different airplanes requiring a type rating.  

(4) Subject to the limitation of paragraph (g)(5) of this section, an applicant who does not meet the requirements of paragraph (g)(3) of this section may complete all training and testing (except for preflight inspection) for an additional rating if—  

(i) The flight simulator is qualified and approved as Level C or Level D; and  

(ii) The applicant meets the aeronautical experience requirements of § 61.159 of this part and at least one of the following—  

(A) Holds a type rating in a propeller-driven airplane if a type rating in a turbojet airplane is sought, or holds a type rating in a turbojet airplane if a type rating in a propeller-driven airplane is sought;  

(B) Since the beginning of the 12th calendar month before the month in which the applicant completes the practical test for the additional rating, has logged—  

(1) At least 100 hours of flight time in airplanes in the same class as the airplane for which the type rating is sought and which requires a type rating; and  

(2) At least 25 hours of flight time in airplanes of the same type for which the type rating is sought.  

(5) An applicant meeting only the requirements of paragraph (g)(4)(ii)(A) and (B) of this section will be issued an additional rating, or an airline transport pilot certificate with an added rating, as applicable, with a limitation. The limitation shall state: “This certificate is subject to pilot-in-command limitations for the additional rating.”  

(6) An applicant who has been issued a certificate with the limitation specified in paragraph (g)(5) of this section—  

(i) May not act as pilot in command of the aircraft for which an additional rating was obtained under the provisions of this section until the limitation is removed from the certificate; and  

(ii) May have the limitation removed by accomplishing 15 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in an airplane of the same type for which the limitation applies.  

(7) An applicant who does not meet the requirements of paragraph (g)(3)(ii)(A) through (E) or (g)(4)(ii)(A) and (B) of this section may be issued an airline transport pilot certificate or an additional rating to that pilot certificate after successful completion of one of the following requirements—
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(i) An approved course at a part 142 training center that includes all training and testing for that certificate or rating, followed by training and testing on the following tasks, which must be successfully completed on a static airplane or in flight, as appropriate—

(A) Preflight inspection;
(B) Normal takeoff;
(C) Normal ILS approach;
(D) Missed approach; and
(E) Normal landing.

(ii) An approved course at a part 142 training center that complies with paragraphs (g)(8) and (g)(9) of this section and includes all training and testing for a certificate or rating.

(8) An applicant meeting only the requirements of paragraph (g)(7)(ii) of this section will be issued an additional rating or an airline transport pilot certificate with an additional rating, as applicable, with a limitation. The limitation shall state: ‘‘This certificate is subject to pilot-in-command limitations for the additional rating.’’

(9) An applicant issued a pilot certificate with the limitation specified in paragraph (g)(8) of this section—

(i) May not act as pilot in command of the aircraft for which an additional rating was obtained under the provisions of this section until the limitation is removed from the certificate; and

(ii) May have the limitation removed by accomplishing 25 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in an airplane of the same type for which the limitation applies.

(b) Use of a flight simulator or flight training device for a helicopter rating. If a flight simulator or flight training device is used for accomplishing all of the training and the required practical test for an airline transport pilot certificate with a helicopter class rating and type rating, if applicable, the applicant, flight simulator, and flight training device are subject to the following requirements:

(1) The flight simulator and flight training device must represent that helicopter type if the rating involves a type rating in a helicopter, or is representative of a helicopter if the applicant is only seeking a helicopter class rating and does not require a type rating;

(2) The flight simulator and flight training device must be used in accordance with an approved course at a training center certificated under part 142 of this chapter.

(3) All training and testing requirements (except preflight inspection) must be accomplished by the applicant to receive a helicopter class rating and type rating, if applicable, without limitations and—

(i) The flight simulator must be qualified and approved as a Level C or Level D; and

(ii) The applicant must meet the aeronautical experience requirements of §61.161 of this part and at least one of the following—

(A) Hold a type rating for a turbine-powered helicopter, or have been designated by a military service as a pilot in command of a turbine-powered helicopter, if a turbine-powered helicopter type rating is sought;

(B) Have at least 1,200 hours of flight time, of which 500 hours must be in turbine-powered helicopters;

(C) Have at least 500 hours of flight time in the same type helicopter as the helicopter for which the type rating is sought; or

(D) Have at least 1,000 hours of flight time in at least two different helicopters requiring a type rating.

(4) Subject to the limitation of paragraph (h)(5) of this section, an applicant who does not meet the requirements of paragraph (h)(3) of this section may complete all training and testing (except for preflight inspection) for an additional rating if—

(i) The flight simulator is qualified and approved as Level C or Level D; and

(ii) The applicant meets the aeronautical experience requirements of §61.161 of this part and, since the beginning of the 12th calendar month before the month in which the applicant completes the practical test for the additional rating, has logged—

(A) At least 100 hours of flight time in helicopters; and
(B) At least 15 hours of flight time in helicopters of the same type of helicopter for which the type rating is sought.

(5) An applicant meeting only the requirements of paragraph (h)(4)(ii) (A) and (B) of this section will be issued an additional rating or an airline transport pilot certificate with a limitation. The limitation shall state: “This certificate is subject to pilot-in-command limitations for the additional rating.”

(6) An applicant who has been issued a certificate with the limitation specified in paragraph (h)(5) of this section—

(i) May not act as pilot in command of the helicopter for which an additional rating was obtained under the provisions of this section until the limitation is removed from the certificate; and

(ii) May have the limitation removed by accomplishing 15 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in a helicopter of the same type for which the limitation applies.

(7) An applicant who does not meet the requirements of paragraph (h)(3)(ii) (A) through (D), or (h)(4)(ii) (A) and (B) of this section may be issued an airline transport pilot certificate or an additional rating to that pilot certificate after successful completion of one of the following requirements—

(i) An approved course at a part 142 training center that includes all training and testing for that certificate or rating, followed by training and testing on the following tasks, which must be successfully completed on a static aircraft or in flight, as appropriate—

(A) Preflight inspection;

(B) Normal takeoff from a hover;

(C) Manually flown precision approach; and

(D) Steep approach and landing to an off-airport heliport; or

(ii) An approved course at a training center that includes all training and testing for that certificate or rating and compliance with paragraphs (h)(8) and (h)(9) of this section.

