

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

FSTD Directive 2: Applicable to all airplane Full Flight Simulators (FFS), regardless of the original qualification basis and qualification date (original or upgrade), used to conduct full stall training, upset recovery training, airborne icing training, and other flight training tasks as described in this Directive.

Agency: Federal Aviation Administration (FAA), DOT.

Action: This is a retroactive requirement for any FSTD being used to obtain training, testing, or checking credit in an FAA approved flight training program for the specific training maneuvers as defined in this Directive.

Summary: Notwithstanding the authorization listed in paragraph 13b in Appendix A of this Part, this FSTD Directive requires that each FSTD sponsor conduct additional subjective and objective testing, conduct required modifications, and apply for additional FSTD qualification under § 60.16 to support continued qualification of the following flight training tasks where training, testing, or checking credit is being sought in a selected FSTD being used in an FAA approved flight training program:

- a. Recognition of and Recovery from a Full Stall
- b. Upset Prevention and Recovery
- c. Engine and Airframe Icing
- d. Takeoff and Landing with Gusting Crosswinds
- e. Recovery from a Bounced Landing

The FSTD sponsor may elect to apply for additional qualification for any, all, or none of the above defined training tasks for a particular FSTD. After March 12, 2019, any FSTD used to conduct the above training tasks must be evaluated and issued additional qualification by the National Simulator Program Manager (NSPM) as defined in this Directive.

Dates: FSTD Directive No. 2 becomes effective on May 31, 2016.

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Specific Requirements

1. Part 60 requires that each FSTD be:
 - a. Sponsored by a person holding or applying for an FAA operating certificate under Part 119, Part 141, or Part 142, or holding or applying for an FAA-approved training program under Part 63, Appendix C, for flight engineers, and
 - b. Evaluated and issued a Statement of Qualification (SOQ) for a specific FSTD level.
2. The evaluation criteria contained in this Directive is intended to address specific training tasks that require additional evaluation to ensure adequate FSTD fidelity.

3. The requirements described in this Directive define additional qualification criteria for specific training tasks that are applicable only to those FSTDs that will be utilized to obtain training, testing, or checking credit in an FAA approved flight training program. In order to obtain additional qualification for the tasks described in this Directive, FSTD sponsors must request additional qualification in accordance with § 60.16 and the requirements of this Directive. FSTDs that are found to meet the requirements of this Directive will have their Statement of Qualification (SOQ) amended to reflect the additional training tasks that the FSTD has been qualified to conduct. The additional qualification requirements as defined in this Directive are divided into the following training tasks:
 - a. Section I – Additional Qualification Requirements for Full Stall Training Tasks
 - b. Section II – Additional Qualification Requirements for Upset Prevention and Recovery Training Tasks
 - c. Section III – Additional Qualification Requirements for Engine and Airframe Icing Training Tasks
 - d. Section IV – Additional Qualification Requirements for Takeoff and Landing in Gusting Crosswinds
 - e. Section V – Additional Qualification Requirements for Bounced Landing Recovery Training Tasks
4. A copy of this Directive (along with all required Statements of Compliance and objective test results) must be filed in the MQTG in the designated FSTD Directive Section, and its inclusion must be annotated on the Index of Effective FSTD Directives chart. See Attachment 4, Appendix A for a sample MQTG Index of Effective FSTD Directives chart.

