

**Index of Effective FSTD Directives
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**APPENDIX D TO PART 60—QUALIFICATION
PERFORMANCE STANDARDS FOR HELI-
COPTER 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.

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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
- (10) Advisory Circular (AC) 120-28C, Criteria for Approval of Category III Landing Weather Minima.
- (11) AC 120-29, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
- (12) AC 120-35B, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.
- (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 150/5340-1G, 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 150/5340-24, Runway and Taxiway Edge Lighting System.
- (21) AC 150/5345-28D, Precision Approach Path Indicator (PAPI) Systems.
- (22) International Air Transport Association document, "Flight Simulator Design and Performance Data Requirements," as amended.
- (23) AC 29-2B, Flight Test Guide for Certification of Transport Category Rotorcraft.

(24) AC 27-1A, Flight Test Guide for Certification of Normal Category Rotorcraft.

(25) International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, as amended.

(26) Airplane Flight Simulator Evaluation Handbook, Volume I, as amended and Volume II, as amended, The Royal Aeronautical Society, London, UK.

(27) FAA Publication FAA-S-8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).

(28) The FAA Aeronautical Information Manual (AIM). An electronic version of the AIM is on the internet at <http://www.faa.gov/atpubs>.

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 person who are not sponsors and who are engaged in certain unauthorized activities.

3. DEFINITIONS (§60.3)

BEGIN INFORMATION

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

END INFORMATION

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)

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

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 helicopter simulated during the 12-month period described. The identification of the specific FTD may change from one 12-month period to the next 12-month period as long as that sponsor sponsors and uses at least one FTD at least once during the prescribed period. There is no minimum number of hours or minimum FTD periods required.

b. The following examples describe acceptable operational practices:

(1) Example One.

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

(i) If the FTD was qualified prior to 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.

(2) Example Two.

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

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

OR

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

OR

(iii) Provided a statement each year from a qualified pilot, (after having flown the heli-

copter not the subject FTD or another FTD, during the preceding 12-month period) stating that the subject FTD's performance and handling qualities represent the helicopter (as described in §60.7(d)(2)). This statement is provided at least once in each 12-month period established in the same manner as in example one.

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

(3) Example Three.

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

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

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

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

OR

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

END INFORMATION

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. FTD USE (§60.11)

There is no additional regulatory or informational material that applies to §60.11, FTD 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 helicopter configuration, including weight and center of gravity.
 - (v) The data to be gathered.
 - (vi) All other information necessary to recreate the flight test conditions in the FTD.
- (2) Appropriately qualified flight test personnel.
- (3) 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 D2F.
- (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 D2A 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 helicopter systems related data is available if this data is used to program and operate a qualified FTD. The data referred to in this sub-section 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

BEGIN INFORMATION

e. The FTD sponsor is encouraged to maintain a liaison with the manufacturer of the aircraft being simulated (or with the holder of the aircraft type certificate for the aircraft being simulated if the manufacturer is no longer in business), and if appropriate, with the person having supplied the aircraft data package for the FTD in order to facilitate the notification described in this paragraph.

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, 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 snap shot is taken. The time period most frequently used is 5 seconds prior through 2 seconds following the instant of time captured by the snap shot. This paragraph is primarily addressing the source data and the method by which the data provider ensures that the steady state condition for the snap shot 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 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.

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

(1) Parameters, tolerances, and flight conditions;

(2) Pertinent and complete instructions for conducting automatic and manual tests;

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

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

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

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

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 4, Figure D4C, for a sample QTG cover page).

(2) A continuing qualification evaluation requirements page. This page will be used by the NSPM to establish and record the frequency with which continuing qualification evaluations must be conducted and any subsequent changes that may be determined by

the NSPM in accordance with §60.19. See Attachment 4, Figure D4G, for a sample Continuing Qualification Evaluation Requirements page.

(3) An FTD information page that provides the information listed in this paragraph, if applicable (see Attachment 4, Figure D4B, 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 visual system model and manufacturer, including display type.

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

(4) A Table of Contents.

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

(6) List of all relevant data references.

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

(8) Statements of compliance and capability (SOCs) with certain requirements. 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.

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

(10) 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 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 identifications.

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

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in Attachment 2, Table D2A of this appendix.

(5) Tests involving time histories, data sheets (or transparencies thereof) and FTD test results must be clearly marked with appropriate reference points to ensure an accurate comparison between FTD and helicopter with respect to time. Time histories recorded via a line printer are to be clearly identified for cross-plotting on the helicopter data. Over-plots 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, 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 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 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 regard-

ing 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.

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-qualifica-

tion under the standards in effect and current at the time of requalification.

END INFORMATION

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

BEGIN QPS REQUIREMENT

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

b. The description of the functional 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 and control sweeps.

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 ($\frac{1}{3}$) 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 ($\frac{2}{3}$) 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

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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

**ATTACHMENT 1 TO APPENDIX D TO PART 60—
GENERAL FTD REQUIREMENTS**

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS

a. Certain requirements included in this appendix must be supported with 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 D1A of this appendix.

b. Table D1A describes the requirements for the indicated level of FTD. Many devices include operational systems or functions that exceed the requirements outlined in this section. In any event, all systems will be tested and evaluated in accordance with this appendix to ensure proper operation.

