conducted and where and how the results of such audits are maintained and reported to Responsible Management, the NSPM, and the TPAA.

End QPS Requirements

g. Additional Information.

Begin Information

(1) In addition to specifically designated QA evaluations, the NSPM will evaluate the sponsor's QA program as part of regularly scheduled recurrent simulator evaluations and no-notice simulator evaluations, focusing in large part on the effectiveness and viability of the QA program and its contribution to the overall capability of the simulator to meeting the requirements of this part.

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

(3) Should a sponsor include a ''foreign simulator'' (*i.e.,* one maintained by a non-US certificate holder) under their sponsorship, the sponsor remains responsible for the QA program for that simulator. However, if that foreign simulator is maintained under a QA program accepted by that foreign regulatory authority and that authority and the NSPM have agreed to accept each other's QA programs (*e.g.,* the Joint Aviation Authorities, JAA, of Europe), the sponsor will be required only to perform an ''external audit'' of the non-US certificate holder's compliance with the accepted foreign QA program, with the results of that audit submitted to and accepted by the NSPM.

End Information

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6. Sponsor Qualification Requirements

Begin Rule Language (§ 60.7)

a. A person is eligible to apply to be a sponsor of a simulator if the following conditions are met:

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

(2) The simulator will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for the helicopter being simulated as evidenced in a request for evaluation submitted to the NSPM through the TPAA.

b. A person is a sponsor of the simulator if the following conditions are met:

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

(2) The person has operations specifications authorizing the use of the helicopter type being simulated by the simulator or has training specifications or a course of training authorizing the use of a simulator for that helicopter type.

(3) The person has an approved quality assurance program in accordance with § 60.5.

(4) The NSPM has approved the person as the sponsor of the simulator and that approval has not been withdrawn by the FAA.

c. A person continues to be a sponsor of a simulator, if the following conditions are met:

(1) Beginning 12 calendar months after the initial qualification and every 12 calendar months thereafter, the simulator must have been used within the sponsor's FAA-approved flight training program for the helicopter type for a minimum of 600 hours.

(2) The use of the simulator described in paragraph (c)(1) of this section must be dedicated to meeting the requirements of parts 61, 63, 91, 121, or 135 of this chapter.

(3) If the use requirements of paragraphs (c)(1) and (2) of this section are not met, the person will continue to sponsor the simulator on a provisional basis for a period not longer than 12 calendar months; and—

(i) If the simulator is used as described in paragraphs (c)(1) and (2) of this section within this additional 12 calendar month period, the provisional status will be removed and regular sponsorship resumed; or

(ii) If the simulator is not used as described in paragraphs (c)(1) and (2) of this section within the additional 12 calendar month period, the simulator is not qualified and the sponsor will not be eligible to apply to sponsor that simulator for at least 12 calendar months.

End Rule Language (§ 60.7)

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7. Additional Responsibilities of the Sponsor

Begin Rule Language (§ 60.9)

a. The sponsor must not allow the simulator to be used for flightcrew member training or evaluation or for attaining flight experience for the flightcrew member to meet any of the requirements under this chapter unless the sponsor, upon request, allows the NSPM to inspect immediately the simulator, including all records and documents relating to the simulator, to determine its compliance with this part.

b. The sponsor must, for each simulator—

(1) Establish a mechanism for the following persons to provide comments regarding the simulator and its operation and provide for receipt of those comments:

(i) Flightcrew members recently completing training or evaluation or recently obtaining flight experience in the simulator;

(ii) Instructors and check airmen using the simulator for training, evaluation, or flight experience sessions; and

(iii) Simulator technicians and maintenance personnel performing work on the simulator.

(2) Examine each comment received under paragraph (b)(1) of this section for content and importance and take appropriate action.

(3) Maintain a liaison with the manufacturer of the helicopter being simulated by the simulator to facilitate compliance with § 60.13(f) when necessary.

(4) Post in or adjacent to the simulator the Statement of Qualification issued by the NSPM.

End Rule Language (§ 60.9)

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8. Simulator Use

Begin Rule Language (§ 60.11)

No person may use or allow the use of or offer the use of a simulator for meeting training, evaluation, or flight experience requirements of this chapter for flightcrew member certification or qualification unless, in accordance with the QPS for the specific device—

a. It has a single sponsor who is qualified under § 60.9. The sponsor may arrange with another person for services of document preparation and presentation, as well as simulator inspection, maintenance, repair, and servicing; however, the sponsor remains responsible for ensuring that these functions are conducted in a manner and with a result of continually meeting the requirements of this part.

b. It is qualified as described in the Statement of Qualification that is required to be posted pursuant to § 60.9(b)(4)—

(1) For the make, model, and series of helicopter; and

(2) For all tasks and configurations.

c. It remains qualified, through satisfactory inspection, recurrent evaluations, appropriate maintenance, and use requirements in accordance with this part and the appropriate QPS.

d. Its software and active programming used during the training, evaluation, or flight experience is the same as the software and active programming that was evaluated by the NSPM.

