Attachment 4 to Appendix B to Part 60—
Figure B4H – Sample MQTG Index of Effective FSTD Directives

Index of Effective FSTD Directives
Filed in this Section

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

Continue as Necessary....

APPENDIX C TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FULL FLIGHT SIMULATORS

BEGIN INFORMATION

This appendix establishes the standards for Helicopter Full Flight Simulator (FFS) evaluation and qualification. The Flight Standards Service, National Simulator Program Manager (NSPM), is responsible for the development, application, and implementation of the standards contained within this appendix. The procedures and criteria specified in this appendix will be used by the NSPM, or a person assigned by the NSPM, when conducting helicopter FFS evaluations.

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Attachment 1 to Appendix C to Part 60—General Simulator Requirements.

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

Attachment 4 to Appendix C to Part 60—Sample Documents.

END INFORMATION

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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) AC 120–35B, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.

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

(12) AC 150/5300–13, Airport Design.

(13) AC 150/5340–1G, Standards for Airport Markings.

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

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

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

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

(18) AC 150/5390–2B, Heliport Design.

(19) International Air Transport Association document, ''Flight Simulator Design and Performance Data Requirements,'' as amended.

(20) AC 29–2B, Flight Test Guide for Certification of Transport Category Rotorcraft.

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

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

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

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

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

END INFORMATION

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2. APPLICABILITY (§§60.1 & 60.2)

BEGIN INFORMATION

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.

END INFORMATION

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3. DEFINITIONS (§60.3)

BEGIN INFORMATION

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

END INFORMATION

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4. QUALIFICATION PERFORMANCE STANDARDS (§60.4)

BEGIN INFORMATION

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

END INFORMATION

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5. QUALITY MANAGEMENT SYSTEM (§60.5)

BEGIN INFORMATION

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

END INFORMATION

6. SPONSOR QUALIFICATION REQUIREMENTS (§60.7)

BEGIN INFORMATION

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

b. The following examples describe acceptable operational practices:

(1) Example One.

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

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

(ii) A device qualified on or after October 30, 2007 will be required to undergo an initial or upgrade evaluation in accordance with §60.15. Once the initial or upgrade evaluation is complete, the first continuing qualification evaluation will be conducted within 6 months. The 12 month continuing qualification evaluation cycle begins on that date and continues for each subsequent 12-month period.

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

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

(2) Example Two.

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

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

OR

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

OR

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

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

(3) Example Three.

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

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

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

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

OR

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

END INFORMATION

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

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8. FSTD USE (§60.11)

BEGIN INFORMATION

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

END INFORMATION

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9. SIMULATOR OBJECTIVE DATA REQUIREMENTS (§60.13)

BEGIN QPS REQUIREMENTS

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

(1) A flight test plan consisting of:

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

(b) For each maneuver or procedure—

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

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

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

(v) The data to be gathered.

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

(2) Appropriately qualified flight test personnel.

(3) An understanding of the accuracy of the data to be gathered using appropriate alternative data sources, procedures, and instrumentation that is traceable to a recognized standard as described in Attachment 2, Table C2D.

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

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

(1) in a format that supports the FFS validation process;

(2) in a manner that is clearly readable and annotated correctly and completely;

(3) with resolution sufficient to determine compliance with the tolerances set forth in Attachment 2, Table C2A of this appendix.

(4) with any necessary instructions or other details provided, such as yaw damper or throttle position; and

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

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

d. As required by §60.13(f), the sponsor must notify the NSPM when it becomes aware that an addition to, an amendment to, or a revision of data that may relate to FFS performance or handling characteristics is available. The data referred to in this paragraph are those data that are used to validate the performance, handling qualities, or other characteristics of the aircraft, including data related to any relevant changes occurring after the type certificate was issued. This notification must be made within 10 working days.

END QPS REQUIREMENTS

BEGIN INFORMATION

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

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

from data requirements. The aircraft manufacturer may provide this document.

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

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

i. The NSPM will consider, on a case-by-case basis, whether or not to approve supplemental validation data derived from flight data recording systems such as a Quick Access Recorder or Flight Data Recorder.

END INFORMATION

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

BEGIN INFORMATION

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

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

END INFORMATION

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

BEGIN QPS REQUIREMENTS

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

(1) Meet the general requirements listed in Attachment 1;

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

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

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

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

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

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

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

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

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

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

c. The QTG described in paragraph (a)(3) of this section, must provide the documented proof of compliance with the simulator objective tests in Attachment 2, Table C2A of this appendix.

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

(1) Parameters, tolerances, and flight conditions;

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

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

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

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

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

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 4, Figure C4C, for a sample QTG cover page).

(2) A continuing qualification evaluation schedule requirements page. This page will be used by the NSPM to establish and record the frequency with which continuing qualification evaluations must be conducted and any subsequent changes that may be determined by the NSPM in accordance with §60.19. See Attachment 4, Figure C4G, for a sample Continuing Qualification Evaluation Requirements page.

(3) An FFS information page that provides the information listed in this paragraph (see Attachment 4, Figure C4B, for a sample FFS information page). For convertible FFSs, the sponsor must submit a separate page for each configuration of the FFS.

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

(b) The helicopter model and series being simulated.

(c) The aerodynamic data revision number or reference.

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

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

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

(g) The FFS model and manufacturer.

(h) The date of FFS manufacture.

(i) The FFS computer identification.

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

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

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

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

(10) The following information for each objective test designated in Attachment 2, Table C2A, as applicable to the qualification level sought:

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating FFS objective test results.

(g) List of all relevant parameters driven or constrained during the automatically conducted test(s).

(h) List of all relevant parameters driven or constrained during the manually conducted test(s).

(i) Tolerances for relevant parameters.

(j) Source of Validation Data (document and page number).

(k) Copy of the Validation Data (if located in a separate binder, a cross reference for the identification and page number for pertinent data location must be provided).

(l) Simulator Objective Test Results as obtained by the sponsor. Each test result must reflect the date completed and must be clearly labeled as a product of the device being tested.

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

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

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

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

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

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in Attachment 2, Table C2A of this appendix.

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

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

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

j. All FFSs for which the initial qualification is conducted after October 30, 2013 must have an electronic MQTG (eMQTG) including all objective data obtained from helicopter testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the FFS (reformatted or digitized) as prescribed in this appendix. The eMQTG must also contain the general FFS performance or demonstration results (reformatted or digitized) prescribed in this appendix, and a description of the equipment necessary to perform the initial qualification evaluation and the continuing qualification evaluations. The eMQTG must include the original validation data used to validate FFS performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original time-history plots that were provided by the data supplier. A copy of the eMQTG must be provided to the NSPM.

k. All other FFSs not covered in subparagraph ''j'' must have an electronic copy of the MQTG by October 30, 2013. A copy of the eMQTG must be provided to the NSPM. This may be provided by an electronic scan presented in a Portable Document File (PDF), or similar format acceptable to the NSPM.

END QPS REQUIREMENTS

BEGIN INFORMATION

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

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

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

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

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

(4) Cockpit configuration (see Attachment 1 of this appendix);

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

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

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

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

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

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

(2) Subjective tests provide a basis for:

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

(b) Determining that the FFS satisfactorily simulates each required task;
(c) Verifying correct operation of the FFS controls, instruments, and systems; and
(d) Demonstrating compliance with the requirements of this part.

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

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

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

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

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

r. After an FFS is successfully evaluated, the NSPM issues a statement of qualification (SOQ) to the sponsor. The NSPM recommends the FFS to the TPAA, who will approve the FFS for use in a flight training program. The SOQ will be issued at the satisfactory conclusion of the initial or continuing qualification. However, it is the sponsor's responsibility to obtain TPAA approval prior to using the FSTD in an FAA-approved flight training program.

s. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within ten (10) working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made. A sponsor may schedule an evaluation date as early as 6 months in advance. However, there may be a delay of 45 days or more in rescheduling and completing the evaluation if the sponsor is unable to meet the scheduled date. See Attachment 4, Figure C4A, Sample Request for Initial, Upgrade, or Reinstatement Evaluation.

t. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in Attachment 2, FFS Objective Tests, Table C2A.

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

v. Examples of the exclusions for which the FFS might not have been subjectively tested by the sponsor or the NSPM and for which qualification might not be sought or granted, as described in §60.15(g)(6), include takeoffs and landing from slopes and pinnacles.

END INFORMATION

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

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

13. PREVIOUSLY QUALIFIED SIMULATORS (§60.17)

BEGIN QPS REQUIREMENTS

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

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

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

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

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

inspections missed during the period of inactivity.

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

b. Simulators qualified prior to October 30, 2007, are not required to meet the general simulation requirements, the objective test requirements, and the subjective test requirements of attachments 1, 2, and 3, respectively, of this appendix.

c. [Reserved]

END QPS REQUIREMENTS

BEGIN INFORMATION

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

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

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

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

h. It is not the intent of the NSPM to discourage the improvement of existing simulation (*e.g.*, the ''updating'' of a visual system to a newer model, or the replacement of the IOS with a more capable unit) by requiring the ''updated'' device to meet the qualification standards current at the time of the update. Depending on the extent of the update, the NSPM may require that the updated device be evaluated and may require that an evaluation include all or a portion of the elements of an initial evaluation. However, the standards against which the device would be evaluated are those that are found in the MQTG for that device.

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

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

END INFORMATION

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

BEGIN QPS REQUIREMENTS

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

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

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

END QPS REQUIREMENTS

BEGIN INFORMATION

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

(1) Performance.

(2) Handling qualities.

(3) Motion system (where appropriate).

(4) Visual system (where appropriate).

(5) Sound system (where appropriate).

(6) Other FFS systems.

e. If the NSP evaluator plans to accomplish specific tests during a normal continuing qualification evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; but not less than 72 hours. Examples of such

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

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

(1) Review of the results of the quarterly inspections conducted by the sponsor since the last scheduled continuing qualification evaluation.

(2) A selection of approximately 8 to 15 objective tests from the MQTG that provide an adequate opportunity to evaluate the performance of the FFS. The tests chosen will be performed either automatically or manually and should be able to be conducted within approximately one-third (1/3) of the allotted FFS time.

(3) A subjective evaluation of the FFS to perform a representative sampling of the tasks set out in attachment 3 of this appendix. This portion of the evaluation should take approximately two-thirds (2/3) of the allotted FFS time.