END QPS REQUIREMENTS

BEGIN INFORMATION

2. DISCUSSION

a. This attachment describes the general requirements for qualifying Level 4 through Level 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

<<<QPS requirements >>>					<<Information>> Notes
No.	General FTD requirements	FTD Level			
		4	5	6	

1. General Cockpit Configuration

TABLE D1A—MINIMUM FTD REQUIREMENTS

<<<QPS requirements >>>					<<Information>> Notes
No.	General FTD requirements	FTD Level			
		4	5	6	
1.a	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 "eye position" for specific helicopters, or to approximate such a position for a generic set of helicopters.			X	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.
2.b	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.	X	X		
3.c	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.		X	X	

4. Programming

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

<<<QPS requirements >>>				<<Information>> Notes		
No.	General FTD requirements	FTD Level				
		4	5			6
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.		X	X		
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.	X	X	X		
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.	X	X	X		
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 out put 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 QTG. Additionally, if a visual system is installed and training, testing, or checking credit 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.	X	X		

5. Equipment Operation

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

<<<QPS requirements >>>					<<Information>> Notes
No.	General FTD requirements	FTD Level			
		4	5	6	
5.a	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.		X	X	
5.b	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.		X	X	
5.c	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.	X	X	X	
5.d	The lighting environment for panels and instruments must be sufficient for the operation being conducted.	X	X	X	
5.e	The FTD must provide control forces and control travel that correspond to the replicated helicopter or set of helicopters. Control forces must react in the same manner as in the helicopter or set of helicopters under the same flight conditions.			X	
5.f	The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach. The control forces must react in the same manner as in the helicopter or set of helicopters under the same flight conditions.		X		
6. Instructor or Evaluator Facilities					
6.a	In addition to the flight crewmember stations, suitable seating arrangements for an instructor/check airman and FAA Inspector must be available. These seats must provide adequate view of crewmember's panel(s).	X	X	X	These seats need not be a replica of an aircraft seat and may be as simple as an office chair placed in an appropriate position.
6.b	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.	X	X	X	

TABLE D1A—MINIMUM FTD REQUIREMENTS—Continued

<<<QPS requirements >>>		<<Information>> Notes		
No.	General FTD requirements	FTD Level		
		4	5	6
7. Motion System				
7.a	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.	X	X	X
8. Visual System				
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 through-put must not exceed 300 milliseconds. A statement of capability is required. A demonstration of latency or through-put 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 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 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 effect 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.

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1. 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 $\pm 10\%$ 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 D2A—FLIGHT TRAINING DEVICE (FTD) OBJECTIVE TESTS

<<< QPS Requirements >>>		Test	Tolerances	Flight conditions	Test details	FTD Level		<< Information >>
No.	Title					5	6	
1. Performance								
1.a Engine Assessment								
1.a.1	Start Operations	Engine start and acceleration (transient).	Light Off Time— $\pm 10\%$ or ± 1 sec. Torque— $\pm 5\%$ Rotor Speed— $\pm 3\%$ Fuel Flow— $\pm 10\%$ Gas Generator Speed— $\pm 5\%$ Power Turbine Speed— $\pm 5\%$ Gas Turbine Temp.— $\pm 30^\circ\text{C}$.	Ground with the Rotor Brake Used and Not Used.	Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM.	X		
1.a.1.a								
1.a.1.b	Steady State Idle and Operating RPM conditions.		Torque— $\pm 3\%$ Rotor Speed— $\pm 1.5\%$ Fuel Flow— $\pm 5\%$ Gas Generator Speed— $\pm 2\%$ Power Turbine Speed— $\pm 2\%$ Turbine Gas Temp.— $\pm 20^\circ\text{C}$. $\pm 10\%$ of total change of power turbine speed.	Ground	Record both steady state idle and operating RPM conditions. May be a series of snapshot tests.	X		
1.a.2	Power Turbine Speed Trim			Ground	Record engine response to trim system actuation in both directions.	X		
1.a.3	Engine and Rotor Speed Governing.		Torque— $\pm 5\%$ Rotor Speed— $\pm 1.5\%$	1) Climb 2) Descent	Record results using a step input to the collective. May be conducted concurrently with climb and descent performance tests.	X		
1.b. In Flight								
	Performance and Trimmed Flight Control Positions.		Torque— $\pm 3\%$ Pitch Attitude— $\pm 1.5^\circ$ Sideslip Angle— $\pm 2^\circ$ Longitudinal Control Position— $\pm 5\%$ Lateral Control Position— $\pm 5\%$ Directional Control Position— $\pm 5\%$ Collective Control Position— $\pm 5\%$.	Cruise (Augmentation On and Off).	Record results for two gross weight CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests.	X		
1.c. Climb								

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

<<< QPS Requirements >>>>		<< Information >>	
Test		FTD Level	
No.	Title	5	6
	Performance and Trimmed Flight Control Positions.		
1.d Descent			
1.d.1	Descent Performance and Trimmed Flight Control Positions.	Record results for two gross weight and CG combinations. The data presented must be for normal climb power conditions. May be a series of snapshot tests.	X
1.d.2	Aut rotation Performance and Trimmed Flight Control Positions.	Record results for two gross weight and CG combinations. May be a series of snapshot tests.	X
1.e. Autorotation			