SECTION I – EVALUATION REQUIREMENTS FOR FULL STALL TRAINING TASKS

1. This section applies to previously qualified Level C and Level D FSTDs being used to obtain credit for stall training maneuvers beyond the first indication of a stall (such as stall warning system activation, stick shaker, etc.) in an FAA approved training program.
2. The evaluation requirements in this Directive are intended to validate FSTD fidelity at angles of attack sufficient to identify the stall, to demonstrate aircraft performance degradation in the stall, and to demonstrate recovery techniques from a fully stalled flight condition.
3. After March 12, 2019, any FSTD being used to obtain credit for full stall training maneuvers in an FAA approved training program must be evaluated and issued additional qualification in accordance with this Directive and the following sections of Appendix A of this Part:
 - a. Table A1A, General Requirements, Section 2.m. (High Angle of Attack Modeling)
 - b. Table A1A, General Requirements, Section 3.f. (Stick Pusher System) [where applicable]
 - c. Table A2A, Objective Testing Requirements, Test 2.a.10 (Stick Pusher Force Calibration) [where applicable]
 - d. Table A2A, Objective Testing Requirements, Test 2.c.8.a (Stall Characteristics)
 - e. Table A2A, Objective Testing Requirements, Test 3.f.5 (Characteristic Motion Vibrations – Stall Buffet) [See paragraph 4 of this section for applicability on previously qualified FSTDs]
 - f. Table A3A, Functions and Subjective Testing Requirements, Test 5.b.1.b. (High Angle of Attack Maneuvers)
 - g. Attachment 7, Additional Simulator Qualification Requirements for Stall, Upset Prevention and Recovery, and Engine and Airframe Icing Training Tasks (High Angle of Attack Model Evaluation)
4. For FSTDs initially qualified before May 31, 2016, including FSTDs that are initially qualified under the grace period conditions as defined in § 60.15(c):
 - a. Objective testing for stall characteristics (Table A2A, test 2.c.8.a.) will only be required for the (wings level) second segment climb and approach or landing flight conditions. In lieu of objective testing for the high altitude cruise and turning flight stall conditions, these maneuvers may be subjectively evaluated by a qualified subject matter expert (SME) pilot and addressed in the required statement of compliance.
 - b. Where existing flight test validation data in the FSTD’s Master Qualification Test Guide (MQTG) is missing required parameters or is otherwise unsuitable to fully meet the objective testing requirements of this Directive, the FAA may accept alternate sources of validation, including subjective validation by an SME pilot with direct experience in the stall characteristics of the aircraft.
 - c. Objective testing for characteristic motion vibrations (Stall buffet – Table A2A, test 3.f.5) is not required where the FSTD’s stall buffets have been subjectively evaluated by an SME pilot. For previously qualified Level D FSTDs that currently have objective stall buffet tests in their approved MQTG, the results of these existing tests must be provided to the FAA with the updated stall and stall buffet models in place.

- d. As described in Attachment 7 of this Appendix, the FAA may accept a statement of compliance from the data provider which confirms the stall characteristics have been subjectively evaluated by an SME pilot on an engineering simulator or development simulator that is acceptable to the FAA. Where this evaluation takes place on an engineering or development simulator, additional objective “proof-of-match” testing for all flight conditions as described in tests 2.c.8.a. and 3.f.5. will be required to verify the implementation of the stall model and stall buffets on the training FSTD.
5. Where qualification is being sought to conduct full stall training tasks in accordance with this Directive, the FSTD Sponsor must conduct the required evaluations and modifications as prescribed in this Directive and report compliance to the NSPM in accordance with § 60.23 using the NSP’s standardized FSTD Sponsor Notification Form. At a minimum, this form must be accompanied with the following information:
 - a. A description of any modifications to the FSTD (in accordance with § 60.23) necessary to meet the requirements of this Directive.
 - b. Statements of Compliance (High Angle of Attack Modeling/Stick Pusher System) – See Table A1A, Section 2.m., 3.f., and Attachment 7
 - c. Statement of Compliance (SME Pilot Evaluation) – See Table A1A, Section 2.m. and Attachment 7
 - d. Copies of the required objective test results as described above in sections 3.c., 3.d., and 3.e.
6. The NSPM will review each submission to determine if the requirements of this Directive have been met and respond to the FSTD Sponsor as described in § 60.23(c). Additional NSPM conducted FSTD evaluations may be required before the modified FSTD is placed into service. This response, along with any noted restrictions, will serve as interim qualification for full stall training tasks until such time that a permanent change is made to the Statement of Qualification (SOQ) at the FSTD’s next scheduled evaluation.