(4) An examination of the functions of the FFS may include the motion system, visual system, sound system, instructor operating station, and the normal functions and simulated malfunctions of the 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 FFS is typically 12 months. However, the establishment and satisfactory implementation of an approved QMS for a sponsor will provide a basis for adjusting the frequency of evaluations to exceed 12-month intervals.

END INFORMATION

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15. LOGGING SIMULATOR DISCREPANCIES (§60.20)

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

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

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

17. MODIFICATIONS TO SIMULATORS (§60.23)

BEGIN QPS REQUIREMENTS

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

b. Prior to using the modified FFS:

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

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

END QPS REQUIREMENTS

BEGIN INFORMATION

FSTD Directives are considered modifications of an FFS. See Attachment 4 for a sample index of effective FSTD Directives.

END INFORMATION

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

BEGIN INFORMATION

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

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

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

END INFORMATION

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

BEGIN INFORMATION

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

END INFORMATION

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

END INFORMATION

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21. RECORDKEEPING AND REPORTING (§ 60.31)

BEGIN QPS REQUIREMENTS

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

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

END QPS REQUIREMENTS

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

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

23. [RESERVED]

24. [RESERVED]

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

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

ATTACHMENT 1 TO APPENDIX C TO PART 60—GENERAL SIMULATOR REQUIREMENTS

BEGIN QPS REQUIREMENTS

1. REQUIREMENTS.

a. Certain requirements included in this appendix must be supported with a Statement of Compliance and Capability (SOC), which may include objective and subjective tests. The SOC will confirm that the requirement was satisfied, and describe how the requirement was met, such as gear modeling approach or coefficient of friction sources. The requirements for SOCs and tests are indicated in the ''General Simulator Requirements'' column in Table C1A of this appendix.

b. Table C1A describes the requirements for the indicated level of FFS. Many devices include operational systems or functions that exceed the requirements outlined in this section. However, all systems will be tested and evaluated in accordance with this appendix to ensure proper operation.

END QPS REQUIREMENTS

BEGIN INFORMATION

2. DISCUSSION.

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

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

(1) General cockpit configuration.
(2) Simulator programming.
(3) Equipment operation.
(4) Equipment and facilities for instructor/evaluator functions.
(5) Motion system.
(6) Visual system.
(7) Sound system.

c. Table C1A provides the standards for the General Simulator Requirements.

END INFORMATION

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
1. General Cockpit Configuration						
1.a	The simulator must have a cockpit that is a replica of the helicopter simulated with controls, equipment, observable cockpit indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the helicopter. The direction of movement of controls and switches must be identical to that in the helicopter. Pilot seats must afford the capability for the occupant to be able to achieve the design ''eye position'' established for the helicopter being simulated. Equipment for the operation of the cockpit windows must be included, but the actual windows need not be operable. Fire axes, extinguishers, spare light bulbs, etc., must be available in the FFS but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette. An SOC is required.		X	X	X	For simulator 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 addiitonal, required flight crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes or extinguishers, spare light bulbs, aircraft documents pouches etc., are not considered essential and may be omitted.
1.b.	Those circuit breakers that affect procedures and/or result in observable cockpit indications must be properly located and functionally accurate. An SOC is required.		X	X	X	
2. Programming						
2.a.	A flight dynamics model that accounts for various combinations of drag and thrust normally encountered in flight must correspond to actual flight conditions, including the effect of change in helicopter attitude, thrust, drag, altitude, temperature, gross weight, moments of inertia, center of gravity location, and configuration. An SOC is required.		X	X	X	
2.b.	The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought. An SOC is required.		X	X	X	
2.c	Ground handling and aerodynamic programming must include the following:					
2.c.1 ..	Ground effect ..... Level B does not require hover programming. An SOC is required.		X	X	X	Applicable areas include flare and touchdown from a running landing as well as for in-ground-effect (IGE) hover. A reasonable simulation of ground effect includes modeling of lift, drag, pitching moment, trim, and power while in ground effect.

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
2.c.2 ..	Ground reaction ..... Level B does not require hover programming. An SOC is required.		X	X	X	Reaction of the helicopter upon contact with the landing surface during landing, (e.g., strut deflection, tire or skid friction, side forces) and may differ with changes in gross weight, airspeed, rate of descent on touchdown, and slide slip.
2.c.3 ..	Ground handling characteristics. Control inputs required during operations in crosswind, during braking and deceleration, and for turning radius.		X	X	X	
2.d	The simulator must provide for manual and automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests as prescribed in Attachment 2. An SOC is required.			X	X	This may include an automated system, which could be used for conducting at least a portion of the QTG tests. Automatic ''flagging'' of out-of-tolerance situations is encouraged.
2.e	Relative responses of the motion system, visual system, and cockpit instruments, measured by latency tests or transport delay tests. Motion onset should occur before the start of the visual scene change (the start of the scan of the first video field containing different information) but must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. Test results must be within the following limits:					The intent is to verify that the simulator provides instrument, motion, and visual cues that are like the helicopter responses within the stated time delays. For helicopter response, acceleration in the appropriate corresponding rotational axis is preferred.
2.e.1 ..	Response must be within 150 milliseconds of the helicopter response. Objective Tests are required. See Attachment 2 for Transport Delay and Latency Tests.		X			
2.e.2 ..	Response must be within 100 milliseconds of the helicopter response. Objective Tests are required. See Attachment 2 for Transport Delay and Latency Tests.			X	X	
2.f	The simulator must accurately reproduce the following runway conditions: (1) Dry; (2) Wet; (3) Icy; (4) Patchy Wet (5) Patchy Icy An SOC is required. Objective tests are required for dry, wet, and icy runway conditions. Subjective tests are required for patchy wet, patchy icy, and wet on rubber residue in touchdown zone conditions.			X	X	
2.g.	The simulator must simulate: (1) Brake and tire failure dynamics (including anti-skid failure). (2) Decreased brake efficiency due to high brake temperatures, if applicable. An SOC is required.			X	X	Simulator pitch, side loading, and directional control characteristics should be representative of the helicopter.

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
2.h	The modeling in the simulator must include: (1) Ground effect, (2) Effects of airframe icing (if applicable), (3) Aerodynamic interference effects between the rotor wake and fuselage, (4) Influence of the rotor on control and stabilization systems, and (5) Representations of nonlinearities due to sideslip. An SOC is required and must include references to computations of aeroelastic representations and of nonlinearities due to sideslip. An SOC and a demonstration of icing effects (if applicable) are required.			X	X	See Attachment 2 for further information on ground effect.
2.i	The simulator must provide for realistic mass properties, including gross weight, center of gravity, and moments of inertia as a function of payload and fuel loading. An SOC is required and must include a range of tabulated target values to enable a subjective test of the mass properties model to be conducted from the instructor's station.		X	X	X	
3. Equipment Operation						
3.a.	All relevant instrument indications involved in the simulation of the helicopter must automatically respond to control movement or external disturbances to the simulated helicopter; e.g., turbulence or windshear. Numerical values must be presented in the appropriate units. A subjective test is required.		X	X	X	
3.b	Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the helicopter being simulated. A subjective test is required.		X	X	X	See Attachment 3 for further information regarding long-range navigation equipment.
3.c	Simulated airplane systems must operate as the helicopter systems would operate under normal, abnormal, and emergency operating conditions on the ground and in flight. A subjective test is required.		X	X	X	
3.d	The simulator must provide pilot controls with control forces and control travel that correspond to the simulated helicopter. The simulator must also react in the same manner as in the helicopter under the same flight conditions. An objective test is required.		X	X	X	
4. Instructor / Evaluator Facilities						
4.a	In addition to the flight crewmember stations, the simulator must have at least two suitable seats for the instructor/check airman and FAA inspector. These seats must provide adequate vision to the pilot's panel and forward windows. All seats other than flight crew seats need not represent those found in the helicopter but must be adequately secured to the floor and equipped with similar positive restraint devices. A subjective test is required.		X	X	X	The NSPM will consider alternatives to this standard for additional seats based on unique cockpit configurations.

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
4.b	The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions into the simulated helicopter systems as described in the sponsor's FAA-approved training program, or as described in the relevant operating manual as appropriate. A subjective test is required.		X	X	X	
4.c	The simulator must have instructor controls for environmental conditions including wind speed and direction. A subjective test is required.		X	X	X	
4.d	The simulator must provide the instructor or evaluator the the ability to present ground and air hazards.			X	X	For example, another aircraft crossing the active runway and converging airborne traffic.
	A subjective test is required.					
5. Motion System						
5.a	The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in a helicopter. A subjective test is required.		X	X	X	For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated helicopter.
5.b	The simulator must have a motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave). An SOC is required.		X			
5.c	The simulator must have a motion (force cueing) system that produces cues at least equivalent to those of a six-degrees-of-freedom, synergistic platform motion system (i.e., pitch, roll, yaw, heave, sway, and surge). An SOC is required.			X	X	
5.d	The simulator must provide for the recording of the motion system response time. An SOC is required.		X	X	X	
5.e	The simulator must provide motion effects programming to include the following: (1) Runway rumble, oleo deflections, effects of ground speed, uneven runway, characteristics. (2) Buffets due to transverse flow effects. (3) Buffet during extension and retraction of landing gear. (4) Buffet due to retreating blade stall. (5) Buffet due to settling with power. (6) Representative cues resulting from touchdown. (7) Rotor vibrations. A subjective test is required for each.		X	X	X	
	(8) Tire failure dynamics. (9) Engine malfunction and engine damage. (10) Airframe ground strike. A subjective test is required for each.			X	X	
	(11) Motion vibrations that result from atmospheric disturbances.				X	For air turbulence, general purpose disturbance models that approximate demonstrable flight test data are acceptable.
5.f	The simulator must provide characteristic motion vibrations that result from operation of the helicopter, (for example, retreating blade stall, extended landing gear, settling with power) in so far as vibration marks an event or helicopter state, which can be sensed in the cockpit. A subjective test is required.				X	The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to helicopter data.