Entry	Rotor Speed— $\pm 3\%$ Pitch Attitude— $\pm 2^\circ$ Roll Attitude— $\pm 3^\circ$ Yaw Attitude— $\pm 5^\circ$ Airspeed— ± 5 kts. Vertical Velocity— ± 200 fpm (1.00 m/sec) or 10%.	1) Cruise; or 2) Climb	Record results of a rapid throttle reduction to idle. If accomplished in cruise, results must be for the maximum range airspeed. If accomplished in climb, results must be for the maximum rate of climb airspeed at or near maximum continuous power.	X	
2. Handling Qualities.					
2.a.	Start [here] Contro 1 System Mechanical Characteristics.				
2.a.1.	Cyclic	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	
2.a.2.	Collective and Pedals	Ground; Static conditions. Trim On and Off. Friction Off Augmentation and On and Off.	Record results for an uninterrupted control sweep to the stops.	X	
2.a.3.	Brake Pedal Force vs. Position.	Ground; Static conditions.	The tolerance applies to the recorded value of the trim rate.	X	
2.a.4.	Trim System Rate (all applicable systems).	Ground; Static conditions. Trim On Friction Off.	Results must be recorded for a normal control displacement in both directions in each axis (approximately 255 to 50% of full throw).	X	
2.a.5.	Control Dynamics (all axes)	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 a full cycle of oscillation.	X	
2.a.6.	Freeplay	Ground; Static conditions	Record and compare results for all controls.	X	
2.b. Longitudinal Handling Qualities.					

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

<<< OPS Requirements >>>>		Test		Tolerances	Flight conditions	Test details	FTD Level		<< Information >>
No.	Title	5	6				Notes		
2.b.1	Control Response	Pitch Rate— $\pm 10\%$ or ± 2 /sec. Pitch Attitude Change— $\pm 10\%$ or $\pm 1.5^\circ$.	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			
2.b.2	Static Stability	Longitudinal Control Position: $\pm 10\%$ of change from trim or ± 0.25 in. (6.3 mm) or Longitudinal Control Force: ± 0.5 lb. (0.223 daN) or $\pm 10\%$.	Cruise or Climb, Autorotation, Augmentation On and Off.	Record results for a minimum of two speeds on each side of the trim speed. May be a series of snapshot tests.	X	X			
2.b.3	Dynamic Stability								
2.b.3.a	Long Term Response	$\pm 10\%$ of calculated period, $\pm 10\%$ of time to $\frac{1}{2}$ or double amplitude, or ± 0.02 of damping ratio.	Cruise Augmentation On and Off.	Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to $\frac{1}{2}$ double or amplitude, whichever is less. For non-periodic responses, the time history must be matched.	X	X			
2.b.3.b	Short Term Response	$\pm 1.5^\circ$ Pitch or ± 2 /sec. Pitch Rate. ± 0.1 g Normal Acceleration.	Cruise or Climb, Augmentation On and Off.	Record results for at least two airspeeds.		X			
2.b.4	Maneuvering Stability	Longitudinal Control Position— $\pm 10\%$ of change from trim or ± 0.25 in. (6.3mm) or Longitudinal Control Forces— ± 0.5 lb. (0.223 daN) or $\pm 10\%$.	Cruise or Climb, Augmentation On and Off.	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.		X			
2.b.5	Landing Gear Operating Times	± 1 sec	Takeoff (Retraction) Approach (Extension).			X			

2.c. Lateral and Directional Handling Qualities.			
2.c.1	Control Response	Roll Rate— $\pm 10\%$ or $\pm 3^\circ/\text{sec}$. Roll Attitude Change— $\pm 10\%$ or $\pm 3^\circ$.	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.
2.c.1.a	Lateral		X
2.c.1.b	(b) Directional	Yaw Rate— $\pm 10\%$ or $\pm 2^\circ/\text{sec}$. Yaw Attitude Change— $\pm 10\%$ or $\pm 2^\circ$.	X
2.c.2	Directional Static Stability	Lateral Control Position— $\pm 10\%$ of change from trim or ± 0.25 in. (6.3mm) or Lateral Control Force— ± 0.5 lb. (0.223 daN) or 10%. Roll Attitude— $\pm 1.5^\circ$. Directional Control Position— $\pm 10\%$ of change from trim or ± 0.25 in. (6.3mm) or Directional Control Force— ± 1 lb. (0.448 daN) or 10%. Longitudinal Control Position— $\pm 10\%$ of change from trim or ± 0.25 in. (6.3mm). Vertical Velocity— ± 100 fpm (0.50m/sec) or 10%.	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.
2.c.3	Dynamic Lateral and Directional Stability	Cruise Augmentation On and Off.	X
		Cruise Augmentation On and Off.	X
		1) Cruise; or 2) Climb (may use Descent instead of Climb if Augmentation On and Off.	X
			This is a steady heading sideslip test.

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

<<< QPS Requirements >>>		Test		Tolerances	Flight conditions	Test details	FTD Level		<< Information >>
No.	Title	5	6				Notes		
2.c.3.a.	Lateral-Directional Oscillations ..	± 0.5 sec. or $\pm 10\%$ of period, $\pm 10\%$ of time to $1/2$ or double amplitude or ± 0.02 of damping ratio, $\pm 20\%$ or ± 1 sec of time difference between peaks of bank and sideslip.	Cruise or Climb. Augmentation On/Off.	Record results for at least two airspeeds. The test must be initiated with a cyclic or a pedal doublet input. Record results for six full cycles (12 overshoots after input completed) or that sufficient to determine time to $1/2$ or double amplitude, whichever is less. For non-periodic response, the time history must be matched.	X	X			
2.c.3.b.	Spiral Stability	Correct Trend, ± 2 bank or $\pm 10\%$ in 20 sec.	Cruise or Climb. Augmentation On and Off.	Record the results of a release from pedal only or cyclic only turns. Results must be recorded from turns in both directions.	X	X			
2.c.3.c.	Adverse/Proverse Yaw	Correct Trend, ± 2 transient sideslip angle.	Cruise or Climb. Augmentation On and Off.	Record the time history of initial entry into cyclic only turns, using only a moderate rate for cyclic input. Results must be recorded for turns in both directions.	X	X			

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

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 systems is essential. Control feel dynamic tests are described in the Table of Objective Tests in this appendix. Where accomplished, the free response is measured after a step or pulse input is used to excite the system.