(8) An applicant meeting only the requirements of paragraph (h)(7)(ii) of this section will be issued an additional rating or an airline transport pilot certificate with an additional rating, as applicable, with a limitation. The limitation shall state: “This certificate is subject to pilot-in-command limitations for the additional rating.”

(9) An applicant issued a certificate with the limitation specified in paragraph (h)(8) of this section—

(i) May not act as pilot in command of the aircraft for which an additional rating was obtained under the provisions of this section until the limitation is removed from the certificate; and

(ii) May have the limitation removed by accomplishing 25 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in a aircraft of the same type for which the limitation applies.

(i) Use of a flight simulator or flight training device for a powered-lift rating. If a flight simulator or flight training device is used for accomplishing all of the training and the required practical test for an airline transport pilot certificate with a powered-lift category rating and type rating, if applicable, the applicant, flight simulator, and flight training device are subject to the following requirements:

(1) The flight simulator and flight training device must represent that powered-lift type, if the rating involves a type rating in a powered-lift, or is representative of a powered-lift if the applicant is only seeking a powered-lift category rating and does not require a type rating.

(2) The flight simulator and flight training device must be used in accordance with an approved course at a training center certificated under part 142 of this chapter.

(3) All training and testing requirements (except preflight inspection) must be accomplished by the applicant to receive a powered-lift category rating and type rating, if applicable, without limitations; and—

(i) The flight simulator must be qualified and approved as Level C or Level D; and

(ii) The applicant must meet the aeronautical experience requirements
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of §61.163 of this part and at least one of the following—

(A) Hold a type rating for a turbine-powered powered-lift, or have been designated by a military service as a pilot in command of a turbine-powered powered-lift, if a turbine-powered powered-lift type rating is sought;

(B) Have at least 1,200 hours of flight time, of which 500 hours must be in turbine-powered powered-lifts;

(C) Have at least 500 hours of flight time in the same type of powered-lift for which the type rating is sought; or

(D) Have at least 1,000 hours of flight time in at least two different powered-lifts requiring a type rating.

(5) Subject to the limitation of paragraph (i)(5) of this section, an applicant who does not meet the requirements of paragraph (i)(3) of this section may complete all training and testing (except for preflight inspection) for an additional rating if—

(i) The flight simulator is qualified and approved as Level C or Level D; and

(ii) The applicant meets the aeronautical experience requirements of §61.163 of this part, and, since the beginning of the 12th calendar month before the month in which the applicant completes the practical test for the additional rating, has logged—

(A) At least 100 hours of flight time in powered-lifts; and

(B) At least 15 hours of flight time in powered-lifts of the same type of powered-lift for which the type rating is sought.

(6) An applicant meeting only the requirements of paragraph (i)(4)(ii) (A) and (B) of this section will be issued an additional rating or an airline transport pilot certificate with a limitation. The limitation shall state: “This certificate is subject to pilot-in-command limitations for the additional rating.”

(7) An applicant who does not meet the requirements of paragraph (i)(3)(ii) (A) through (D) or (i)(4)(ii) (A) and (B) of this section may be issued an airline transport pilot certificate or an additional rating to that pilot certificate after successful completion of one of the following requirements—

(i) An approved course at a part 142 training center that includes all training and testing for that certificate or rating, followed by training and testing on the following tasks, which must be successfully completed on a static aircraft or in flight, as appropriate—

(A) Preflight inspection;

(B) Normal takeoff from a hover;

(C) Manually flown precision approach; and

(D) Steep approach and landing to an off-airport site; or

(ii) An approved course at a training center that includes all training and testing for that certificate or rating and is in compliance with paragraphs (i)(8) and (i)(9) of this section.

(8) An applicant meeting only the requirements of paragraph (i)(7)(ii) of this section will be issued an additional rating or an airline transport pilot certificate with an additional rating, as applicable, with a limitation. The limitation shall state: “This certificate is subject to pilot-in-command limitations for the additional rating.”

(9) An applicant issued a pilot certificate with the limitation specified in paragraph (i)(8) of this section—

(i) May not act as pilot in command of the aircraft for which an additional rating was obtained under the provisions of this section until the limitation is removed from the certificate; and

(ii) May have the limitation removed by accomplishing 25 hours of supervised operating experience as pilot in command under the supervision of a qualified and current pilot in command, in the seat normally occupied by the pilot in command, in a powered-lift of the same type for which the limitation applies.
(j) Waiver authority. Unless the Administrator requires certain or all tasks to be performed, the examiner who conducts the practical test for an airline transport pilot certificate may waive any of the tasks for which the Administrator approves waiver authority.

§ 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) 75 hours of instrument flight time, in actual or simulated instrument conditions, subject to the following:

(i) Except as provided in paragraph (a)(3)(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) 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.

(4) 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.

(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.

(d) An applicant may be issued an airline transport pilot certificate with
the endorsement. "Holder does not meet the pilot in command aeronautical experience requirements of ICAO," as prescribed by Article 39 of the Convention on International Civil Aviation, if the applicant:

(1) Credits second-in-command or flight-engineer time under paragraph (c) of this section toward the 1,500 hours total flight time requirement of paragraph (a) of this section;

(2) Does not have at least 1,200 hours of flight time as a pilot, including no more than 50 percent of his or her second-in-command time and none of his or her flight-engineer time; and

(3) Otherwise meets the requirements of paragraph (a) of this section.

(e) When the applicant specified in paragraph (d) of this section presents satisfactory evidence of the accumulation of 1,200 hours of flight time as a pilot including no more than 50 percent of his or her second-in-command flight time and none of his or her flight-engineer time, the applicant is entitled to an airline transport pilot certificate without the endorsement prescribed in that paragraph.

§ 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, 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.

§ 61.164 Aeronautical experience: Power-lift category rating.

(a) A person who is applying for an airline transport pilot certificate with a power-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 power-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.

(5) 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.

§ 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 §61.159 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)(4) 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) 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)(2) of this part.

(d) Powered-lift category. A person applying for an airline transport 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. A person applying for an airline transport certificate who holds an additional class rating who
§ 61.167 Privileges.

(a) A person who holds an airline transport pilot certificate is entitled to the same privileges as those afforded a person who holds a commercial pilot certificate with an instrument rating.