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
	An objective test is required.					
6. Visual System						
6.a	The simulator must have a visual system providing an out-of-the-cockpit view. A subjective test is required.		X	X	X	
6.b	The simulator must provide a continuous minimum collimated field of view of 75° horizontally and 30° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. An SOC is required.		X			
6.c	The simulator must provide a continuous minimum collimated visual field of view of 150° horizontally and 40° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselange. An SOC is required.			X		Optimization of the visual field of view may be considered with respect to the specific helicopter cockpit cut-off angle.
6.d	The simulator must provide a continuous minimum collimated visual field of view of 180° horizontally and 60° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC is required. An objective test is required.				X	Optimization of the visual field of view may be considered with respect to the specific airplane cockpit cut-off angle.
6.e	The visual system must be free from optical discontinuities and artifacts that create non-realistic cues. A subjective test is required.		X	X	X	Non-realistic cues might include image ''swimming'' and image ''roll-off,'' that may lead a pilot to make incorrect assessments of speed, acceleration and/or situational awareness.
6.f	The simulator must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights. A subjective test is required.		X	X	X	
6.g	The simulator must have instructor controls for the following: (1) Cloudbase. (2) Visibility in statute miles (kilometers) and runway visual range (RVR) in ft. (meters). (3) Airport or landing area selection. (4) Airport or landing area lighting. A subjective test is required.		X	X	X	
6.h	Each airport scene displayed must include the following: 1. Airport runways and taxiways. 2. Runway definition: a. Runway surface and markings. b. Lighting for the runway in use, including runway threshold, edge, centerline, touchdown zone, VASI (or PAPI), and approach lighting of appropriate colors, as appropriate. c. Taxiway lights. A subjective test is required.		X	X	X	
6.i	The distances at which runway features are visible, as measured from runway threshold to a helicopter aligned with the runway on an extended 3° glide slope must not be less than listed below:		X	X	X	

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
	1. Runway definition, strobe lights, approach lights, runway edge white lights and VASI or PAPI system lights from 5 statute miles (8 km) of the runway threshold. 2. Runway centerline lights and taxiway definition from 3 statute miles (4.8 km). 3. Threshold lights and touchdown zone lights from 2 statute miles (3.2 km). 4. Runway markings within range of landing lights for night scenes and as required by three (3) arc-minutes resolution on day scenes. A subjective test is required.					
6.j	The simulator must provide visual system compatibility with dynamic response programming. A subjective test is required.		X	X	X	
6.k	The simulator must show that the segment of the ground visible from the simulator cockpit is the same as from the airplane cockpit (within established tolerances) when at the correct airspeed, in the landing configuration, at a main wheel height of 100 feet (30 meters) above the touchdown zone. Data submitted must include at least the following: (1) Static helicopter dimensions as follows: (i) Horizontal and vertical distance from main landing gear (MLG) or landing skids to glideslope reception antenna. (ii) Horizontal and vertical distance from MLG or skids to pilot's eyepoint. (iii) Static cockpit cutoff angle. (2) Approach data as follows: (i) Identification of runway. (ii) Horizontal distance from runway threshold to glideslope intercept with runway. (iii) Glideslope angle. (iv) Helicopter pitch angle on approach. (3) Helicopter data for manual testing: (i) Gross weight. (ii) Helicopter configuration. (iii) Approach airspeed. The QTG must contain appropriate calculations and a drawing showing the pertinent data used to establish the helicopter location and the segment of the ground that is visible considering the helicopter attitude (cockpit cut-off angle) and a runway visual range of 1,200 feet or 350 meters. Simulator performance must be measured against the QTG calculations. Sponsors must provide this data for each simulator (regardless of previous qualification standards) to qualify the simulator for all precision instrument approaches. At the near end of the visual ground segment, lights and ground objects computed to be visible from the helicopter cockpit must be visible in the FFS. The far end of the visual ground segment must be at the computed end of the segment ±20% of the computed visible segment distance. An SOC is required. An objective test is required.		X	X	X	The test should be conducted in the landing configuration, trimmed for appropriate airspeed, at 100 ft (30m) above the touchdown zone, on glide slope with an RVR value set at 1,200 ft (350m). This will show the modeling accuracy of RVR, glideslope, and localizer for a given weight, configuration and speed within the helicopter's operational envelope for a normal appraoch and landing. If non-homogenous fog is used, the vertical variation in horizontal visibility should be described and be included in the slant range visibility calculation used in the computations.
6.l	The simulator must provide visual cues necessary to assess rate of change of height, height AGL, as well as translational displacement and rates during takeoffs and landings. A subjective test is required.		X			

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirements		Simulator levels				Information Notes
No.	General simulator requirements	A	B	C	D	
6.m	The simulator must have night and dusk (or twilight) visual scene capability, including general terrain characteristics and significant landmarks, free from apparent quantization. Dusk (or twilight) scene must enable identification of a visible horizon and general terrain characteristics. A subjective test is required.			X	X	Examples of general terrain characteristics are fields, roads, and bodies of water.
6.n	The simulator must provide visual cues necessary to assess rate of change of height, height AGL, as well as translational displacement and rates during takeoff, low altitude/low airspeed maneuvering, hover, and landing. A subjective test is required.			X	X	
6.o.	The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude. A subjective test is required.		X	X	X	Visual attitude vs. simulator attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator.
6.p	The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity. An SOC is required. A subjective test is required.			X	X	
6.q	The simulator must provide a minimum of three airport scenes including the following: 1. Surfaces on runways, taxiways, and ramps. 2. Lighting of approriate color for all runways, including runway threshold, edge, centerline, VASI (or PAPI), and approach lighting for the runway in use. 3. Airport taxiway lighting. 4. Ramps and buildings that correspond to the sponsor's Line Oriented scenarios, as appropriate. A subjective test is required.			X	X	
6.r	The simulator must be capable of producing at least 10 levels of occulting.. A subjective test is required.			X	X	
6.s	The fog simulator must be able to provide weather representations including the following: (1) Variable cloud density. (2) Partial obscuration of ground scenes; i.e., the effect of a scattered to broken cloud deck. (3) Gradual breakout. (4) Patchy fog. (5) The effect of fog on airport lighting The weather representations must be provided at and below an altitude of 2,000 ft (610 m) height above the airport and within a radius of 10 miles (16 km) from the airport. A subjective test is required.			X	X	

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

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

TABLE C1A— MINIMUM SIMULATOR REQUIREMENTS—Continued

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

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

BEGIN INFORMATION

1. DISCUSSION.

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

(b) The NSPM will not evaluate any simulator unless the required SOC indicates that the motion system is designed and manufactured to safely operate within the simulator's maximum excursion, acceleration, and velocity capabilities (see Motion System in the following table).

END INFORMATION

BEGIN QPS REQUIREMENTS

1. TEST REQUIREMENTS.

a. The ground and flight tests required for qualification are listed in Table of C2A, FFS Objective Tests. Computer generated simulator test results must be provided for each

test except where an alternative test is specifically authorized by the NSPM. If a flight condition or operating condition is required for the test but does not apply to the helicopter being simulated or to the qualification level sought, it may be disregarded (e.g., an engine out missed approach for a single-engine helicopter, or a hover test for a Level B simulator). Each test result is compared against the validation data described in §60.13 and in this appendix. Although use of a driver program designed to automatically accomplish the tests is encouraged for all simulators and required for Level C and Level D simulators, each test must be able to be accomplished manually while recording all appropriate parameters. The results must be produced on an appropriate recording device acceptable to the NSPM and must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the validation data. Time histories are required unless otherwise indicated in Table C2A. All results must be labeled using the tolerances and units given.

b. Table C2A sets out the test results required, including the parameters, tolerances, and flight conditions for simulator validation. Tolerances are provided for the listed tests because mathematical modeling and acquisition/development of reference data are often inexact. All tolerances listed in the following tables are applied to simulator performance. When two tolerance values are given for a parameter, the less restrictive 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 C2A, requirements for SOCs are indicated in the ''Test Details'' column.

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

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

f. When comparing the parameters listed to those of the helicopter, sufficient data must also be provided to verify the correct flight condition and helicopter configuration changes. For example, to show that control force is within ±0.5 pound (0.22 daN) in a static stability test, data to show the correct airspeed, power, thrust or torque, helicopter configuration, altitude, and other appropriate datum identification parameters must also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the helicopter, but airspeed, altitude, control input, helicopter configuration, and other appropriate data must also be given. All airspeed values must be properly annotated (e.g., indicated versus calibrated). In addition, the same variables must be used for comparison (e.g., compare inches to inches rather than inches to centimeters).

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

h. In those cases where the objective test results authorize a ''snapshot test'' or ''a series of snapshot test'' results in lieu of a time-history result, the sponsor or other data provider must ensure that a steady state condition exists at the instant of time captured by the ''snapshot.''

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

j. Motion System Tests:

(a) The minimum excursions, accelerations, and velocities for pitch, roll, and yaw must be measurable about a single, common reference point and must be achieved by driving one degree of freedom at a time.

(b) The minimum excursions, accelerations, and velocities for heave, sway, and surge may be measured about different but identifiable reference points and must also be achieved by driving one degree of freedom at a time.

k. Tests of handling qualities must include validation of augmentation devices. FFSs for highly augmented helicopters will be validated both in the unaugmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. For those performance and static handling qualities tests where the primary concern is control position in the unaugmented configuration, unaugmented data are not required if the design of the system precludes any affect on control position. In those instances where the unaugmented helicopter response is divergent and non-repeatable, it may not be feasible to meet the specified tolerances. Alternative requirements for testing will be mutually agreed upon by the sponsor and the NSPM on a case-by-case basis.

l. Some tests will not be required for helicopters using helicopter hardware in the simulator cockpit (*e.g.*, ''helicopter modular controller''). These exceptions are noted in Table C2A of this attachment. However, in these cases, the sponsor must provide a statement that the helicopter hardware meets the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

m. For objective test purposes, ''Near maximum'' gross weight is a weight chosen by the sponsor or data provider that is not less than the basic operating weight (BOW) of the helicopter being simulated plus 80% of the difference between the maximum certificated gross weight (either takeoff weight or landing weight, as appropriate for the test) and the BOW. ''Light'' gross weight is a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the helicopter being simulated or as limited by the minimum practical operating weight of the test helicopter. ''Medium'' gross weight is a weight chosen by the sponsor or data provider that is approximately ±10% of the average of the numerical values of the BOW and the maximum certificated gross weight. (Note: BOW is the empty weight of the aircraft plus the weight of the following: normal oil quantity; lavatory servicing fluid; potable water; required crewmembers and their baggage; and emergency equipment. (References: Advisory Circular 120–27, ''Aircraft Weight and Balance;'' and FAA–H–8083–1, ''Aircraft Weight and Balance Handbook.'').