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 interpretation of the measurements and the tolerances to be applied. Criteria are needed for both the underdamped system and the overdamped system, including the critically damped case. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or overdamped systems, the frequency and damping is not readily measured from a response time history. Therefore, some other measurement must be used.

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 described below for the underdamped 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

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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)

T(P₀) $\pm 10\%$ of P₀

T(P₁) $\pm 20\%$ of P₁

T(A) $\pm 10\%$ of A₁, $\pm 20\%$ of Subsequent Peaks

T(A_d) $\pm 10\%$ of A_d = Residual Band

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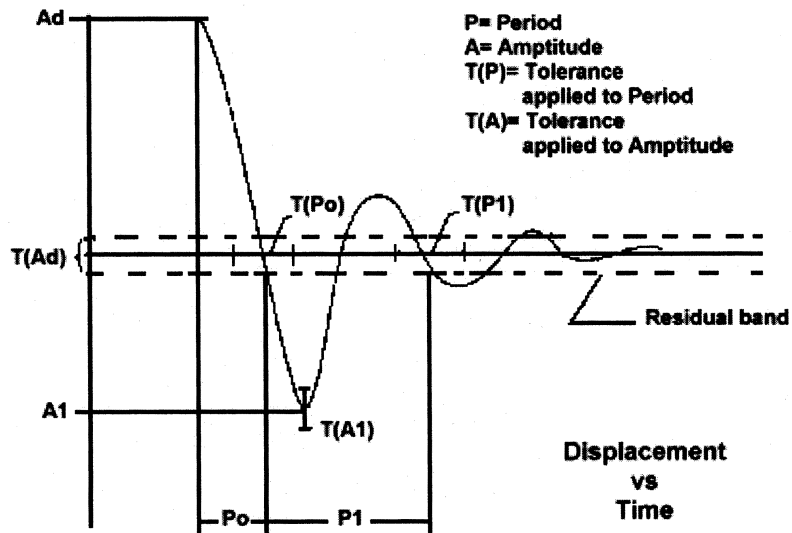
Overshoots ± 1

(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:

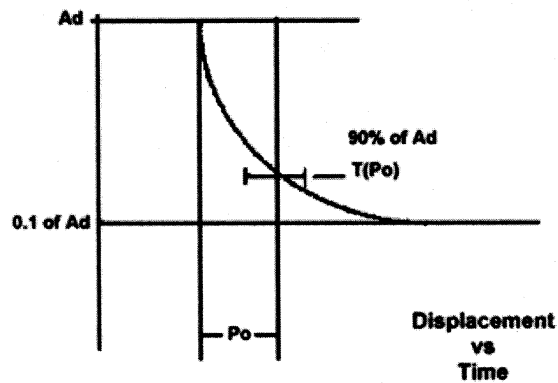
T(P_n) $\pm 10\%(n+1)\%$ of P_n, where "n" is the next in sequence.

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

Normal, abnormal, and emergency operations associated with a flight phase will be assessed during the evaluation of maneuvers or events within that flight phase.

1. DISCUSSION

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.

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.

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.

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.

END INFORMATION

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

<<< QPS Requirements >>>	
No.	Operations tasks
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 6 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.	
1. Preflight Procedures	
1.a	Preflight Inspection (Cockpit Only) switches, indicators, systems, and equipment.
1.b	APU/Engine start and run-up.
1.b.1	Normal start procedures.
1.b.2	Alternate start procedures.
1.b.3	Abnormal starts and shutdowns.
1.b.4	Rotor engagement.
1.b.5	System checks.
2. Takeoff and Departure Phase	
2.a	instrument
2.b	Takeoff with engine failure after critical decision point (CDP).
3. Climb	
3.a	Normal.
3.b	One engine inoperative.
4. Inflight Maneuvers	
4.	Performance.
4.b	Flying qualities.
4.c	Turns.
4.c.1	Timed.
4.c.2	Normal.
4.c.3	Steep.
4.d	Accelerations and decelerations.
4.e	Abnormal/emergency procedures.