(b) An airline transport pilot may instruct—

(1) 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;

(2) In flight simulators, and flight training devices representing the aircraft referenced in paragraph (b)(1) 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;

(3) Only as provided in this section, unless the airline transport pilot also holds a flight instructor certificate, in which case the holder may exercise the instructor privileges of subpart H of part 61 for which he or she is rated; and

(4) In an aircraft, only if the aircraft has functioning dual controls, when instructing under the provisions of this section.

(c) Excluding briefings and debriefings, an airline transport pilot may not instruct in aircraft, flight simulators, and flight training devices under this section—

(1) For more than 8 hours in any 24-consecutive-hour period; or

(2) For more than 36 hours in any 7-consecutive-day period.

(d) 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.

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§ 61.183  (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 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) 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 certified 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, or 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
§ 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.

§ 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:
§ 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
§ 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 give training and endorsements that are required for, and relate to:

(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.

§ 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 flight training for the issuance of an instrument rating or a type rating not limited to VFR must hold an instrument rating on his or her flight instructor certificate and pilot certificate that is appropriate to the category and class of aircraft in which instrument training is being 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 certificate and 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 pre-solo 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 current ground or flight instructor certificate with the appropriate rating, has held that certificate for at least 24 months, and has given at least 40 hours of ground training; or

(ii) Holds a current 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 current 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.
§ 61.197 Renewal of flight instructor certificates.

(a) A person who holds a flight instructor certificate that has not expired may renew that 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) Presenting to an authorized FAA Flight Standards Inspector—

(i) A record of training students showing that, during the preceding 24 calendar months, the flight instructor has endorsed at least five 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; or

(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.

(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)(ii) 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]

§ 61.199 Expired flight instructor certificates and ratings.

(a) Flight instructor certificates. The holder of an expired flight instructor certificate may exchange that certificate for a new certificate with the same ratings by passing a practical test as prescribed in §61.183(h) of this part for one of the ratings listed on the expired flight instructor certificate.

(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.


§ 61.201 [Reserved]
§61.217 Recent experience requirements.

The holder of a ground instructor certificate may not perform the duties of a ground instructor unless, within the preceding 12 months:

(a) The person has served for at least 3 months as a ground instructor; or

(b) The person has received an endorsement from an authorized ground or flight instructor certifying that the person has demonstrated satisfactory proficiency in the subject areas prescribed in §61.213 (a)(3) and (a)(4), as applicable.

§ 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.
(7) Transition provisions for registered ultralight pilots.

(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.

§ 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 valid. If you hold a recreational pilot certificate, but not a medical certificate, you must comply with cross-country requirements in §61.301(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.

<table>
<thead>
<tr>
<th>If you hold</th>
<th>And you hold</th>
<th>Then you may operate</th>
<th>And</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) A medical certificate ..........</td>
<td>(i) A sport pilot certificate, ......</td>
<td>(A) Any light sport aircraft for which you hold the endorsements required for its category, class, make and model,</td>
<td>(f) You must hold any other endorsements required by this subpart, and comply with the limitations in §61.315.</td>
</tr>
<tr>
<td></td>
<td>(ii) At least a recreational pilot certificate with a category and class rating,</td>
<td>(A) Any light sport aircraft in that category and class,</td>
<td>(f) 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.</td>
</tr>
<tr>
<td></td>
<td>(iii) At least a recreational pilot certificate but not a rating for the category and class of light sport aircraft you operate,</td>
<td>(A) That light sport aircraft, only if you hold the endorsements required in §61.321 for its category and class,</td>
<td>(f) 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).</td>
</tr>
<tr>
<td>(2) Only a U.S. driver’s license</td>
<td>(i) A sport pilot certificate, ......</td>
<td>(A) Any light sport aircraft for which you hold the endorsements required for its category, class, make and model,</td>
<td>(f) You must hold any other endorsements required by this subpart, and comply with the limitations in §61.315.</td>
</tr>
<tr>
<td></td>
<td>(ii) At least a recreational pilot certificate with a category and class rating,</td>
<td>(A) Any light sport aircraft in that category and class,</td>
<td>(f) You do not have to hold any of the endorsements required by this subpart, but you must comply with the limitations in §61.315.</td>
</tr>
<tr>
<td></td>
<td>(iii) At least a recreational pilot certificate but not a rating for the category and class of light sport aircraft you operate,</td>
<td>(A) That light sport aircraft, only if you hold the endorsements required in §61.321 for its category and class,</td>
<td>(f) 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).</td>
</tr>
<tr>
<td>(3) Neither a medical certificate nor a U.S. driver’s license</td>
<td>(i) A sport pilot certificate, ......</td>
<td>(A) Only a light sport glider or balloon for which you hold the endorsements required for its category, class, make and model,</td>
<td>(f) You must hold any other endorsements required by this subpart, and comply with the limitations in §61.315.</td>
</tr>
<tr>
<td></td>
<td>(ii) At least a private pilot certificate with a category and class rating for glider or balloon,</td>
<td>(A) Only a light sport glider or balloon in that category and class,</td>
<td>(f) You do not have to hold any of the endorsements required by this subpart, but you must comply with the limitations in §61.315.</td>
</tr>
</tbody>
</table>
(b) A person using a current and valid 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.

§ 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?

Except as specified in §61.329, 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,
§ 61.311 What flight proficiency requirements must I meet to apply for a sport pilot certificate?

Except as specified in §61.329, 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.

§ 61.313 What aeronautical experience must I have to apply for a sport pilot certificate?

Except as specified in §61.329, use the following table to determine the aeronautical experience you must have to apply for a sport pilot certificate:

<table>
<thead>
<tr>
<th>If you are applying for a sport pilot certificate with . . .</th>
<th>Then you must log at least . . .</th>
<th>Which must include at least . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Airplane category and single-engine land or sea class privileges,</td>
<td>(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,</td>
<td>(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) 3 hours of flight training on those areas of operation specified in §61.311 preparing for the practical test within 60 days before the date of the test.</td>
</tr>
<tr>
<td>(b) Glider category privileges, and you have not logged at least 20 hours of flight time in a heavier-than-air aircraft,</td>
<td>(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,</td>
<td>(i) Five solo launches and landings, and (ii) 3 hours of flight training on those areas of operation specified in §61.311 preparing for the practical test within 60 days before the date of the test.</td>
</tr>
<tr>
<td>(c) Glider category privileges, and you have logged 20 hours flight time in a heavier-than-air aircraft,</td>
<td>(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,</td>
<td>(i) Three solo launches and landings, and (ii) 3 hours of flight training on those areas of operation specified in §61.311, preparing for the practical test within 60 days before the date of the test.</td>
</tr>
</tbody>
</table>
If you are applying for a sport pilot certificate with . . . Then you must log at least . . . Which must include at least . . .