END QPS REQUIREMENTS

BEGIN QPS REQUIREMENTS

TABLE C2A—FULL FLIGHT SIMULATOR (FFS) OBJECTIVE TESTS

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
1. Performance									
1.a	Engine Assessment.								
1.a.1	Start Operations..								
1.a.1.a	Engine start and acceleration (transient).	Light Off Time — ±10% or ±1 sec., Torque — ±5%, Rotor Speed — ±3%, Fuel Flow — ±10%, Gas Generator Speed — ±5%, Power Turbine Speed — ±5%, Gas Turbine Temp. — ±30 °C.	Ground with the Rotor Brake Used and Not Used.	Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM.		X	X	X	
1.a.1.b	Steady State Idle and Operating RPM conditions.	Torque — ±3%, Rotor Speed — ±1.5%, Fuel Flow — ±5%, Gas Generator Speed — ±2%, Power Turbine Speed — ±2%, Turbine Gas Temp. — ±20 °C.	Ground	Record both steady state idle and operating RPM conditions.. May be a series of snapshot tests..		X	X	X	
1.a.2	Power Turbine Speed Trim.	±10% of total change of power turbine speed.	Ground	Record engine response to trim system actuation in both directions.		X	X	X	
1.a.3	Engine and Rotor Speed Governing.	Torque — ±5%, Rotor Speed — 1.5%.	Climb, descent	Record results using a step input to the collective. May be conducted concurrently with climb and descent performance tests.		X	X	X	

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
1.b	Surface Operations.								
1.b.1	Minimum Radius Turn	±3 ft. (0.9m) or 20% of helicopter turn radius.	Ground	If brakes are used, brake force must be matched to the helicopter flight test value.		X	X	X	
1.b.2	Rate of Turn vs. Pedal Deflection or Nosewheel Angle.	±10% or ±2°/sec. Turn Rate	Ground Takeoff			X	X	X	
1.b.3	Taxi	Pitch Angle — ±1.5°, Torque — ±3%, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Dirrectional Control Position.	Ground	Record results for control position and pitch attitude during ground taxi for a specific ground speed, wind speed and direction, and density altitude.		X	X	X	
		±5%, Collective Control Position — ±5%.				X	X	X	
1.b.4	Brake Effectiveness	±10% of time and distance	Ground			X	X	X	
1.c	Takeoff .								

1.c.1	All Engines	Airspeed — ±3 kt, Altitude — ±20 ft (6.1m), Torque — ±3%, Rotor Speed — ±1.5%, Vertical Velocity — ±100 fpm (0.50m/sec) or 10%, Pitch Attitude — ±1.5°, Bank Attitude — ±2°, Heading — ±2°, Longitudinal Control Position — ±10%, Lateral Control Position — ±10%, Directional Control Position — ±10%, Collective Control Position — ±10%.	Ground/Takeoff and Initial Segment of Climb.	Record results of takeoff flight path as appropriate to helicopter model simulated (running takeoff for Level B, takeoff from a hover for Level C and D). For Level B, the criteria apply only to those segments at airspeeds above effective translational lift. Results must be recorded from the initiation of the takeoff to at least 200 ft (61m) AGL.		X	X	X	
1.c.2	One Engine Inoperative	Airspeed — ±3 kt, Altitude — ±20 ft (6.1m), Torque — ±3%, Rotor Speed — ±1.5%, Vertical Velocity — ±100 fpm (0.50m/sec) or 10%, Pitch Attitude — ±1.5°, Bank Attitude — ±2°, Heading — ±2°, Longitudinal Control Position — ±10%, Lateral Control Position — ±10%, Directional Control Position — ±10%, Collective Control Position — ±10%.	Ground/Takeoff; and Initial Segment of Climb.	Record takeoff flight path as appropriate to helicopter model simulated. Results must be recorded from the initiation of the takeoff to at least 200 ft (61m) AGL.		X	X	X	
1.d	Hover.								

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
	Performance	Torque — ±3%, Pitch Attitude — ±1.5°, Bank Attitude — ±1.5°, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Directional Control Position — ±5%, Collective Control Position — ±5%,.	In Ground Effect (IGE); and Out of Ground Effect (OGE).	Record results for light and heavy gross weights. May be a series of snapshot tests.		X	X	X	
1.e	Vertical Climb.								
	Performance	Vertical Velocity — ±100 fpm (0.50 m/sec) or ±10%, Directional Control Position — ±5%, Collective Control Position — ±5%.	From OGE Hover ...	Record results for light and heavy gross weights. May be a series of snapshot tests.			X	X	
1.f	Level Flight.								
	Performance and Trimmed Flight Control Positions.	Torque — ±3%, Pitch Attitude — ±1.5°, Sideslip Angle — ±2°, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Directional Control Position — ±5%, Collective Control Position — ±5%.	Cruise (Augmentation On and Off).	Record results for two gross weight and CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests.		X	X	X	
1.g	Climb.								

	Performance and Trimmed Flight Control Positions.	Vertical Velocity — ±100 fpm (6.1m/sec) or ±10%, Pitch Attitude — ±1.5°, Sideslip Angle — ±2°, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Directional Control Position — ±5%, Collective Control Position — ±5%.	All engines operating; One engine inoperative; Augmentation System(s) On and Off.	Record results for two gross weight and CG combinations. The data presented must be for normal climb power conditions. May be a series of snapshot tests.		X	X	X	
1.h	Descent.								
1.h.1	Descent Performance and Trimmed Flight Control Positions.	Torque — ±3%, Pitch Attitude — ±1.5°, Sideslip Angle — ±2°, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Directional Control Position — ±5%, Collective Control Position — ±5%.	At or near 1,000 fpm rate of descent (RoD) at normal approach speed. Augmentation System(s) On and Off.	Results must be recorded for two gross weight and CG combinations. May be a series of snapshot tests.		X	X	X	
1.h.2	Autorotation Performance and Trimmed Flight Control Positions.	Torque — ±3%, Pitch Attitude — ±1.5°, Sideslip Angle — ±2°, Longitudinal Control Position — ±5%, Lateral Control Position — ±5%, Directional Control Position — ±5%, Collective Control Position — ±5% Vertical Velocity ±100 fpm or 19%, Rotor Speed ±1.5%.	Steady descents. Augmentation System(s) On and Off.	Record results for two gross weight conditions. Data must be recorded for normal operating RPM. (Rotor speed tolerance applies only if collective control position is full down.) May be a series of snapshot tests.		X	X	X	
1.i	Autorotation.								

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
	Entry	Rotor Speed—±3% Pitch Attitude ±2°Roll Attitude—±3° Yaw Attitude—±5° Airspeed—±5 kts. Vertical Velocity—±200 fpm (1.00 m/sec) or 10%.	Cruise or Climb	Record results of a rapid throttle reduction to idle. If the cruise condition is selected, comparison must be made for the maximum range airspeed. If the climb condition is selected, comparison must be made for the maximum rate of climb airspeed at or near maximum continuous power.		.....	X	X	
1.j	Landing.								

1.j.1	All Engines	Airspeed—±3 kts., Altitude—±20 ft. (6.1m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%.	Approach	Record results of the approach and landing profile as appropriate to the helicopter model simulated (running landing for Level B, or approach to a hover for Level C and D). For Level B, the criteria apply only to those segments at airspeeds above effective translational lift.		X	X	X	
1.j.2	One Engine Inoperative	Airspeed—±3 kts., Altitude—±20 ft. (6.1m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%.	Approach	Record results for both Category A and Category B approaches and landing as appropriate to helicopter model simulated. For Level B, the criteria apply only to those segments at airspeeds above effective translational lift.		X	X	X	

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
1.j.3	Balked Landing	Airspeed—±3 kts., Altitude—±20 ft. (6.1 m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%.	Approach	Record the results for the maneuver initiated from a stabilized approach at the landing decision point (LDP).		X	X	X	
1.j.4	Autorotational Landing	Torque—±3%, Rotor Speed—±3%, Vertical Velocity—±100 fpm (0.50 m/sec) or 10%, Pitch Attitude—±2°, Bank Attitude—±2°, Heading—±5°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%.	Landing	Record the results of an autorotational deceleration and landing from a stabilized autorotational descent, to touch down.			X	X	
2. Handling Qualities.									
2.a	Control System Mechanical Characteristic(s).								
	For simulators requiring Static or Dynamic tests at the controls (i.e., cyclic, collective, and pedal), special test fixtures will not be required during initial or upgrade evaluations if the sponsor's QTG/MQTG shows both test fixture results *and* the results of an alternative approach, such as computer plots produced concurrently showing satisfactory agreement. Repeat of the alternative method during the initial or upgrade evaluation would then satisfy this test requirement. For initial and upgrade evaluations, the control dynamic characteristics must be measured at and recorded directly from the cockpit controls, and must be accomplished in hover, climb, cruise, and autorotation.								Contact the NSPM for clarification of any issue regarding helicopters with reversible controls.

2.a.1	Cyclic	Breakout—±0.25 lbs. (0.112 daN) or 25%; Force—±1.0 lb. (0.224 daN) or 10%.	Ground; Static conditions. Trim On and Off. Friction Off Augmentation On and Off.	Record results for an uninterrupted control sweep to the stops. (This test does not apply if aircraft hardware modular controllers are used.).		X	X	X	
2.a.2	Collective/Pedals	Breakout—±0.5 lb. (0.224 daN) or 25%; Force—±1.0 lb. (0.224 daN) or 10%..	Ground; Static conditions. Trim On and Off. Friction Off. Augmentation On and Off.	Record results for an uninterrupted control sweep to the stops.		X	X	X	
2.a.3	Brake Pedal Force vs. Position.	±5 lbs. (2.224 daN) or 10%	Ground; Static conditions.			X	X	X	
2.a.4	Trim System Rate (all applicable systems).	Rate—±10%	Ground; Static conditions. Trim On, Friction Off.	The tolerance applies to the recorded value of the trim rate.		X	X	X	
2.a.5	Control Dynamics (all axes).	±10% of time for first zero crossing and ±10 (N+1)% of period thereafter, ±10% of amplitude of first overshoot, 20% of amplitude of 2nd and subsequent overshoots greater than 5% of initial displacement, ±1 overshoot.	Hover/Cruise, Trim On, Friction Off.	Results must be recorded for a normal control displacement in both directions in each axis.		......	X	X	Typically, control displacement of 25% to 50% is necessary for proper excitation. Control Dynamics for irreversible control systems may be evaluated in a ground/static condition. Additional information on control dynamics is found later in this attachment. "N" is the sequential period of a full cycle of oscillation.