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

<<< QPS Requirements >>>	
No.	Operations tasks
4.e.1	Engine fire.
4.e.2	Engine failure.
4.e.3	In-flight engine shutdown (and restart, if applicable).
4.e.4	Fuel governing system failures (e.g., FADEC malfunction).
4.e.5	Directional control malfunction (restricted to the extent that the maneuver may not terminate in a landing).
4.e.6	Hydraulic failure.
4.e.7	Stability augmentation system failure.
5. Instrument Procedures	
5.a	Holding.
5.b	Precision Instrument Approach.
5.b.1	All engines operating.
5.b.2	One or more engines inoperative.
5.b.3	Approach procedures:
5.b.4	PAR.
5.b.5	ILS.
5.b.6	Manual (raw data).
5.b.7	Flight director only.
5.b.8	Autopilot* and flight director (if appropriate) coupled.
5.c	Non-precision Instrument Approach.
5.c	Normal—All engines operating.
5.c	One or more engines inoperative.
5.c	Approach procedures:
5.c.1	NDB.
5.c.2	VOR, RNAV, TACAN, GPS.
5.c.3	ASR.
5.c.4	Helicopter only.
5.d	Missed Approach.
5.d.1	All engines operating.
5.d.2	One or more engines inoperative.
5.d.3	Stability augmentation system failure.
6. Normal and Abnormal Procedures (any phase of flight)	
6.a	Helicopter and powerplant systems operation (as applicable).
6.a.1	Anti-icing/deicing systems.
6.a.2	Auxiliary power-plant.
6.a.3	Communications.
6.a.4	Electrical system.
6.a.5	Environmental system.
6.a.6	Fire detection and suppression.
6.a.7	Flight control system.
6.a.8	Fuel system.
6.a.9	Engine oil system.
6.a.10	Hydraulic system.
6.a.11	Landing gear.
6.a.12	Oxygen.
6.a.13	Pneumatic.
6.a.14	Powerplant.
6.a.15	Flight control computers.
6.a.16	Stability augmentation and control augmentation system(s).
6.b	Flight management and guidance system (as applicable).
6.b.1	Airborne radar.
6.b.2	Automatic landing aids.
6.b.3	Autopilot*.
6.b.4	Collision avoidance system.
6.b.5	Flight data displays.
6.b.6	Flight management computers.
6.b.7	Navigation systems.
7. Postflight Procedures	
7.a	Parking and Securing.
7.b	Engine and systems operation.
7.c	Parking brake operation.
7.d	Rotor brake operation.
7.e	Abnormal/emergency procedures.
8. Instructor Operating Station (IOS), as appropriate	

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

<<< QPS Requirements >>>	
No.	Operations tasks
8.a	Power Switch(es).
8.b.1	Helicopter conditions.
8.b.2	Gross weight, center of gravity, fuel loading and allocation, etc.
8.b.3	Helicopter system status.
8.b.4	Ground crew functions (e.g., ext. power).
8.c	Airports and landing areas.
8.c.1	Number and selection.
8.c.2	Runway or landing area selection.
8.c.3	Preset positions (e.g., ramp, over FAF).
8.c.4	Lighting controls.
8.d	Environmental controls.
8.d.1	Temperature.
8.d.2	Climate conditions (e.g., ice, rain).
8.d.3	Wind speed and direction.
8.e	Helicopter system malfunctions.
8.e.1	Insertion/deletion.
8.e.2	Problem clear.
8.f	Locks, Freezes, and Repositioning.
8.f.1	Problem (all) freeze/release.
8.f.2	Position (geographic) freeze/release.
8.f.3	Repositioning (locations, freezes, and releases).
8.f.4	Ground speed control.
8.g	Sound Controls. On/off / adjustment.
8.h	Control Loading System (as applicable On/off/emergency stop.)
8.i	Observer Stations.
8.i.1	Position.
8.i.2	Adjustments.

*“Autopilot” means attitude retention mode of operation.

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

<<< QPS Requirements >>>	
Item No.	Operations tasks
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.	
1. Preflight Procedures	
1.a. Preflight Inspection (Cockpit Only) switches, indicators, systems, and equipment.	
1.b.	APU/Engine start and run-up.
1.b.1	Normal start procedures.
1.b.2	Alternate start procedures.
1.b.3	Abnormal starts and shutdowns.
2. Climb	
2.a. Normal.	
3. Inflight Maneuvers	
3.a. Performance.	
3.b. Turns, Normal.	
4. Instrument Procedures	
4.a. Coupled instrument approach maneuvers (as applicable for the systems installed).	

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

<<< QPS Requirements >>>	
Item No.	Operations tasks
5. Normal and Abnormal Procedures (any phase of flight)	
5.a. Normal system operation (Installed systems).	
5.b. Abnormal/Emergency system operation (installed systems).	
6. Postflight Procedures	
6.a. Parking and Securing.	
6.b. Engine and systems operation.	
6.c. Parking brake operation.	
6.d. Rotor brake operation.	
6.e. Abnormal/emergency procedures.	
7. Instructor Operating Station (IOS), as appropriate	
7.a. Power Switch(es).	
7.b. Preset positions (ground; air)	
7.c. Helicopter system malfunctions.	
7.c.1	Insertion / deletion.
7.c.2	Problem clear.
7.d. Control Loading System (as applicable On / off / emergency stop.	

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

<<< QPS Requirements >>>	
Item No.	Operations tasks
7.e.	Observer Stations.
7.e1.	Position.
7.e2.	Adjustments.

TABLE D3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS
Level 4 FTD

<<< QPS Requirements >>>	
Item number	Operations tasks

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 4 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.

1. Preflight Procedures.

1.a. Preflight Inspection (Cockpit Only) switches, indicators, systems, and equipment.

1.b. APU/Engine start and run-up.

1.b.1.	Normal start procedures.
1.b.2.	Alternate start procedures.
1.b.3.	Abnormal starts and shutdowns.

2. Normal and Abnormal Procedures (any phase of flight).

2.a. Normal system operation (Installed systems).

2.b. Abnormal/Emergency system operation (installed systems).