SECTION II – EVALUATION REQUIREMENTS FOR UPSET PREVENTION AND RECOVERY TRAINING TASKS

1. This section applies to previously qualified FSTDs being used to obtain training, testing, or checking credits for upset prevention and recovery training tasks (UPRT) as defined in Appendix A, Table A1A, Section 2.n. of this part. Additionally, FSTDs being used for unusual attitude training maneuvers that are intended to exceed the parameters of an aircraft upset must also be evaluated and qualified for UPRT under this section. These parameters include pitch attitudes greater than 25 degrees nose up; pitch attitudes greater than 10 degrees nose down, and bank angles greater than 45 degrees.
2. The requirements contained in this section are intended to define minimum standards for evaluating an FSTD for use in upset prevention and recovery training maneuvers that may exceed an aircraft's normal flight envelope. These standards include the evaluation of qualified training maneuvers against the FSTD's validation envelope and providing the instructor with minimum feedback tools for the purpose of determining if a training maneuver is conducted within FSTD validation limits and the aircraft's operating limits.
3. This Directive contains additional subjective testing that exceeds the evaluation requirements of previously qualified FSTDs. Where aerodynamic modeling data or validation data is not available or insufficient to meet the requirements of this Directive, the NSPM may limit additional qualification to certain upset prevention and recovery maneuvers where adequate data exists.
4. After March 12, 2019, any FSTD being used to obtain training, testing, or checking credit for upset prevention and recovery training tasks in an FAA approved flight training program must be evaluated and issued additional qualification in accordance with this Directive and the following sections of Appendix A of this part:
 - a. Table A1A, General Requirements, Section 2.n. (Upset Prevention and Recovery)
 - b. Table A3A, Functions and Subjective Testing, Test 5.b.3. (Upset Prevention and Recovery Maneuvers)
 - c. Attachment 7, Additional Simulator Qualification Requirements for Stall, Upset Prevention and Recovery, and Engine and Airframe Icing Training Tasks (Upset Prevention and Recovery Training Maneuver Evaluation)
5. Where qualification is being sought to conduct upset prevention and recovery training tasks in accordance with this Directive, the FSTD Sponsor must conduct the required evaluations and modifications as prescribed in this Directive and report compliance to the NSPM in accordance with § 60.23 using the NSP's standardized FSTD Sponsor Notification Form. At a minimum, this form must be accompanied with the following information:
 - a. A description of any modifications to the FSTD (in accordance with § 60.23) necessary to meet the requirements of this Directive.
 - b. Statement of Compliance (FSTD Validation Envelope) – See Table A1A, Section 2.n. and Attachment 7
 - c. A confirmation statement that the modified FSTD has been subjectively evaluated by a qualified pilot as described in § 60.16(a)(1)(iii).

6. The NSPM will review each submission to determine if the requirements of this Directive have been met and respond to the FSTD Sponsor as described in § 60.23(c). Additional NSPM conducted FSTD evaluations may be required before the modified FSTD is placed into service. This response, along with any noted restrictions, will serve as an interim qualification for upset prevention and recovery training tasks until such time that a permanent change is made to the Statement of Qualification (SOQ) at the FSTD's next scheduled evaluation.

SECTION III – EVALUATION REQUIREMENTS FOR ENGINE AND AIRFRAME ICING TRAINING TASKS

1. This section applies to previously qualified Level C and Level D FSTDs being used to obtain training, testing, or checking credits in maneuvers that demonstrate the effects of engine and airframe ice accretion.
2. The requirements in this section are intended to supersede and improve upon existing Level C and Level D FSTD evaluation requirements on the effects of engine and airframe icing. The requirements define a minimum level of fidelity required to adequately simulate the aircraft specific aerodynamic characteristics of an in-flight encounter with engine and airframe ice accretion as necessary to accomplish training objectives.
3. This Directive contains additional subjective testing that exceeds the evaluation requirements of previously qualified FSTDs. Where aerodynamic modeling data is not available or insufficient to meet the requirements of this Directive, the NSPM may limit qualified engine and airframe icing maneuvers where sufficient aerodynamic modeling data exists.
4. After March 12, 2019, any FSTD being used to conduct training tasks that demonstrate the effects of engine and airframe icing must be evaluated and issued additional qualification in accordance with this Directive and the following sections of Appendix A of this part:
 - a. Table A1A, General Requirements, Section 2.j. (Engine and Airframe Icing)
 - b. Attachment 7, Additional Simulator Qualification Requirements for Stall, Upset Prevention and Recovery, and Engine and Airframe Icing Training Tasks (Engine and Airframe Icing Evaluation; Paragraphs 1, 2, and 3). Objective demonstration tests of engine and airframe icing effects (Attachment 2, Table A2A, test 2.i. of this Appendix) are not required for previously qualified FSTDs.
5. Where continued qualification is being sought to conduct engine and airframe icing training tasks in accordance with this Directive, the FSTD Sponsor must conduct the required evaluations and modifications as prescribed in this Directive and report compliance to the NSPM in accordance with § 60.23 using the NSP's standardized FSTD Sponsor Notification Form. At a minimum, this form must be accompanied with the following information:
 - a. A description of any modifications to the FSTD (in accordance with § 60.23) necessary to meet the requirements of this Directive;
 - b. Statement of Compliance (Ice Accretion Model) – See Table A1A, Section 2.j., and Attachment 7; and
 - c. A confirmation statement that the modified FSTD has been subjectively evaluated by a qualified pilot as described in § 60.16(a)(1)(iii).
6. The NSPM will review each submission to determine if the requirements of this Directive have been met and respond to the FSTD Sponsor as described in § 60.23(c). Additional NSPM conducted FSTD evaluations may be required before the modified FSTD is placed into service. This response, along with any noted restrictions, will serve as an interim update to the FSTD's Statement of Qualification (SOQ) until such time that a permanent change is made to the SOQ at the FSTD's next scheduled evaluation.