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
2.a.6	Freeplay	±0.10 in	Ground; Static conditions.	Record and compare results for all controls.		X	X	X	
2.b	Low Airspeed Handling Qualities.								
2.b.1	Trimmed Flight Control Positions.	Torque—±3% Pitch Attitude—±1.5° Bank Attitude—±2° Longitudinal Control Position—±5% Lateral Control Position—±5% Directional Control Position—±5% Collective Control Position—±5%.	Translational Flight IGE—Sideward, rearward, and forward flight. Augmentation On and Off.	Record results for several airspeed increments to the translational airspeed limits and for 45 kts. forward airspeed.. May be a series of snapshot tests.			X	X	
2.b.2	Critical Azimuth	Torque—±3% Pitch Hover—Bank Attitude—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%.	Stationary Hover. Augmentation On and Off.	Record results for three relative wind directions (including the most critical case) in the critical quadrant. May be a series of snapshot tests.			X	X	
2.b.3	Control Response.								
2.b.3.a	Longitudinal	Pitch Rate—±10% or ±2% sec. Pitch Attitude Change—±10% or 1.5°.	Hover. Agumentation On and Off.	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.			X	X	

2.b.3.b	Lateral	Roll Rate—±10% or ±2% sec. Pitch Attitude Change—±10% or 1.5°.	Hover. Augmentation On and Off.	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.			X	X	
2.b.3.c	Directional	Yaw Rate—±10% or ±2% sec. Heading Change—±10% or 2°.	Hover. Augmentation On and Off.	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.			X	X	
2.b.3.d	Vertical	Normal Acceleration—±0.1 g	Hover control input. The Off-axis response must show correct trend for unaugmented cases.	Record results for a step.			X	X	
2.c	Longitudinal Handling Qualities.								
2.c.1	Control Response	Pitch Rate—±10% or ±2°/sec., Pitch Attitude Change—±10% or ±1.5°.	Cruise Augmentation On and Off.	Results must be recorded for two cruise airspeeds to include minimum power required speed. Record data for a step control input. The Off-axis response must show correct trend for unaugmented cases.		X	X	X	

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
2.c.2	Static Stability	Longitudinal Control Position: ±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Force: ±0.5 lb. (0.223 daN) or ±10%.	Cruise or Climb. Autorotation. Augmentation On and Off.	Record results for a minimum of two speeds on each side of the trim speed. May be a series of snap-shot tests.		X	X	X	
2.c.3	Dynamic Stability.								
2.c.3.a	Long Term Response ..	±10% of calculated period, ±10% of time to ½ or double amplitude, or ±0.02 of damping ratio.	Cruise Augmentation On and Off.	Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. For non-period responses, the time history must be matched.		X	X	X	
2.c.3.b	Short Term Response ..	±1.5° Pitch or ±2°/sec. Pitch Rate. ±0.1 g Normal Acceleration.	Cruise or Climb. Augmentation On and Off.	Record results for at least two airspeeds.		X	X	X	

2.c.4	Maneuvering Stability ...	Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3mm) or Longitudinal Control Forces—±0.5 lb. (0.223 daN) or ±10%.	Cruise or Climb. Augmentation On and Off.	Record results for at least two airspeeds. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests.		X	X	X	Typically, 30°–45° bank angle is necessary for adequate stability measurement.
2.c.5	Landing Gear Operating Times.	±1 sec	Takeoff (Retraction) Approach (Extension).		X	X	X	xl	
2.d	Lateral and Directional Handling Qualities.								
2.d.1	Control Response.								
2.d.1.a	Lateral	Roll Rate—±10% or ±3°/sec., Roll Attitude Change—±10% or ±3°.	Cruise Augmentation On and Off.	Record results for least two airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.		X	X	X	

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
2.d.1.b	Directional	Yaw Rate—±10% or ±2°/sec., Yaw Attitude Change—±10% or ±2°.	Cruise Augmentation On and Off.	Record data for at least two airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.		X	X	X	
2.d.2	Directional Static Stability.	Lateral Control Position—±10% of change from trim or ±0.25 in. (6.3mm) or Lateral Control Force—±0.5 lb. (0.223 daN) or 10%, Roll Attitude—±1.5, Directional Control Position—±10% of change from trim or ±0.25 in. (6.3mm) or Directional Control Force—±1 lb. (0.448 daN) or 10%., Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3mm), Vertical Velocity—±100 fpm (0.50m/sec) or 10%.	Cruise; or Climb (may use Descent instead of Climb if desired), Augmentation On and Off.	Record results for at least two sideslip angles on either side of the trim point. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests.		X	X	X	This is a steady heading sideslip test.
2.d.3	Dynamic Lateral and Directional Stability.								

2.d.3.a	Lateral-Directional Oscillations.	±0.5 sec. or ±10% of period, ±10% of time to ½ or double amplitude or ±0.02 of damping ratio, ±20% of ±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 ½ or double amplitude, whichever is less. For non-periodic response, the time history must be matched.		X	X	X	
2.d.3.b	Spiral Stability	Correct Trend, ±2° bank or ±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	X	
2.d.3.c	Adverse/Proverse Yaw	Correct Trend, ±2° transient sideslip angle.	Cruise or Climb. Augmentation On and Off.	Record the time history of initial entry into cyclic only turns, using only a moderate rate for cyclic input. Results must be recorded for turns in both directions.		X	X	X	
2. Handling Qualities.									

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
2.a	Control System								
3. Motion System.									
3.a	Motion Envelope.								
3.a.1	Pitch.								
3.a.1.a	Displacement—TBD° ...	.....	.....	.....	.....	X			
	±25°	.....	.....	.....			X	X	
3.a.1.b	Velocity—TBD°/sec	.....	.....	.....		X			
	±20°/sec	.....	.....	.....			X	X	
3.a.1.c	Acceleration—TBD°/sec^2.	.....	.....	.....		X			
	±100°/sec^2	.....	.....	.....		X	X		
3.a.2 3.a.2.a	Displacement—TBD° ...	.....	.....	.....		X			
	±25°	.....	.....	.....			X	X	
3.a.2.b	Velocity—TBD°/sec	.....	.....	.....		X			
	±20°/sec	.....	.....	.....			X	X	
3.a.2.c	Acceleration—TBD°/sec^2.	.....	.....	.....		X	.....		
	±100°/sec^2	.....	.....	.....			X	X	
3.a.3	Yaw								

3.a.3.a	Displacement −±25° ...	....	....	....			X	X	
3.a.3.b	Velocity—±20°/sec	....	....	....			X	X	
3.a.3.c	Acceleration—±100°/ sec^2.	....	....	....			X	X	
3.a.4	Vertical	....	....	....					
3.a.4.a	Displacement—TBD in	....	....	....		X			
	±34 in.	....	....	....			X	X	
3.a.4.b	Velocity—TBD in	....	....	....		X			
	±24 in	....	....	....			X	X	
3.a.4.c	Acceleration—TBD g	....	....	....		X	......		
	±0.8 g	....	....	....			X	X	
3.A.5	Lateral								
	Displacement: ±45 in ...	....	....	....			X	X	
	Velocity: ±28 in/sec	....	....	....			X	X	
	Acceleration: ±0.6 g	....	....	....			X	X	
3.a.6	Longitudinal.								
	Displacement: ±34 in ...	....	....	....			X	X	
	Velocity: ±28 in/sec	....	....	....			X	X	
	Acceleration: ±0.6 g	....	....	....			X	X	
3.a.7	Initial Rotational Acceleration Ratio								
	All axes: TBD°/sec^2/sec	....	....	....		X			
	All axes: 300°/ sec^2/sec	....	....	....			X	X	
3.a.8	Initial Linear Acceleration Ratio.								

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
	Vertical: ±TBD g/sec	....	....	....		X			
	±6g/sec	....	....	....			X	X	
	Lateral: ±3g/sec	....	....	....			X	X	
	Longitudinal: ±3g/sec ...	....	....	....			X	X	
3.b	Frequency Response								
	Band, Hz Phase, deg. ..	Amplitude, Ratio, db, ...	....	....	......	X	X	X	
	0.10 to 0.5 −15 to −20.	±2 .... ±2	....	....	......				
	0.51 to 1.0 −15 to −20.	±4, ... ±4	....	....	......				
3.c	Leg Balance.								
	Leg Balance	1.5°	....	The phase shift between a datum jack and any other jack must be measured using a heave (vertical) signal of 0.5 Hz. at ±0.25 g.	......	X	X	X	
3.d	Turn Around.								

	Turn Around	0.05 g		The motion base must be driven sinusoidally in heave through a displacement of 6 inches (150mm) peak to peak at a frequency of 0.5 Hz. Deviation from the desired sinusoidal acceleration must be measured.		X	X	X	
4	Visual System Display Tests.								
4.a	Field of View.								
4.a.1	Continuous collimated visual field of view.	Minimum continuous collimated field of view providing 75° horizontal and 30° vertical field of view for each pilot simultaneously.	N/A	An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.		X			A vertical field of view of 30° may be insufficient to meet visual ground segment requirements. Field of view may be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. The installed alignment should be addressed in the SOC.

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

<<<QPS requirements>>>										<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level					Notes
No.	Title				A	B	C	D		
4.a.2	Continuous collimated visual field of view.	Minimum continuous collimated field of view providing 150° horizontal and 40° vertical field of view for each pilot simultaneously.	N/A/	An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.			X			Field of view may be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. The installed alignment should be addressed in the SOC.
4.a.3	Continuous collimated visual field of view.	Minimum continuous collimated field of view providing 180° horizontal and 60° vertical field of view for each pilot simultaneously.	N/A	An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.				X		Field of view may be measured using a visual test pattern filling the entire visual scene (all channels) with a matrix of black and white 5° squares. The installed alignment should be addressed in the SOC.