3. Postflight Procedures.

TABLE D3C—TABLE OF FUNCTIONS AND SUBJECTIVE TESTS—Continued
Level 4 FTD

<<< QPS Requirements >>>	
Item number	Operations tasks
3.a. Parking and Securing.	
3.b. Engine and systems operation.	
3.c. Parking brake operation.	
4. Instructor Operating Station (IOS), as appropriate.	
4.a. Power Switch(es).	
4.b. Preset positions (ground; air)	
4.c. Helicopter system malfunctions.	
4.c.1.	Insertion / deletion.
4.c.2.	Problem clear.

ATTACHMENT 4 TO APPENDIX D TO PART 60—
SAMPLE DOCUMENTS

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Figure D4E—Sample Statement of Qualification—Configuration List

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Figure D4G—Sample Continuing Qualification Evaluation Requirements Page

Figure D4H—Sample MQTG Index of Effective FSTD Directives

Attachment 4 to Appendix D to Part 60—
**Figure D4A – Sample Letter, Request for Initial, Upgrade, or Reinstatement Evaluation
 INFORMATION**

Date _____

Mr. Charles A. Spillner
 Manager, National Simulator Program
 Federal Aviation Administration
 100 Hartsfield Centre Parkway
 Suite 400
 Atlanta, GA 30354

Dear Mr. Spillner:

RE: Request for Initial/Upgrade Evaluation Date

This is to advise you of our intent to request an (initial or upgrade) evaluation of our (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 "1/3 on-site" tests provided not later than 14 days prior to the proposed evaluation date.

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

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

10. Sponsor's Letter of Request (*Company Compliance Letter*).
11. Principal Operations Inspector (POI) or Training Center Program Manager's (TCPM) endorsement.
12. Complete QTG.

If we are unable to meet the above requirements, we understand this may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation.

(The sponsor should add additional comments as necessary).

Please contact (Name Telephone and Fax Number of Sponsor's Contact) to confirm the date for this initial evaluation. We understand a member of your National Simulator Program staff will respond to this request within 14 days.

A copy of this letter of intent has been provided to (Name), the Principal Operations Inspector (POI) and/or Training Center Program Manager (TCPM).

Sincerely,

Attachment: 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**

Date: _____			
Section 1. FSTD Information and Characteristics			
Sponsor Name: _____		FSTD Location: _____	
Address: _____		Physical Address: _____	_____
City: _____		City: _____	
State: _____		State: _____	
Country: _____		Country: _____	
ZIP: _____		ZIP: _____	
Manager _____			
Sponsor ID No: <i>(Four Letter FAA Designator)</i> _____		Nearest Airport: <i>(Airport Designator)</i> _____	
Type of Evaluation Requested: <input type="checkbox"/> Initial <input type="checkbox"/> Upgrade <input type="checkbox"/> Recurrent <input type="checkbox"/> Special <input type="checkbox"/> Reinstatement			
Qualification Basis: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> Interim C <input type="checkbox"/> C <input type="checkbox"/> D		<input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> Provisional Status	
Initial Qualification: <i>(If Applicable)</i>	Date: _____ Level _____	Manufacturer's Identification/Serial No: _____	
Upgrade Qualification: <i>(If Applicable)</i>	Date: _____ Level _____ MM/DD/YYYY	<input type="checkbox"/> eQTG	
Other Technical Information:			
FAA FSTD ID No: <i>(If Applicable)</i>	_____	FSTD Manufacturer:	_____
Convertible FSTD:	<input type="checkbox"/> Yes:	Date of Manufacture:	MM/DD/YYYY
Related FAA ID No. <i>(If Applicable)</i>	_____	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: _____			
National Aviation Authority (NAA): <i>(If Applicable)</i>	_____	_____	_____
NAA FSTD ID No:	_____	Last NAA Evaluation Date:	_____
NAA Qualification Level:	_____		
NAA Qualification Basis:	_____		

**ATTACHMENT 4 TO APPENDIX D TO PART 60—
Figure D4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation
Attachment: FSTD Information Form
INFORMATION**

Visual System Manufacturer and Type:	_____	Motion System Manufacturer and Type:	_____
Aircraft Make/Model/Series:	_____	FSTD Seats Available:	_____
Aircraft Equipment	ENGINE TYPE(S): _____	Flight Instrumentation: <input type="checkbox"/> EFIS <input type="checkbox"/> HUD <input type="checkbox"/> HGS <input type="checkbox"/> EFVS <input type="checkbox"/> TCAS <input type="checkbox"/> GPWS <input type="checkbox"/> Plain View <input type="checkbox"/> GPS <input type="checkbox"/> FMS Type: _____ <input type="checkbox"/> WX Radar <input type="checkbox"/> Other: _____	Engine Instrumentation: <input type="checkbox"/> EICAS <input type="checkbox"/> FADEC <input type="checkbox"/> Other: _____
Airport Models:	3.6.1 _____ <i>Airport Designator</i>	3.6.2 _____ <i>Airport Designator</i>	3.6.3 _____ <i>Airport Designator</i>
Circle to Land:	3.7.1 _____ <i>Airport Designator</i>	3.7.2 _____ <i>Approach</i>	3.7.3 _____ <i>Landing Runway</i>
Visual Ground Segment	3.8.1 _____ <i>Airport Designator</i>	3.8.2 _____ <i>Approach</i>	3.8.3 _____ <i>Landing Runway</i>
Section 2. Supplementary Information			
FAA Training Program Approval Authority:	<input type="checkbox"/> POI <input type="checkbox"/> TCPM <input type="checkbox"/> 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:	_____