<table>
<thead>
<tr>
<th>Class Privileges</th>
<th>Required Flight Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(d) Rotorcraft category and gyroplane class privileges,</td>
<td>(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,</td>
</tr>
<tr>
<td>(e) Lighter-than-air category and airship class privileges,</td>
<td>(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,</td>
</tr>
<tr>
<td>(f) Lighter-than-air category and balloon class privileges,</td>
<td>(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,</td>
</tr>
<tr>
<td>(g) Powered parachute category land or sea class privileges,</td>
<td>(1) 12 hours of flight time in a powered parachute, including 10 hours flight training and, and at least 2 hours solo flight training in the areas of operation listed in §61.311,</td>
</tr>
<tr>
<td>(h) Weight-shift-control aircraft category land or sea class privileges,</td>
<td>(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,</td>
</tr>
</tbody>
</table>
§ 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.
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.
12. When the flight or surface visibility is less than 3 statute miles.
13. Without visual reference to the surface.
14. If the aircraft has a \( V_{h} \) that exceeds 87 knots CAS, unless you have met the requirements of § 61.327.
15. Contrary to any operating limitation placed on the airworthiness certificate of the aircraft being flown.
16. Contrary to any limit or endorsement on your pilot certificate, 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.

§ 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, class, and make and model of aircraft in which you are authorized to act as pilot in command.

§ 61.319 Can I operate a make and model of aircraft other than the make and model aircraft for which I have received an endorsement?

If you hold a sport pilot certificate you may operate any make and model of light-sport aircraft in the same category and class and within the same set of aircraft as the make and model of aircraft for which you have received an endorsement.

§ 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 How do I obtain privileges to operate a make and model of light-sport aircraft in the same category and class within a different set of aircraft?

If you hold a sport pilot certificate and seek to operate a make and model of light-sport aircraft in the same category and class but within a different set of aircraft as the make and model of aircraft for which you have received an endorsement, you must—

(a) Receive and log ground and flight training from an authorized instructor in a make and model of light-sport aircraft that is within the same set of aircraft as the make and model of aircraft you intend to operate;

(b) Receive a logbook endorsement from the authorized instructor who provided you with the aircraft specific training specified in paragraph (a) of this section certifying you are proficient to operate the specific make and model of light-sport aircraft.

§61.325 How do I obtain privileges to operate a light-sport aircraft that has a $V_H$ greater than 87 knots CAS?

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—

(a) 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

(b) Receive a logbook endorsement from the authorized instructor who provided the training specified in paragraph (a) of this section certifying that you are proficient in the operation of light-sport aircraft with a $V_H$ greater than 87 knots CAS.

§61.327 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, or in other airspace with 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.

§61.329 Are there special provisions for obtaining a sport pilot certificate for persons who are registered ultralight pilots with an FAA-recognized ultralight organization?

(a) If you are a registered ultralight pilot with an FAA-recognized ultralight organization use the following table to determine how to obtain a sport pilot certificate.

<table>
<thead>
<tr>
<th>If you are . . .</th>
<th>Then you must . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) A registered ultralight pilot with an FAA-recognized ultralight organization on or before September 1, 2004, and you want to apply for a sport pilot certificate</td>
<td>(i) Not later than January 31, 2007—</td>
</tr>
</tbody>
</table>
If you are . . . Then you must . . .

(A) Meet the eligibility requirements in §§ 61.305 and 61.23, but not the aeronautical knowledge requirements specified in § 61.309, the flight proficiency requirements specified in § 61.311, and the aeronautical experience requirements specified in § 61.313.

(B) Pass the knowledge test for a sport pilot certificate specified in § 61.307 or the knowledge test for a flight instructor certificate with a sport pilot rating specified in § 61.405.

(C) Pass the practical test for a sport pilot certificate specified in § 61.307.

(D) Provide the FAA with a certified copy of your ultralight pilot records from an FAA-recognized ultralight organization, and those records must

1. Document that you are a registered ultralight pilot with that FAA-recognized ultralight organization, and
2. Indicate that you are recognized to operate each category and class of aircraft for which you seek sport pilot privileges.

(b) When you successfully pass the practical test for a sport pilot certificate, 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, class, and make and model of aircraft in which you have successfully passed the practical test and for which you are authorized to act as pilot in command. If you meet the provisions of paragraph (a)(1) of this section, the FAA will provide you with a logbook endorsement for each category, class, and make and model of aircraft listed on the ultralight pilot records you provide to the FAA.

Subpart K—Flight Instructors With a Sport Pilot Rating


§ 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.
6. Transition provisions for registered ultralight flight instructors.

(b) Other provisions of this part apply to the logging of flight time and testing.

§ 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 current and valid sport pilot certificate with category
§ 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 current teacher’s certificate issued by a State, county, city, or municipality; or

(3) Are employed as a teacher at an accredited college or university.
§ 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:

<table>
<thead>
<tr>
<th>If you are applying for a flight instructor certificate with a sport pilot rating for . . .</th>
<th>Then you must log at least . . .</th>
<th>Which must include at least . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Airplane category and single-engine class privileges,</td>
<td>(1) 150 hours of flight time as a pilot,</td>
<td>(i) 100 hours of flight time as pilot in command in powered aircraft,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) 50 hours of flight time in a single-engine airplane,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) 25 hours of cross-country flight time,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iv) 10 hours of cross-country flight time in a single-engine airplane, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(v) 15 hours of flight time as pilot in command in a single-engine airplane that is a light-sport aircraft.</td>
</tr>
<tr>
<td>(b) Glider category privileges,</td>
<td>(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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(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.</td>
<td></td>
</tr>
<tr>
<td>(c) Rotorcraft category and gyroplane class privileges,</td>
<td>(1) 125 hours of flight time as a pilot,</td>
<td>(i) 100 hours of flight time as pilot in command in powered aircraft,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) 50 hours of flight time in a gyroplane,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) 10 hours of cross-country flight time,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iv) 3 hours of cross-country flight time in a gyroplane, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(v) 15 hours of flight time as pilot in command in a gyroplane that is a light-sport aircraft.</td>
</tr>
<tr>
<td>(d) Lighter-than-air category and airship class privileges,</td>
<td>(1) 100 hours of flight time as a pilot,</td>
<td>(i) 40 hours of flight time in an airship,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) 20 hours of pilot in command time in an airship,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) 10 hours of cross-country flight time,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iv) 5 hours of cross-country flight time in an airship, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(v) 15 hours of flight time as pilot in command in an airship that is a light-sport aircraft.</td>
</tr>
<tr>
<td>(e) Lighter-than-air category and balloon class privileges,</td>
<td>(1) 35 hours of flight time as pilot-in-command,</td>
<td>(i) 20 hours of flight time in a balloon,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) 10 flights in a balloon, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) 5 flights as pilot in command in a balloon that is a light-sport aircraft.</td>
</tr>
</tbody>
</table>
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 . . .

(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,

(ii) 50 hours of flight time in a weight-shift-control aircraft,

(iii) 25 hours of cross-country flight time,

(iv) 10 hours of cross-country flight time in a weight-shift-control aircraft, and

(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,

(ii) 50 hours of flight time in a powered parachute,

(iii) 15 hours of cross-country flight time,

(iv) 5 hours of cross-country flight time in a powered parachute, and

(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 flight instructor certificate with a sport pilot rating, you are authorized, within the limits of your certificate and rating, to provide training and logbook endorsements for—

(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, class, or make and model privilege for a sport pilot certificate or a flight instructor certificate with a sport pilot rating.

§ 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 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 and make and model 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—

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§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) An additional make and model of light-sport aircraft;
      (C) 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; 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—
      (A) Category or class of light-sport aircraft; and
      (B) Make and model 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.

§ 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 current and valid 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:
§ 61.431 Are there special provisions for obtaining a flight instructor certificate with a sport pilot rating for persons who are registered ultralight flight instructors with an FAA-recognized ultralight organization?

If you are a registered ultralight instructor with an FAA-recognized ultralight organization on or before September 1, 2004, and you want to apply for a flight instructor certificate with a sport pilot rating, not later than January 31, 2008—

(a) You must hold either a current and valid sport pilot certificate, a current recreational pilot certificate, and meet the requirements § 61.101(c), or at least a current and valid private pilot certificate issued under this part.

(b) You must meet the eligibility requirements in §§ 61.403 and 61.23. You do not have to meet the aeronautical knowledge requirements specified in § 61.407, the flight proficiency requirements specified in § 61.409, and the aeronautical experience requirements specified in § 61.411, except you must meet the minimum total flight time requirements in the category and class of light-sport aircraft specified in § 61.411.

(c) You do not have to meet the aeronautical knowledge requirement specified in § 61.407(a) if you have passed an FAA-recognized ultralight organization’s fundamentals of instruction knowledge test.

(d) You must submit a certified copy of your ultralight pilot records from the FAA-recognized ultralight organization. Those records must—

(1) Document that you are a registered ultralight flight instructor with that FAA-recognized ultralight organization; and

(2) Indicate that you are recognized to operate and provide training in the category and class of aircraft for which you seek privileges.

(e) You must pass the knowledge test and practical test for a flight instructor certificate with a sport pilot rating applicable to the aircraft category and class for which you seek flight instructor privileges.

PART 63—CERTIFICATION: FLIGHT CREWMEMBERS OTHER THAN PILOTS

§ 63.2 Certification of foreign flight crewmembers other than pilots.
Subpart B—Flight Engineers

63.31 Eligibility requirements; general.
63.33 Aircraft ratings.
63.35 Knowledge requirements.
63.37 Aeronautical experience requirements.
63.39 Skill requirements.
63.41 Retesting after failure.
63.42 Flight engineer certificate issued on
basis of a foreign flight engineer license.
63.43 Flight engineer courses.

Subpart C—Flight Navigators

63.51 Eligibility requirements; general.
63.53 Knowledge requirements.
63.55 Experience requirements.
63.57 Skill requirements.
63.59 Retesting after failure.
63.61 Flight navigator courses.

APPENDIX A TO PART 63—TEST REQUIREMENTS
FOR FLIGHT NAVIGATOR CERTIFICATE

APPENDIX B TO PART 63—FLIGHT ENGINEER TRAINING COURSE REQUIREMENTS

APPENDIX C TO PART 63—FLIGHT ENGINEER TRAINING COURSE REQUIREMENTS

AUTHORITY: 49 U.S.C. 106(g), 40113, 44701–
44703, 44707, 44709–44711, 45102–45103, 45301–
45302.

SPECIAL FEDERAL AVIATION REGULATION NO. 93

EDITORIAL NOTE: For the text of SFAR No.
93, see part 61 of this chapter.

SPECIAL FEDERAL AVIATION REGULATION No. 100–1

EDITORIAL NOTE: For the text of SFAR No.
100–1, see part 61 of this chapter.

EFFECTIVE DATE NOTE: By Doc. No. FAA–
2005–15431, 70 FR 37948, June 30, 2005, SFAR
No. 100–1 was added, effective June 30, 2005
through June 20, 2010.

Subpart A—General

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 cer-
tificates.

§ 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) out-
side the United States only when the
Administrator finds that the certifi-
cate 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
483(a)); sec. 28, International Air Transporta-
tion Competition Act of 1979 (49 U.S.C.
1159(b)))

[Doc. No. 22052, 47 FR 35693, Aug. 18, 1982]

§ 63.3 Certificates and ratings re-
quired.

(a) No person may act as a flight en-
gineer of a civil aircraft of U.S. reg-
istry unless he has in his personal pos-
session a current flight engineer cer-
tificate 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 air-
craft is operated, with evidence of cur-
rent medical qualification for that cer-
tificate, may be used. Also, in the case
of a flight engineer certificate issued
under §63.42, evidence of current med-
ical qualification accepted for the issue
of that certificate is used in place of a
medical certificate.