4.c	Surface contrast ratio	Not less than 5:1	N/A	The ratio is calculated by dividing the brightness level of the center, bright square (providing at least 2 foot-lamberts or 7 cd/ms^2) by the brightness level of any adjacent dark square.				X	Measurements may be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5 per square, with a white square in the center of each channel. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero.
4.d	Highlight brightness	Not less than six (6) foot-lamberts (20 cd/m^2).	N/A	Measure the brightness of the center, white square while superimposing a highlight on that white square. The use of calligraphic capabilities to enhance the raster brightness is acceptable; however, measuring light points is not acceptable.				X	Measurements may be made using a 1° spot photometer and a raster drawn test pattern filling the entire visual scene (all channels) with a test pattern of black and white squares, 5 per square, with a white square in the center of each channel.

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

<<<QPS requirements>>>									<<Information>>
Test		Tolerance(s)	Flight condition	Test details	Simulator level				Notes
No.	Title				A	B	C	D	
4.e	Vernier resolution (surface resolution).	Not greater than 3 arc minutes.	N/A	An SOC is required and must include the appropriate calculations and an explanation of those calculations.			X	X	
4.f	Light point size	Not greater than six (6) arc-minutes..	N/A	An SOC is required and must include the relevant calculations and an explanation of those calculations.			X	X	Light point size may be measured using a test pattern consisting of a centrally located single row of light points reduced in length until modulation is just discernible in each visual channel. A row of 48 lights will form a 4° angle or less.

4.g	Light point contrast ratio	Not less than 25:1	N/A	An SOC is required and must include the relevant calculations..			X	X	A 1° spot photometer may be used to measure a square of at least 1° filled with light points (where light point modulation is just discernible) and compare the results to the measured adjacent background. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero.

BEGIN INFORMATION

2. CONTROL DYNAMICS.

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

b. Recordings such as free response to an impulse or step function are classically used to estimate the dynamic properties of electromechanical systems. In any case, it is only possible to estimate the dynamic properties as a result of only being able to estimate true inputs and responses. Therefore, it is imperative that the best possible data be collected since close matching of the FFS control loading system to the helicopter system is essential. The required dynamic control tests are described in Table C2A of this attachment.

c. For initial and upgrade evaluations, the QPS requires that control dynamics characteristics be measured and recorded directly from the flight controls (Handling Qualities—Table C2A). This procedure is usually accomplished by measuring the free response of the controls using a step or impulse input to excite the system. The procedure should be accomplished in the takeoff, cruise and landing flight conditions and configurations.

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

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

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

e. 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 non-uniform periods in the response. Each period will be independently compared to the respective period of the helicopter control system and, consequently, will enjoy the full tolerance specified for that period.

(b) The damping tolerance will be applied to overshoots on an individual basis. Care should be taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 percent of the total initial displacement should be considered significant. The residual band, labeled $T(A_d)$ on Figure C2A is ±5 percent of the initial displacement amplitude A_d from the steady state value of the oscillation. Only oscillations outside the residual band are considered significant. When comparing FFS data to helicopter data, the process should begin by overlaying or aligning the FFS and airplane steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual

periods of oscillation. The FFS should show the same number of significant overshoots to within one when compared against the helicopter airplane data. The procedure for evaluating the response is illustrated in Figure C2A.

(2) Critically damped and Overdamped Response. overdamped response. Due to the nature of critically damped and overdamped responses (no overshoots), the time to reach 90 percent of the steady state (neutral point) value should be the same as the helicopter within ±10 percent. The simulator response must be critically damped also. Figure C2B illustrates the procedure.

(3) The following summarizes the tolerances:

$T(P_0)$ ±10% of P_0
$T(P_1)$ ±20% of P_1
T(A) ±10% of A_1, ±20% of Subsequent Peaks
$T(A_d)$ ±10% of A_d = Residual Band
Overshoots ±1

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

$T(P_n)$ ±10%(n+1)% of P_n, where ''n'' is the next in sequence.

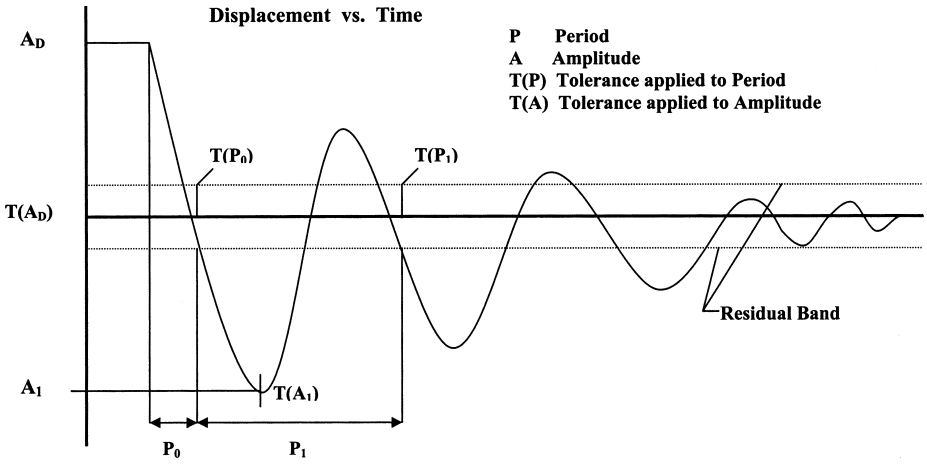


Figure C2A
Under-Damped Step Response

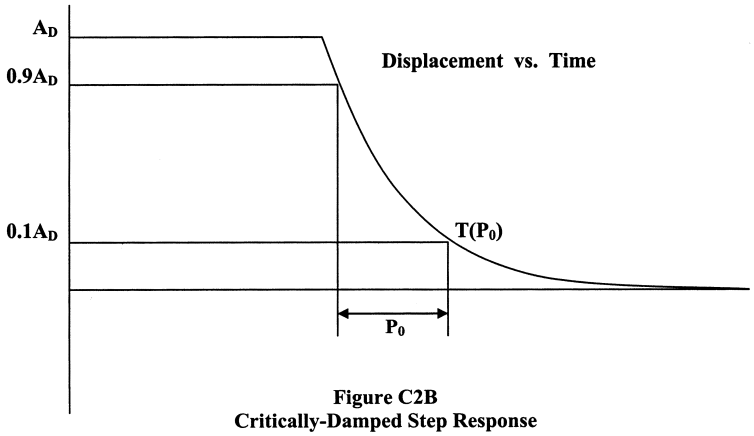


Figure C2B
Critically-Damped Step Response

3. MOTION CUE REPEATABILITY TESTING.

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

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

(1) Compare the current performance of the motion system to the initial recorded test data.

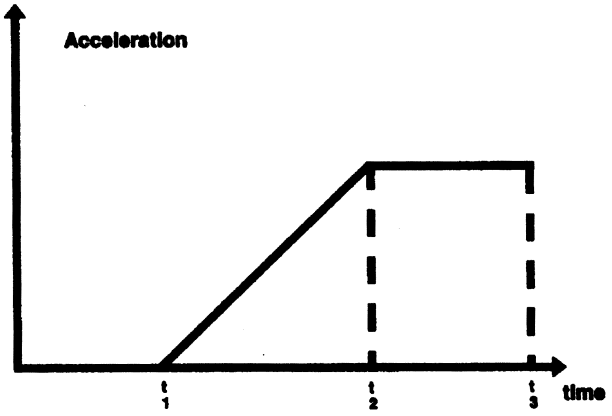
(2) Record the parameters of the motion drive algorithms and the jack position transducers.

(3) Insert the test input signals at an appropriate point prior to the integrations in

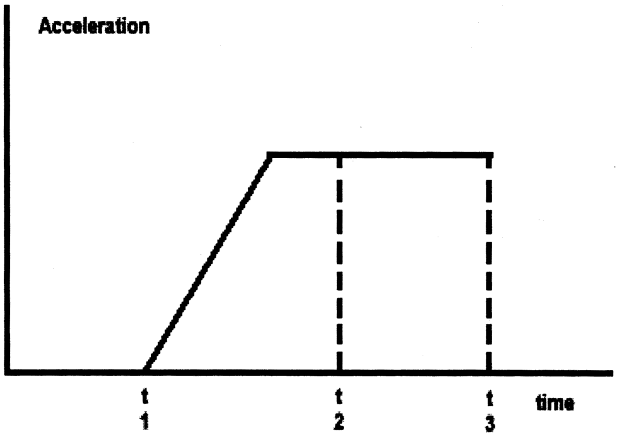
the equations of motion (see Figure C2C of this attachment).

(4) Adjust the characteristics of the test signal (see Figure C2D of this attachment) to ensure that the motion is exercised properly. Motion system manufactures suggest a range of approximately ⅔ of the maximum displacement capability in each axis with a time segment (T_0–T_1) of sufficient duration to ensure steady initial conditions.

Attachment 2 to Appendix C to Part 60—
Figure C2C. Acceleration Test Signals



Attachment 2 to Appendix C to Part 60—
Figure C2D. Test Signal Characteristics



NOTE: Motion system baseline performance repeatability tests should be rerun if the simulator weight changes for any reason (i.e., visual change, or structural change). The new results should be used for future comparison.

End Information

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

1. DISCUSSION

BEGIN INFORMATION

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

b. The tests in Table A3A, Operations Tasks, in this attachment address pilot functions, including maneuvers and procedures (called flight tasks), and is divided by flight phases. The performance of these tasks by the NSPM includes an operational examination of the visual system and special effects. There are flight tasks included to address some features of advanced technology helicopters and innovative training programs.

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

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

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

f. At the request of the TPAA, the NSP Pilot may assess the simulator for a special aspect of a sponsor's training program during the functions and subjective portion of an evaluation. Such an assessment may include a portion of a Line Oriented Flight Training (LOFT) scenario or special emphasis items in the sponsor's training program. Unless directly related to a requirement for the qualification level, the results of such an evaluation would not affect the qualification of the simulator.

g. The NSPM acknowledges that there are previously qualified simulators with certain, early generation Computer Generated Image (CGI) visual systems, that are limited by either the capability of the Imgage Generator or the display system used. As a result, the NSPM has agreed to discuss the specific circumstances that may be determined to exist and has agreed to reach a mutually acceptable course of action to address these limitations beyond those that are listed in the QPS requirements of this table. The following are examples:

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

(a) Link NVS and DNVS.