**ATTACHMENT 4 TO APPENDIX D TO PART 60—
Figure D4B – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation
Attachment: FSTD Information Form
INFORMATION**

Section 3. Training, Testing and Checking Considerations		
<u>Area/Function/Maneuver</u>	<u>Requested</u>	<u>Remarks</u>
Private Pilot - Training / Checks: (142)	<input type="checkbox"/>	_____
Commercial Pilot - Training /Checks:(142)	<input type="checkbox"/>	_____
Multi-Engine Rating - Training / Checks (142)	<input type="checkbox"/>	_____
Instrument Rating -Training / Checks (142)	<input type="checkbox"/>	_____
Type Rating - Training / Checks (135/121/142)	<input type="checkbox"/>	_____
Proficiency Checks (135/121/142)	<input type="checkbox"/>	_____
CAT I: (RVR 2400/1800 ft. DH200 ft)	<input type="checkbox"/>	_____
CAT II: (RVR 1200 ft. DH 100 ft)	<input type="checkbox"/>	_____
CAT III * (lowest minimum) _____ RVR _____ ft. * State CAT III (< 700 ft.), CAT IIIb (< 150 ft.), or CAT IIIc (0 ft.)	<input type="checkbox"/>	_____
Circling Approach	<input type="checkbox"/>	_____
Windshear Training: (FSTD GB 03-05)	<input type="checkbox"/>	_____
Windshear Training IAW 121.409d (121 Turbojets Only) (FSTD GB 03-05)	<input type="checkbox"/>	_____
Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB 04-03)	<input type="checkbox"/>	_____
Specific Unusual Attitudes Recoveries (HBAT 95-10) (FSTD GB 04-03)	<input type="checkbox"/>	_____
Auto-coupled Approach/Auto Go Around	<input type="checkbox"/>	_____
Auto-land / Roll Out Guidance	<input type="checkbox"/>	_____
TCAS/ACAS I / II	<input type="checkbox"/>	_____
WX-Radar	<input type="checkbox"/>	_____
HUD (FSTD GB 03-02)	<input type="checkbox"/>	_____
HGS (FSTD GB 03-02)	<input type="checkbox"/>	_____
EFVS (FSTD GB 03-03)	<input type="checkbox"/>	_____
Future Air Navigation Systems (HBAT 98-16A)	<input type="checkbox"/>	_____
GPWS / EGPWS	<input type="checkbox"/>	_____
ETOPS Capability	<input type="checkbox"/>	_____
GPS	<input type="checkbox"/>	_____
SMGCS	<input type="checkbox"/>	_____
Helicopter Slope Landings	<input type="checkbox"/>	_____
Helicopter External Load Operations	<input type="checkbox"/>	_____
Helicopter Pinnacle Approach to Landings	<input type="checkbox"/>	_____
Helicopter Night Vision Maneuvers	<input type="checkbox"/>	_____
Helicopter Category A Takeoffs	<input type="checkbox"/>	_____

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)	
(<i>for example</i>)
(Vertilite AB-320)
(FTD Identification Including Manufacturer, Serial Number, Visual System Used)	
(FTD Level)	
(Qualification Performance Standard Used)	
(FTD Location)	
FAA Initial Evaluation	
Date: _____	
_____	Date: _____
(Sponsor)	
_____	Date: _____
Manager, National Simulator Program, FAA	

Attachment 4 to Appendix D to Part 60—
Figure D4D – 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 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)

I. B. Checkin, Jr.

(for the NSPM)

Attachment 4 to Appendix D to Part 60—
Figure D4E – Sample Statement of Qualification – Configuration List
INFORMATION

Date: _____			
Section 1. FSTD Information and Characteristics			
Sponsor Name: _____		FSTD Location: _____	
Address: _____		Physical Address: _____	
City: _____		City: _____	
State: _____		State: _____	
Country: _____		Country: _____	
ZIP: _____		ZIP: _____	
Manager: _____		Nearest Airport: _____ <i>(Airport Designator)</i>	
Sponsor ID No: <i>(Four Letter FAA Designator)</i>		_____	
Type of Evaluation Requested:		<input type="checkbox"/> Initial <input type="checkbox"/> Upgrade <input type="checkbox"/> Recurrent <input type="checkbox"/> Special <input type="checkbox"/> Reinstatement	
Qualification Basis:	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> 6 <input type="checkbox"/> 7	<input type="checkbox"/> Interim C <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> Provisional Status	
Initial Qualification: <i>(If Applicable)</i>	Date: _____ Level _____	Manufacturer's Identification/Serial No:	_____
Upgrade Qualification: <i>(If Applicable)</i>	Date: _____ Level _____ MM/DD/YYYY	<input type="checkbox"/> eQTG	
Other Technical Information:			
FAA FSTD ID No: <i>(If Applicable)</i>	_____	FSTD Manufacturer:	_____
Convertible FSTD: <i>(If Applicable)</i>	<input type="checkbox"/> Yes: _____	Date of Manufacture:	MM/DD/YYYY
Related FAA ID No. <i>(If Applicable)</i>	_____	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:	_____		
National Aviation Authority (NAA): <i>(If Applicable)</i>	_____		
NAA FSTD ID No:	_____	Last NAA Evaluation Date:	_____
NAA Qualification Level:	_____		
NAA Qualification Basis:	_____		