(b) No person may act as a flight nav-
ginator of a civil aircraft of U.S. reg-
istry unless he has in his personal pos-
session a current flight navigator cer-
tificate 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 air-
craft is operated, with evidence of cur-
rent medical qualification for that cer-
tificate, may be used. Also, in the case
of a flight navigator certificate issued
under §63.42, evidence of current med-
ical qualification accepted for the issue
of that certificate is used in place of a
medical certificate.

[Doc. No. 22052, 47 FR 35693, Aug. 18, 1982]
§ 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.

§ 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.

§ 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.

§ 63.12b Refusal to submit to a drug or alcohol test.

(a) This section applies to an individual who holds a certificate under this part and is subject to the types of testing required under appendix I to part 121 or appendix J to part 121 of this chapter.
§ 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 Services.
§ 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.

§ 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
§ 63.23 Special purpose flight engineer and flight navigator certificates:

(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
§ 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.


§ 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.

§ 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:
§ 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
§ 63.53 Knowledge requirements.

(a) An applicant for a flight navigator certificate, a person must—

(1) Be at least 21 years of age;

(2) Be able to read, write, speak, and understand the English language;

(3) 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

(4) 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 fundamentals of meteorology;

(2) The fundamentals of weather analysis and forecasting;

(3) The fundamentals of aviation navigation;

(4) The fundamentals of aircraft performance;

(5) The fundamentals of aircraft construction and operation;

(6) The fundamentals of flight characteristics and performance of the aircraft to be flown.

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(a) An applicant for a flight navigator certificate must pass a written test on—

(1) The fundamentals of meteorology;

(2) The fundamentals of weather analysis and forecasting;

(3) The fundamentals of aviation navigation;

(4) The fundamentals of aircraft performance;

(5) The fundamentals of aircraft construction and operation;

(6) The fundamentals of flight characteristics and performance of the aircraft to be flown.

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(1) The fundamentals of meteorology;

(2) The fundamentals of weather analysis and forecasting;

(3) The fundamentals of aviation navigation;

(4) The fundamentals of aircraft performance;

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(6) The fundamentals of flight characteristics and performance of the aircraft to be flown.

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(2) The fundamentals of weather analysis and forecasting;

(3) The fundamentals of aviation navigation;

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(a) An applicant for a flight navigator certificate must pass a written test on—

(1) The fundamentals of meteorology;

(2) The fundamentals of weather analysis and forecasting;

(3) The fundamentals of aviation navigation;

(4) The fundamentals of aircraft performance;

(5) The fundamentals of aircraft construction and operation;

(6) The fundamentals of flight characteristics and performance of the aircraft to be flown.
§ 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.

§ 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.
§ 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 alternates.

(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 girocompass (when available), with special emphasis on the cabling 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 heading line 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 35 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 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. (1) 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:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Classroom hours</th>
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<tbody>
<tr>
<td>Federal Aviation Administration</td>
<td>5</td>
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<tr>
<td>To include Parts 63, 91, and 121 of this chapter.</td>
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<tr>
<td>Meteorology</td>
<td>40</td>
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<tr>
<td>To include:</td>
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<td>Basic weather principles.</td>
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<td>Temperature.</td>
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<td>Pressure.</td>
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<td>Winds.</td>
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<td>Moisture in the atmosphere.</td>
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<td>Stability.</td>
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<td>Clouds.</td>
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<td>Hazards.</td>
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<td>Air masses.</td>
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<td>Front weather.</td>
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<td>Fog.</td>
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<td>Thunderstorms.</td>
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<td>Icing.</td>
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<td>World weather and climate.</td>
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<td>Weather maps and weather reports.</td>
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<td>Forecasting.</td>
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<td>International Morse code:</td>
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<td>Ability to receive code groups of letters and numerals at a speed of eight words per minute</td>
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<td>Navigation instruments (exclusive of radio and radar)</td>
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<td>To include:</td>
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<td>Compasses.</td>
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<td>Pressure altimeters.</td>
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<td>Airspeed indicators.</td>
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<td>Driftmeters.</td>
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<td>Bearing indicators.</td>
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<td>Aircraft octants.</td>
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<td>Instrument calibration and alignment.</td>
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<tr>
<td>Charts and pilotage</td>
<td>15</td>
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<tr>
<td>To include:</td>
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<td>Chart projections.</td>
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<tr>
<td>Chart symbols.</td>
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<tr>
<td>Principles of pilotage.</td>
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<tr>
<td>Dead reckoning</td>
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<td>To include:</td>
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<td>Air plot.</td>
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<td>Ground plot.</td>
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<td>Calculation of ETA.</td>
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<td>Vector analysis.</td>
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<td>Use of computer.</td>
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<td>Search.</td>
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<td>Absolute altimeter with:</td>
<td>15</td>
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<tr>
<td>Applications</td>
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<td>To include:</td>
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<tr>
<td>Principles of construction.</td>
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<tr>
<td>Operating instructions.</td>
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<tr>
<td>Use of Bellamy’s formula.</td>
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<tr>
<td>Flight planning with single drift correction.</td>
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<tr>
<td>Radio and long-range navigational aids</td>
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</table>

(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 instances, the approved course operator is responsible for the nature and quality of instruction given during flight.

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 (1) 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 certified 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.

(1) 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.

(i) 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.

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. (1) 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.

(1) All of the flight training must be given in the same type airplane.

to the Administrator through the local Flight Standards District Office.

(i) 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 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.


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.
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(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:
- Flight engineer on the type of airplane to be flown, the duties and responsibilities of a flight engineer including normal duties, procedures, and operations.
- Analyze the students, the flight engineer training device, and the student's flight training device or instructor simulators, for any exigencies of instruction as described in paragraph (d) of this appendix.
- 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.

**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:
- Analyze abnormalities or non-ideal operation of the systems of the airplane in which the student is to receive his flight training.
- Use of oxygen.
- Land gear, spoilers, speed brakes, and flap extension and retraction.
- Engine shut-down and restart.
- Engine operation analysis.
- Engine starting, power checks, pretakeoff, postlanding and shut-down procedures.
- Power control.
- Temperature control.
- Operation of all systems.
- Fuel management.
- Logbook entries.
- Pressurization and air conditioning.
- Smoke control.
- Engine fire control.
- Fuselage fire control.
- Engine overspeed.
- Loss of power or pressure in each system.
- Fuel dumping.
- 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 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.
(c) 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 others to obtain suitable airplanes, airplane simulators, or other training devices or equipment.
(2) An operator who has approval 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.