(b) Novoview 2500 and 6000.

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

(d) Redifusion SP1, SP1T, and SP2.

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

(a) FlightSafety VITAL IV.

(b) Redifusion SP3 and SP3T.

(c) Link-Miles Image II.

(3) Previously qualified CGI and/or display systems that are incapable of generating blue lights, and therefore will not be required to have accurate taxi-way edge lighting are:

(a) Redifusion SP1 and SP1T.

(b) FlightSafety Vital IV.

(c) Link-Miles Image II and Image IIT

(d) XKD displays (even though the XKD image generator is capable of generating

blue colored lights, the display cannot accommodate that color).

END INFORMATION

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS

<<< QPS requirements >>>					
No.	Operations tasks	Simulator level			
		A	B	C	D
Tasks in this table are subject to evaluation if appropriate for the helicopter simulated as indicated in the SOQ Configuration List and/or the level of simulator qualification involved. Items not installed or not functional on the simulator and, therefore, not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ.					
1. Preparation For Flight					
1.a	Cockpit check: switches, indicators, systems, and equipment		X	X	X
2. APU/Engine start and run-up					
2.a	Normal start procedures		X	X	X
2.b	Alternate start procedures		X	X	X
2.c	Abnormal starts and shutdowns (e.g., hot start, hung start)		X	X	X
2.d	Rotor engagement		X	X	X
2.e	System checks		X	X	X
3. (Reserved)					
4. (Reserved)					
5. (Reserved)					
6. Take-off					
6.a	Normal		X	X	X
6.a.1	From ground		X	X	X
6.a.2	From hover		X	X	X
6.a.2.a	Cat A		X	X	X
6.a.2.b	Cat B		X	X	X
6.a.3	Running		X	X	X
6.a.4	Crosswind/tailwind		X	X	X
6.a.5	Maximum performance		X	X	X
6.a.6	Instrument		X	X	X
6.a.7	(Reserved).				
6.a.8	(Reserved).				
6.a.9	(Reserved).				
6.a.10	(Reserved).				
6.b	Abnormal/emergency procedures		X	X	X
6.b.1	Takeoff with engine failure after critical decision point (CDP)		X	X	X
6.b.1.a	Cat A		X	X	X
6.b.1.b	Cat B		X	X	X
6.c	(Reserved).				
7. Climb					

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

<<< QPS requirements >>>					
No.	Operations tasks	Simulator level			
		A	B	C	D
7.a	Normal		X	X	X
7.b	(Reserved).				
7.c	(Reserved).				
7.d	One engine inoperative		X	X	X
8. Cruise					
8.a	Performance		X	X	X
8.b	Flying qualities		X	X	X
8.c	Turns		X	X	X
8.c.1	Timed		X	X	X
8.c.2	Normal		X	X	X
8.c.3	Steep		X	X	X
8.d	Accelerations and decelerations		X	X	X
8.e	High speed vibrations		X	X	X
8.f	(Reserved).				
8.g	Abnormal/emergency procedures		X	X	X
8.g.1	Engine fire		X	X	X
8.g.2	Engine failure		X	X	X
8.g.3	Inflight engine shutdown and restart		X	X	X
8.g.4	Fuel governing system failures		X	X	X
8.g.5	Directional control malfunction		X	X	X
8.g.6	Hydraulic failure		X	X	X
8.g.7	Stability system failure		X	X	X
8.g.8	Rotor vibrations		X	X	X
9. Descent					
9.a	Normal		X	X	X
9.b	Maximum rate		X	X	X
9.c	(Reserved).				
10. Approach					
10.a	Non-precision		X	X	X
10.a.1	All engines operating		X	X	X
10.a.2	One or more engines inoperative		X	X	X
10.a.3	Approach procedures		X	X	X
10.a.3.a	NDB		X	X	X
10.a.3.b	VOR, RNAV, TACAN		X	X	X
10.a.3.c	ASR		X	X	X

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

<<< QPS requirements >>>					
No.	Operations tasks	Simulator level			
		A	B	C	D
10.a.3.d	(Reserved).				
10.a.3.e	Helicopter only		X	X	X
10.a.4	Missed approach		X	X	X
10.a.4.a	All engines operating		X	X	X
10.a.4.b	One or more engines inoperative		X	X	X
10.b	Precision		X	X	X
10.b.1	All engines operating		X	X	X
10.b.2	One or more engines inoperative		X	X	X
10.b.3	Approach procedures		X	X	X
10.b.3.a	PAR		X	X	X
10.b.3.b	MLS		X	X	X
10.b.3.c	ILS		X	X	X
10.b.3.c	(1) Manual (raw data)		X	X	X
10.b.3.c	(2) Flight director only		X	X	X
10.b.3.c	(3) Autopilot coupled		X	X	X
10.b.3.c	—Cat I		X	X	X
10.b.3.c	—Cat II		X	X	X
10.b.4	Missed approach.				
10.b.4.a	All engines operating		X	X	X
10.b.4.b	One or more engines inoperative		X	X	X
10.b.4.c	Stability system failure		X	X	X
10.c	(Reserved).				
11. (Reserved)					
12. Any Flight Phase					
12.a	Helicopter and powerplant systems operation.				
12.a.1	Air conditioning		X	X	X
12.a.2	Anti-icing/deicing		X	X	X
12.a.3	Auxiliary power-plant		X	X	X
12.a.4	Communications		X	X	X
12.a.5	Electrical		X	X	X
12.a.6	Fire detection and suppression		X	X	X
12.a.7	Stabilizer		X	X	X
12.a.8	Flight controls		X	X	X
12.a.9	Fuel and oil		X	X	X
12.a.10	Hydraulic		X	X	X

TABLE C3A—FUNCTIONS AND SUBJECTIVE TESTS—Continued

<<< QPS requirements >>>					
No.	Operations tasks	Simulator level			
		A	B	C	D
12.a.11	Landing gear		X	X	X
12.a.12	Oxygen		X	X	X
12.a.13	Pneumatic		X	X	X
12.a.14	Powerplant		X	X	X
12.a.15	Flight control computers		X	X	X
12.a.16	Stability and control augmentation		X	X	X
12.b	Flight management and guidance system.				
12.b.1	Airborne radar		X	X	X
12.b.2	Automatic landing aids		X	X	X
12.b.3	Autopilot		X	X	X
12.b.4	Collision avoidance system		X	X	X
12.b.5	Flight data displays		X	X	X
12.b.6	Flight management computers		X	X	X
12.b.7	Heads-up displays		X	X	X
12.b.8	Navigation systems		X	X	X
12.c	Airborne procedures.				
12.c.1	Holding		X	X	X
12.c.2	Air hazard avoidance		X	X	X
12.c.3	Retreating blade stall recovery		X	X	X
12.c.4	Mast bumping		X	X	X
13. Engine Shutdown and Parking					
13.a	Engine and systems operation		X	X	X
13.b	Parking brake operation		X	X	X
13.c	Rotor brake operation		X	X	X
13.d	Abnormal/emergency procedures		X	X	X

Table C3B [Reserved]

Table C3C [Reserved]

TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS

<<< QPS requirements >>>					
Number	Instructor Operating Station (IOS) (As appropriate)	Simulator level			
		A	B	C	D
Functions in this table are subject to evaluation only if appropriate for the helicopter and/or the system is installed on the specific simulator.					
1. Simulator Power Switch(es)			X	X	X

TABLE C3D—FUNCTIONS AND SUBJECTIVE TESTS—Continued

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

ATTACHMENT 4 TO APPENDIX C TO PART 60—SAMPLE DOCUMENTS

TABLE OF CONTENTS

Title of Sample

ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4A – Sample Letter , Request for Initial, Upgrade, or Reinstatement Evaluation
INFORMATION

Date _____

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

Dear Mr. Spillner:

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 "l/3 on-site" tests provided not later than 14 days prior to the proposed evaluation date.

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

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

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

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

(The sponsor should add additional comments as necessary).

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

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

Sincerely,

Attachment: FSTD Information Form
cc: POI/TCPM

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

Date: ____					
Section 1. FSTD Information and Characteristics					
Sponsor Name:	____		**FSTD Location:**		
Address:	____		**Physical Address:**	____	
City:	____		**City:**	____	
State:	____		**State:**	____	
Country:	____		**Country:**	____	
ZIP:	____		**ZIP:**	____	
Manager	____				
Sponsor ID No: *(Four Letter FAA Designator)*	____		**Nearest Airport:** *(Airport Designator)*	____	
Type of Evaluation Requested:			☐ **Initial** ☐ **Upgrade** ☐ **Recurrent** ☐ **Special** ☐ **Reinstatement**		
Qualification Basis: ____	☐ **A**	☐ **B**	☐ **Interim C**	☐ **C**	☐ **D**
	☐ **6**	☐ **7**	☐ **Provisional Status**		
Initial Qualification: (If Applicable)	**Date:** ____ **Level** ____		**Manufacturer's Identification/Serial No:**	____	
Upgrade Qualification: (If Applicable)	**Date:** ____ **Level** ____ MM/DD/YYYY		☐ **eQTG**		
Other Technical Information:					
FAA FSTD ID No: (If Applicable)	____		**FSTD Manufacturer:**	____	
Convertible FSTD:	☐**Yes:**		**Date of Manufacture:**	____ MM/DD/YYYY	
Related FAA ID No. (If Applicable)	____ ____ ____		**Sponsor FSTD ID No:** ____		
Aircraft model/series: ____			**Source of aerodynamic model:** ____		
Engine model(s) and data revision: ____			**Source of aerodynamic coefficient data:** ____		
FMS identification and revision level: ____			**Aerodynamic data revision number:** ____		
Visual system manufacturer/model: ____			**Visual system display:** ____		
Flight control data revision: ____			**FSTD computer(s) identification:** ____		
Motion system manufacturer/type: ____					
National Aviation Authority (NAA): (If Applicable)	____			____	
NAA FSTD ID No:	____		**Last NAA Evaluation Date:**	____	
NAA Qualification Level:	____				
NAA Qualification Basis:	____				

ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4B – 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:** ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS ☐ TCAS ☐ GPWS ☐ Plain View ☐ GPS ☐ FMS Type: ____ ☐ WX Radar ☐ Other: ____	Engine Instrumentation: ☐ EICAS ☐ FADEC ☐ Other: ____

Airport Models:	3.6.1 ____ *Airport Designator*	3.6.2 ____ *Airport Designator*	3.6.3 ____ *Airport Designator*
Circle to Land:	3. 7.1 ____ *Airport Designator*	3. 7.2 ____ *Approach*	3. 7.3 ____ *Landing Runway*
Visual Ground Segment	3.8.1 ____ *Airport Designator*	3.8 .2 ____ *Approach*	3. 8.3 ____ *Landing Runway*

Section 2. Supplementary Information

FAA Training Program Approval Authority:		☐ **POI** ☐ **TCPM** ☐ **Other:** ____	
Name:	____	**Office:**	____
Tel:	____	**Fax:**	____
Email:	____		

FSTD Scheduling Person:

Name:	____		
Address 1:	____	**Address 2**	____
City:	____	**State:**	____
ZIP:	____	**Email:**	____
Tel:	____	**Fax:**	____

FSTD Technical Contact:

Name:	____		
Address 1:	____	**Address 2**	____
City:	____	**State:**	____
ZIP:	____	**Email:**	____
Tel:	____	**Fax:**	____

Section 3. Training, Testing and Checking Considerations

Area/Function/Maneuver	Requested	Remarks
Private Pilot - Training / Checks: (142)	☐	____
Commercial Pilot - Training /Checks:(142)	☐	____
Multi-Engine Rating - Training / Checks (142)	☐	____
Instrument Rating -Training / Checks (142)	☐	____
Type Rating - Training / Checks (135/121/142)	☐	____
Proficiency Checks (135/121/142)	☐	____
CAT I: (RVR 2400/1800 ft. DH200 ft)	☐	____

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

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

ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4C – Sample Qualification Test Guide Cover Page
INFORMATION

SPONSOR NAME

SPONSOR ADDRESS

FAA QUALIFICATION TEST GUIDE

(SPECIFIC Helicopter MODEL)
for example
Farnsworth Z-100

(Type of Simulator)

(Simulator Identification Including Manufacturer, Serial Number, Visual System Used)

(Simulator Level)

(Qualification Performance Standard Used)

(Simulator Location)

FAA Initial Evaluation

Date: _____

_____ Date: _____
(Sponsor)

_____ Date: _____
Manager, National
Simulator Program, FAA

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

INFORMATION

Federal Aviation Administration
National Simulator Program

Statement of Qualification

This is to certify that representatives of the National Simulator Program Completed an evaluation of the

Go-Fast Airlines
Farnsworth Z-100 Full Flight Simulator
FAA Identification Number 0999

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

The Master Qualification Test Guide and the attached Configuration List and List of Qualified Tasks Provide the Qualification Basis for this device to operate at

Level D

Until March 30, 2009

Unless sooner rescinded or extended by the National Simulator Program Manager

February 15, 2008 (date)

I. B. Checkin, Jr. (for the NSPM)

ATTACHMENT 4 TO APPENDIX C TO PART 60—

Figure A4E – Sample Statement of Qualification; Configuration List

INFORMATION

STATEMENT of QUALIFICATION
CONFIGURATION LIST

Date: ____					
Section 1. FSTD Information and Characteristics					
Sponsor Name:	____		**FSTD Location:**		
Address:	____ ____		**Physical Address:**	____ ____	
City:	____		**City:**	____	
State:	____		**State:**	____	
Country:	____		**Country:**	____	
ZIP:	____		**ZIP:**	____	
Manager	____				
Sponsor ID No: *(Four Letter FAA Designator)*	____		**Nearest Airport:** *(Airport Designator)*	____	
Type of Evaluation Requested:			☐ **Initial** ☐ **Upgrade** ☐ **Recurrent** ☐ **Special** ☐ **Reinstatement**		
Qualification Basis: ____	☐ **A**	☐ **B**	☐ **Interim C**	☐ **C**	☐ **D**
	☐ **6**	☐ **7**	☐ **Provisional Status**		
Initial Qualification: (If Applicable)	**Date:** ____ **Level** ____		**Manufacturer's Identification/Serial No:**	____	
Upgrade Qualification: (If Applicable)	**Date:** ____ **Level** ____ MM/DD/YYYY		☐ **eQTG**		
Other Technical Information:					
FAA FSTD ID No: (If Applicable)	____		**FSTD Manufacturer:**	____	
Convertible FSTD:	☐**Yes**:		**Date of Manufacture**:	____ MM/DD/YYYY	
Related FAA ID No. (If Applicable)	____ ____ ____		**Sponsor FSTD ID No:** ____		
Aircraft model/series: ____			**Source of aerodynamic model:** ____		
Engine model(s) and data revision: ____			**Source of aerodynamic coefficient data:** ____		
FMS identification and revision level: ____			**Aerodynamic data revision number:** ____		
Visual system manufacturer/model: ____			**Visual system display:** ____		
Flight control data revision: ____			**FSTD computer(s) identification:** ____		
Motion system manufacturer/type: ____					
National Aviation Authority (NAA): (If Applicable)	____			____	
NAA FSTD ID No:	____		**Last NAA Evaluation Date:**	____	
NAA Qualification Level:	____				
NAA Qualification Basis:	____				

ATTACHMENT 4 TO APPENDIX C TO PART 60—
Figure A4E – 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:** ☐ EFIS ☐ HUD ☐ HGS ☐ EFVS ☐ TCAS ☐ GPWS ☐ Plain View ☐ GPS ☐ FMS Type: ____ ☐ WX Radar ☐ Other: ____	Engine Instrumentation: ☐ EICAS ☐ FADEC ☐ Other: ____

Airport Models:	3.6.1 ____ *Airport Designator*	3.6.2 ____ *Airport Designator*	3.6.3 ____ *Airport Designator*
Circle to Land:	3. 7.1 ____ *Airport Designator*	3. 7.2 ____ *Approach*	3. 7.3 ____ *Landing Runway*
Visual Ground Segment	3.8.1 ____ *Airport Designator*	3.8 .2 ____ *Approach*	3. 8.3 ____ *Landing Runway*

Section 2. Supplementary Information

FAA Training Program Approval Authority:		☐ POI ☐ TCPM ☐ Other: ____	
Name:	____	**Office:**	____
Tel:	____	**Fax:**	____
Email:	____		

FSTD Scheduling Person:			
Name:	____		
Address 1:	____	**Address 2**	____
City:	____	**State:**	____
ZIP:	____	**Email:**	____
Tel:	____	**Fax:**	____

FSTD Technical Contact:			
Name:	____		
Address 1:	____	**Address 2**	____
City:	____	**State:**	____
ZIP:	____	**Email:**	____
Tel:	____	**Fax:**	____

Section 3. Training, Testing and Checking Considerations

Area/Function/Maneuver	Requested	Remarks
Private Pilot - Training / Checks: (142)	☐	____
Commercial Pilot - Training /Checks:(142)	☐	____
Multi-Engine Rating - Training / Checks (142)	☐	____
Instrument Rating -Training / Checks (142)	☐	____
Type Rating - Training / Checks (135/121/142)	☐	____
Proficiency Checks (135/121/142)	☐	____

ATTACHMENT 4 TO APPENDIX C TO PART 60—

Figure A4E – 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.)*	☐	____
Circling Approach	☐	____
Windshear Training: (FSTD GB 03-05)	☐	____
Windshear Training IAW 121.409d (121 Turbojets Only) (FSTD GB 03-05)	☐	____
Generic Unusual Attitudes and Recoveries within the Normal Flight Envelope (FSTD GB 04-03)	☐	____
Specific Unusual Attitudes Recoveries (HBAT 95-10) (FSTD GB 04-03)	☐	____
Auto-coupled Approach/Auto Go Around	☐	____
Auto-land / Roll Out Guidance	☐	____
TCAS/ACAS I / II	☐	____
WX-Radar	☐	____
HUD (FSTD GB 03-02)	☐	____
HGS (FSTD GB 03-02)	☐	
EFVS (FSTD GB 03-03)	☐	
Future Air Navigation Systems (HBAT 98-16A)	☐	____
GPWS / EGPWS	☐	____
ETOPS Capability	☐	____
GPS	☐	____
SMGCS	☐	____
Helicopter Slope Landings	☐	____
Helicopter External Load Operations	☐	____
Helicopter Pinnacle Approach to Landings	☐	____
Helicopter Night Vision Maneuvers	☐	____
Helicopter Category A Takeoffs	☐	____

ATTACHMENT 4 TO APPENDIX C TO PART 60—

Figure A4F – Sample Statement of Qualification – List of Qualified Tasks

INFORMATION

STATEMENT of QUALIFICATION
List of Qualified Tasks
Go Fast Airline Training -- Farnsworth Z-100 -- Level D -- FAA ID# 0999

The FSTD is qualified to perform all of the Maneuvers, Procedures, Tasks, and Functions Listed in Appendix A, Attachment 1, Table A1B, Minimum FSTD Requirements In Effect on [mm/dd/yyyy] except for the following listed Tasks or Functions.

Qualified for all tasks in Table C1B for which the sponsor has requested qualification, except for the following: 6.e. Environmental system. 6.f. Fire detection and extinguisher system. 7.b. In-flight fire and smoke removal. 7.d. Ditching.
Additional tasks for which this FSTD is qualified (i.e., in addition to the list in Table C1B) Enhanced Visual System

Attachment 4 to Appendix C to Part 60—
Figure A4G – Sample Continuing Qualification Evaluation Requirements Page
INFORMATION

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

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 FSTD Directives
Filed in this Section

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

Continue as Necessary....

APPENDIX D TO PART 60—QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FLIGHT TRAINING DEVICES

BEGIN INFORMATION

This appendix establishes the standards for Helicopter Flight Training Device (FTD) evaluation and qualification at Level 4, Level 5, or Level 6. The Flight Standards Service, National Simulator Program Manager (NSPM), is responsible for the development, application, and implementation of the standards contained within this appendix. The procedures and criteria specified in this appendix will be used by the NSPM, or a person or persons assigned by the NSPM when conducting helicopter FTD evaluations.

TABLE OF CONTENTS