**Attachment 4 to Appendix D to Part 60—
Figure D4E – Sample Statement of Qualification – Configuration List
INFORMATION**

Visual System Manufacturer and Type:	_____	Motion System Manufacturer and Type:	_____
Aircraft Make/Model/Series:	_____	FSTD Seats Available:	_____
Aircraft Equipment	ENGINE TYPE(S): _____	Flight Instrumentation: <input type="checkbox"/> EFIS <input type="checkbox"/> HUD <input type="checkbox"/> HGS <input type="checkbox"/> EFVS <input type="checkbox"/> TCAS <input type="checkbox"/> GPWS <input type="checkbox"/> Plain View <input type="checkbox"/> GPS <input type="checkbox"/> FMS Type: _____ <input type="checkbox"/> WX Radar <input type="checkbox"/> Other: _____	Engine Instrumentation: <input type="checkbox"/> EICAS <input type="checkbox"/> FADEC <input type="checkbox"/> Other: _____
Airport Models:	3.6.1 _____ <i>Airport Designator</i>	3.6.2 _____ <i>Airport Designator</i>	3.6.3 _____ <i>Airport Designator</i>
Circle to Land:	3.7.1 _____ <i>Airport Designator</i>	3.7.2 _____ <i>Approach</i>	3.7.3 _____ <i>Landing Runway</i>
Visual Ground Segment	3.8.1 _____ <i>Airport Designator</i>	3.8.2 _____ <i>Approach</i>	3.8.3 _____ <i>Landing Runway</i>
Section 2. Supplementary Information			
FAA Training Program Approval Authority:	<input type="checkbox"/> POI <input type="checkbox"/> TCPM <input type="checkbox"/> 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			
<u>Area/Function/Maneuver</u>	<u>Requested</u>	<u>Remarks</u>	
Private Pilot - Training / Checks (142)	<input type="checkbox"/>	_____	
Commercial Pilot - Training /Checks:(142)	<input type="checkbox"/>	_____	
Multi-Engine Rating - Training / Checks (142)	<input type="checkbox"/>	_____	
Instrument Rating -Training / Checks (142)	<input type="checkbox"/>	_____	
Type Rating - Training / Checks (135/121/142)	<input type="checkbox"/>	_____	
Proficiency Checks (135/121/142)	<input type="checkbox"/>	_____	
CAT I: (RVR 2400/1800 ft. DH200 ft)	<input type="checkbox"/>	_____	

**Attachment 4 to Appendix D to Part 60—
Figure D4E – Sample Statement of Qualification – Configuration List
INFORMATION**

CAT III * (lowest minimum) _____ RVR _____ ft. * State CAT III (≤ 700 ft.), CAT IIIb (≤ 150 ft.), or CAT IIIc (0 ft.)	<input type="checkbox"/>	_____
Circling Approach	<input type="checkbox"/>	_____
Windshear Training: (FSTD GB 03-05)	<input type="checkbox"/>	_____
Windshear Training IAW 121.409d (121 Turbojets Only) (FSTD GB 03-05)	<input type="checkbox"/>	_____
Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB 04-03)	<input type="checkbox"/>	_____
Specific Unusual Attitudes Recoveries (HBAT 95-10) (FSTD GB 04-03)	<input type="checkbox"/>	_____
Auto-coupled Approach/Auto Go Around	<input type="checkbox"/>	_____
Auto-land / Roll Out Guidance	<input type="checkbox"/>	_____
TCAS/ACAS I / II	<input type="checkbox"/>	_____
WX-Radar	<input type="checkbox"/>	_____
HUD (FSTD GB 03-02)	<input type="checkbox"/>	_____
HGS (FSTD GB 03-02)	<input type="checkbox"/>	_____
EFVS (FSTD GB 03-03)	<input type="checkbox"/>	_____
Future Air Navigation Systems (HBAT 98-16A)	<input type="checkbox"/>	_____
GPWS / EGPWS	<input type="checkbox"/>	_____
ETOPS Capability	<input type="checkbox"/>	_____
GPS	<input type="checkbox"/>	_____
SMGCS	<input type="checkbox"/>	_____
Helicopter Slope Landings	<input type="checkbox"/>	_____
Helicopter External Load Operations	<input type="checkbox"/>	_____
Helicopter Pinnacle Approach to Landings	<input type="checkbox"/>	_____
Helicopter Night Vision Maneuvers	<input type="checkbox"/>	_____
Helicopter Category A Takeoffs	<input type="checkbox"/>	_____

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.**

(Example)

Excepted Tasks:

- 6.f. Fire Detection and Extinguisher System.
- 7.d Ditching.

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

Revision:	
Based on (enter reasoning): 	
Recurrent Evaluations are to be conducted each (fill in) months. Allotting _____ hours. Signed: _____ NSPM Evaluation Team Leader	Recurrent evaluations are due as follows: (month) and (month) and (month) (enter or strike out, as appropriate) _____ Date
(Repeat as Necessary)	

**Index of Effective FSD Directives
Filed in this Section**

Notification Number	Received From: (TPAA/NSPM)	Date of Notification	Date of Modification Completion

Continue as Necessary....

**APPENDIX E TO PART 60—QUALIFICATION
PERFORMANCE STANDARDS FOR
QUALITY MANAGEMENT SYSTEMS FOR
FLIGHT SIMULATION TRAINING DE-
VICES**

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