(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 qualification 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 the 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 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.

(i) Notwithstanding paragraphs (1) and (2) of this section, approval of a ground or flight course may be continued when the Administrator finds—

(1) That the failure rate was based on less than a representative number of students; or

(2) That the course operator has taken satisfactory means to improve the effectiveness of the training.

(2) 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 dates of the training, the type of airplane used in the flight course, 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.

(1) 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.

(l) 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.
(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.

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65.115 Senior parachute rigger certificate: Experience, knowledge, and skill requirements.
65.117 Military riggers or former military riggers: Special certification rule.
65.119 Master parachute rigger certificate: Experience, knowledge, and skill requirements.
65.121 Type ratings.
65.123 Additional type ratings: Requirements.
65.125 Certificates: Privileges.
65.127 Facilities and equipment.
65.129 Performance standards.
65.131 Records.
65.133 Seal.

APPENDIX A TO PART 65—AIRCRAFT DISPATCHER COURSES


SOURCE: Docket No. 1179, 27 FR 7973, Aug. 10, 1962, unless otherwise noted.

SPECIAL FEDERAL AVIATION REGULATION NO. 100–1

EDITORIAL NOTE: For the text of SFAR No. 100–1, 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. Your statement that you have not been involved in an operational error, operational deviation or runway incursion in the last 5 years while working a control position;
      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
§ 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) An applicant who meets the requirements of this part is entitled to an appropriate certificate and rating.
§ 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.

§ 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.


§ 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.


§ 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 certified.
§ 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—
§ 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. 10193, 35 FR 12326, Aug. 1, 1970, unless otherwise noted.]

Subpart B—Air Traffic Control Tower Operators

§ 65.31 Required certificates, and rating or qualification.

No person may act as an air traffic control tower operator at an air traffic control tower in connection with civil aircraft unless he—

(a) Holds an air traffic control tower operator certificate issued to him under this subpart;

(b) Holds a facility rating for that control tower issued to him under this subpart, or has qualified for the operating position at which he acts and is under the supervision of the holder of a facility rating for that control tower; and

For the purpose of this subpart, operating position means an air traffic control function performed within or directly associated with the control tower;

(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.

§ 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.


§ 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.


§ 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.

§ 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 Rating privileges and exchange.

(a) The holder of a senior rating on August 31, 1970, may at any time after that date exchange his rating for a facility rating at the same air traffic control tower. However, if he does not do so before August 31, 1971, he may not thereafter exercise the privileges of his senior rating at the control tower concerned until he makes the exchange.

(b) The holder of a junior rating on August 31, 1970, may not control air traffic, at any operating position at the control tower concerned, until he has met the applicable requirements of §65.37 of this part. However, before meeting those requirements he may control air traffic under the supervision of an operator holding a senior rating, or facility rating, in effect before August 31, 1970.

§ 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.


§ 65.46 Use of prohibited drugs.

(a) The following definitions apply for the purposes of this section:

(1) An employee is a person who performs an air traffic control function for an employer. For the purpose of this section, a person who performs such a function pursuant to a contract with an employer is considered to be performing that function for the employer.

(2) An “employer” means an air traffic control facility not operated by the FAA or by or under contract to the U.S. military that employs a person to perform an air traffic control function.

(b) Each employer shall provide each employee performing a function listed in appendix I to part 121 of this chapter and his or her supervisor with the training specified in that appendix. No employer may use any contractor to perform an air traffic control function unless that contractor provides each of its employees performing that function for the employer and his or her supervisor with the training specified in that appendix.

(c) No employer may knowingly use any person to perform, nor may any person perform for an employer, either directly or by contract, any air traffic control function while that person has a prohibited drug, as defined in appendix I to part 121 of this chapter, in his or her system.

(d) No employer shall knowingly use any person to perform, nor may any person perform for an employer, either directly or by contract, any air traffic control function if the person has a verified positive drug test result on or has refused to submit to a drug test required by appendix I to part 121 of this chapter and the person has not met the requirements of appendix I to part 121 of this chapter for returning to the performance of safety-sensitive duties.

(e) Each employer shall test each of its employees who performs any air traffic control function in accordance
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with appendix I to part 121 of this chapter. No employer may use any contractor to perform any air traffic control function unless that contractor tests each employee performing such a function for the employer in accordance with that appendix.


§ 65.46a Misuse of alcohol.

(a) This section applies to employees who perform air traffic control duties directly or by contract for an employer that is an air traffic control facility not operated by the FAA or the U.S. military (covered employees).

(b) Alcohol concentration. No covered employee shall report for duty or remain on duty requiring the performance of safety-sensitive functions while having an alcohol concentration of 0.04 or greater. No employer having actual knowledge that an employee has an alcohol concentration of 0.04 or greater shall permit the employee to perform or continue to perform safety-sensitive functions.

(c) On-duty use. No covered employee shall use alcohol while performing safety-sensitive functions. No employer having actual knowledge that a covered employee is using alcohol while performing safety-sensitive functions shall permit the employee to perform or continue to perform safety-sensitive functions.

(d) Pre-duty use. No covered employee shall perform air traffic control duties within 8 hours after using alcohol. No employer having actual knowledge that such an employee has used alcohol within 8 hours shall permit the employee to perform or continue to perform air traffic control duties.

(e) Use following an accident. No covered employee who has actual knowledge of an accident involving an aircraft for which he or she performed a safety-sensitive function at or near the time of the accident shall use alcohol for 8 hours following the accident, unless he or she has been given a post-accident test under appendix J to part 121 of this chapter, or the employer has determined that the employee’s performance could not have contributed to the accident.

(f) Refusal to submit to a required alcohol test. A covered employee may not refuse to submit to any alcohol test required under appendix J to part 121 of this chapter. An employer may not permit an employee who refuses to submit to such a test to perform or continue to perform safety-sensitive functions.


§ 65.46b Testing for alcohol.

(a) Each air traffic control facility not operated by the FAA or the U.S. military (hereinafter employer) must establish an alcohol misuse prevention program in accordance with the provisions of appendix J to part 121 of this chapter.