SECTION IV –EVALUATION REQUIREMENTS FOR TAKEOFF AND LANDING IN GUSTING CROSSWIND

1. This section applies to previously qualified FSTDs that will be used to obtain training, testing, or checking credits in takeoff and landing tasks in gusting crosswinds as part of an FAA approved training program. The requirements of this Directive are applicable only to those Level B and higher FSTDs that are qualified to conduct takeoff and landing training tasks.
2. The requirements in this section introduce new minimum simulator requirements for gusting crosswinds during takeoff and landing training tasks as well as additional subjective testing that exceeds the evaluation requirements of previously qualified FSTDs.
3. After March 12, 2019, any FSTD that is used to conduct gusting crosswind takeoff and landing training tasks must be evaluated and issued additional qualification in accordance with this Directive and the following sections of Appendix A of this part:
 - a. Table A1A, General Requirements, Section 2.d.3. (Ground Handling Characteristics);
 - b. Table A3A, Functions and Subjective Testing Requirements, test 3.a.3 (Takeoff, Crosswind – Maximum Demonstrated and Gusting Crosswind); and
 - c. Table A3A, Functions and Subjective Testing Requirements, test 8.d. (Approach and landing with crosswind – Maximum Demonstrated and Gusting Crosswind).
4. Where qualification is being sought to conduct gusting crosswind training tasks in accordance with this Directive, the FSTD Sponsor must conduct the required evaluations and modifications as prescribed in this Directive and report compliance to the NSPM in accordance with § 60.23 using the NSP’s standardized FSTD Sponsor Notification Form. At a minimum, this form must be accompanied with the following information:
 - a. A description of any modifications to the FSTD (in accordance with § 60.23) necessary to meet the requirements of this Directive.
 - b. Statement of Compliance (Gusting Crosswind Profiles) – See Table A1A, Section 2.d.3.
 - c. A confirmation statement that the modified FSTD has been subjectively evaluated by a qualified pilot as described in § 60.16(a)(1)(iii).
5. The NSPM will review each submission to determine if the requirements of this Directive have been met and respond to the FSTD Sponsor as described in § 60.23(c). Additional NSPM conducted FSTD evaluations may be required before the modified FSTD is placed into service. This response, along with any noted restrictions, will serve as an interim qualification for gusting crosswind training tasks until such time that a permanent change is made to the Statement of Qualification (SOQ) at the FSTD’s next scheduled evaluation.

SECTION V –EVALUATION REQUIREMENTS FOR BOUNCED LANDING RECOVERY TRAINING TASKS

1. This section applies to previously qualified FSTDs that will be used to obtain training, testing, or checking credits in bounced landing recovery as part of an FAA approved training program. The requirements of this Directive are applicable only to those Level B and higher FSTDs that are qualified to conduct takeoff and landing training tasks.
2. The evaluation requirements in this section are intended to introduce new evaluation requirements for bounced landing recovery training tasks and contains additional subjective testing that exceeds the evaluation requirements of previously qualified FSTDs.
3. After March 12, 2019, any FSTD that is used to conduct bounced landing training tasks must be evaluated and issued additional qualification in accordance with this Directive and the following sections of Appendix A of this Part:
 - a. Table A1A, General Requirements, Section 2.d.2. (Ground Reaction Characteristics)
 - b. Table A3A, Functions and Subjective Testing Requirements, test 9.e. (Missed Approach – Bounced Landing)
4. Where qualification is being sought to conduct bounced landing training tasks in accordance with this Directive, the FSTD Sponsor must conduct the required evaluations and modifications as prescribed in this Directive and report compliance to the NSPM in accordance with § 60.23 using the NSP's standardized FSTD Sponsor Notification Form. At a minimum, this form must be accompanied with the following information:
 - a. A description of any modifications to the FSTD (in accordance with § 60.23) necessary to meet the requirements of this Directive; and
 - b. A confirmation statement that the modified FSTD has been subjectively evaluated by a qualified pilot as described in § 60.16(a)(1)(iii).
5. The NSPM will review each submission to determine if the requirements of this Directive have been met and respond to the FSTD Sponsor as described in § 60.23(c). Additional NSPM conducted FSTD evaluations may be required before the modified FSTD is placed into service. This response, along with any noted restrictions, will serve as an interim qualification for bounced landing recovery training tasks until such time that a permanent change is made to the Statement of Qualification (SOQ) at the FSTD's next scheduled evaluation.