(b) No employer shall use any person who meets the definition of covered employee in appendix J to part 121 to perform a safety-sensitive function listed in that appendix unless such person is subject to testing for alcohol misuse in accordance with the provisions of appendix J.


§ 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.
§ 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

§ 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—
   (i) Pilot;
   (ii) Flight navigator; or
   (iii) Meteorologist.

(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,
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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 gradua-

§ 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.

§ 65.71 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.

§ 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.


§ 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.


§ 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 Certified 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 §§ 65.82, 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.

§ 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 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.

§ 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.

§ 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.

§ 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;
§ 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.

(4) The holder of an inspection authorization that is suspended or revoked shall, upon the Administrator's request, return it to the Administrator.


§ 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.
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.


§ 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.


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
§ 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 performing work under that certificate.

§ 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

(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.

§ 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.

§ 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:

<table>
<thead>
<tr>
<th>To be eligible for</th>
<th>You must</th>
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<tr>
<td>(1) A repairman certificate (light-sport aircraft).</td>
<td>(i) Be at least 18 years old, (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, (iii) Demonstrate the requisite skill to determine whether a light-sport aircraft is in a condition for safe operation, and</td>
</tr>
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</table>

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.


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§ 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 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—

(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

(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—

(i) Meet the requirements of paragraph (a)(1) of this section, and

(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.

(i) Meet the requirements of paragraph (a)(1) of this section, and

(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:

(A) For airplane class privileges—120 hours,

(B) For weight-shift control aircraft class privileges—104 hours,

(C) For powered parachute class privileges—104 hours,

(D) For lighter than air class privileges—80 hours,

(E) For glider class privileges—80 hours.

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

To be eligible for

You must

(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

(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

(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:

(A) For airplane class privileges—120 hours,

(B) For weight-shift control aircraft class privileges—104 hours,

(C) For powered parachute class privileges—104 hours,

(D) For lighter than air class privileges—80 hours,

(E) For glider class privileges—80 hours.
§ 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.

§ 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;
§ 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.


§ 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. 10468, 37 FR 13252, 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.
§ 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.

§ 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.

§ 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;

II. Meteorology

A. Basic Weather Studies
(1) The earth’s motion and its effects on weather.

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(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.
(e) 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.

(5) Wind:
(a) Major Wind Systems and Coriolis Force.
(b) Jetstreams and their Characteristics.
(c) Local Wind and Related Terms.

(6) States of Matter:
(a) Solids, Liquid, and Gases.
(b) Causes of change of state.
(c) Clouds:
    (a) Composition, Formation, and Dissipation.
    (b) Types and Associated Precipitation.
(c) Use of Cloud Knowledge in Forecasting.
(d) Fog:
    (a) Causes, Formation, and Dissipation.
    (b) Types.
    (i) 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.
(b) 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) Sigmet, Airmet.
(iv) Center Weather Advisories.
(d) Weather Imagery.

U.S. Department of Transportation, Federal Aviation Administration, Pt. 65, App. A.
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.
      (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.
      (2) Tradeoffs and Prioritization.
      (3) Contingency Planning.
      (4) Support Tools and Technologies.
      (5) 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 on 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.
      2. En route charts.
      3. Operational altitude.
      4. Departure and arrival charts.
      5. 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.
      (l) Flight plan.
      (ii) Dispatch release.
      (3) Authorize flight departure with concurrence of pilot in command.
      (4) In-flight operational control:
         (a) Current situational awareness.
PART 67—MEDICAL STANDARDS AND CERTIFICATION

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.

Except as provided in § 67.5, 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.

§ 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.

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(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.

§ 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 dipters of exophoria, or 6 prism dipters 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):

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>500 Hz</th>
<th>1000 Hz</th>
<th>2000 Hz</th>
<th>3000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better ear (Db)</td>
<td>35</td>
<td>30</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Poorer ear (Db)</td>
<td>35</td>
<td>50</td>
<td>50</td>
<td>60</td>
</tr>
</tbody>
</table>

(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 arylocyclohexylamines; 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; or

(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 and 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.


§ 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 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
§ 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.

(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.
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.

§ 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:

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>500 Hz</th>
<th>1000 Hz</th>
<th>2000 Hz</th>
<th>3000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better ear (Db)</td>
<td>35</td>
<td>30</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Poorer ear (Db)</td>
<td>35</td>
<td>50</td>
<td>50</td>
<td>60</td>
</tr>
</tbody>
</table>

(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.


§ 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.

§ 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

§ 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.
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 test 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.

(j) No grant of a special issuance made prior to September 16, 1996, may be used to obtain a medical certificate after the earlier of the following dates:
(1) September 16, 1997; or
(2) The date on which the holder of such special issuance is required to provide additional information to the FAA as a condition for continued medical certification.

 §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.

§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 a medical certificate or an 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 medical certificates and ratings held by that person; and
(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 give.

(a) First-class. Any aviation medical examiner who is specifically designated for the purpose may give the examination for the first-class medical certificate. Any interested person may obtain a list of these aviation medical examiners, in any area, from the FAA Regional Flight Surgeon of the region in which the area is located.

(b) Second- and third-class. Any aviation medical examiner may give the examination for the second- or third-class medical certificate. Any interested person may obtain a list of aviation medical examiners, in any area, from the FAA Regional Flight Surgeon of the region in which the area is located.
§ 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 Medical certificates by flight surgeons of Armed Forces.

(a) The FAA has designated flight surgeons of the Armed Forces on specified military posts, stations, and facilities, as aviation medical examiners.

(b) An aviation medical examiner described in paragraph (a) of this section may give physical examinations for the FAA medical certificates to persons who are on active duty or who are, under Department of Defense medical programs, eligible for FAA medical certification as civil airmen. In addition, such an examiner may issue or
deny an appropriate FAA medical certificate in accordance with the regulations of this chapter and the policies of the FAA.

(c) Any interested person may obtain a list of the military posts, stations, and facilities at which a flight surgeon has been designated as an aviation medical examiner from the Surgeon General of the Armed Force concerned or from the Manager, Aeromedical Education Division, AAM–400, Federal Aviation Administration, P.O. Box 26082, Oklahoma City, Oklahoma 73125.

§ 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.