End Rule Language (§ 60.11)

Begin QPS Requirements

e. Only those simulators that are used by a certificate holder (as defined for use in Part 60 and this QPS) will be evaluated by the NSPM. However, other simulator evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

End QPS Requirements

Begin Information

f. Each simulator must be evaluated as completely as possible. To ensure a thorough and uniform evaluation, each simulator is subjected to the performance demonstrations in attachment 1, the objective tests listed in attachment 2, and the subjective tests listed in attachment 3 of this appendix. The evaluation(s) described in this paragraph f

will include, but not necessarily be limited to the following, as appropriate, for the qualification level of the simulator.

(1) Aerodynamic responses, including control responses in the longitudinal, lateral-directional, and vertical directions; as well as low airspeed responses (see attachment 2 of this appendix);

(2) Performance in authorized portions of the simulated helicopter's operating envelope, to include tasks suitable to the NSPM in the areas of ground operations, takeoff, climb, cruise, descent, approach, landing, hover (if appropriate), and vertical climb, as well as abnormal and emergency operations (see paragraph 23 and 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 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) Simulator 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 complexity of the simulator 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.

g. The NSPM administers the objective and subjective tests, which includes an examination of functions. The tests include a qualitative assessment of the simulator 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 are used to compare simulator and helicopter data objectively to ensure that the simulator performance and handling qualities are within specified tolerances.

(2) Subjective tests provide a basis for:

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

(b) Determining that the simulator satisfactorily meets the appropriate training/testing/checking objectives and competently simulates each required maneuver, procedure, or task; and

(c) Verifying correct operation of the simulator controls, instruments, and systems.

h. The tolerances for the test parameters listed in attachment 2 of this appendix are the maximum acceptable to the NSPM for simulator validation and are not to be confused with design tolerances specified for simulator 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.

i. In addition to the scheduled recurrent evaluation (see paragraph 14 of this appendix), each simulator is subject to evaluations conducted by the NSPM at any time with no prior notification to the sponsor. Such evaluations would be accomplished in a normal manner (i.e., requiring exclusive use of the simulator for the conduct of objective and subjective tests and an examination of functions) if the simulator is not being used for flightcrew member training, testing, or checking. However, if the simulator were being used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the simulator evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the simulator along with the student(s) and observing the operation of the simulator during the training, testing, or checking activities. While the intent is to observe the operation and interaction of the device and not the check airman, instructor, APD, FAA inspector, or student(s), the simulator evaluator is a qualified FAA operations inspector and must, without question, report any obvious lack of proficiency to the appropriate POI or TCPM.

End Information

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9. Simulator Objective Data Requirements

Begin Rule Language (§ 60.13)

a. Except as provided in paragraph (b) and (c) of this section, for the purposes of validating simulator performance and handling qualities during evaluation for qualification, the sponsor must submit the helicopter manufacturer's flight test data to the NSPM.

b. The sponsor may submit flight test data from a source in addition to or independent of the helicopter manufacturer's data to the NSPM in support of a simulator qualification, but only if this data is gathered and developed by that source in accordance with flight test methods, including a flight test plan, as described in the appropriate QPS.

c. The sponsor may submit alternative data acceptable to the NSPM for consideration, approval and possible use in particular applications for simulator qualification.

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

e. The NSPM may require additional flight testing to support certain simulator qualification requirements.

f. When a simulator sponsor learns, or is advised by a helicopter manufacturer or supplemental type certificate (STC) holder, that an addition to, an amendment to, or a revision of the data used to program and operate a simulator used in the sponsor's training program is available, the sponsor must immediately notify the NSPM.

End Rule Language (§ 60.13)

Begin QPS Requirements

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

(1) A flight test plan, that contains:

(a) The required maneuvers and procedures.

(b) For each maneuver or procedure—

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

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

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

(v) The data that is to be gathered.

(vi) Any other appropriate factors.

(2) Appropriately qualified flight test personnel.

(3) An understanding of the accuracy of the data to be gathered.

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

(5) Calibration of data acquisition equipment and helicopter performance instrumentation must be current and traceable to a recognized standard.

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

(1) in a format that supports the flight simulator 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 of this appendix;

(4) with any necessary guidance information provided; and

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

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

End QPS Requirements

Begin Information

j. Any necessary data and the flight test plan should be reviewed with the NSP staff well in advance of commencing the flight test.

End Information

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10. Special Equipment and Personnel Requirements for Qualification of the Simulator

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Begin Rule Language (§ 60.14)

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

End Rule Language (§ 60.14)

Begin Information

b. Examples of a special evaluation would be an evaluation conducted at the request of the TPAA or as a result of comments received from users of the simulator that, upon analysis and confirmation, might cause a question as to the continued qualification or use of the simulator.

c. The NSPM will notify the sponsor at least 24 hours in advance of the evaluation if special equipment or personnel will be required to conduct the evaluation. Examples of special equipment include spot photometers, flight control measurement devices, sound analyzer, etc. Examples of special personnel would be those specifically qualified to install or use any special equipment when its use is required.

End Information

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11. Initial (and Upgrade) Qualification Requirements

Begin Rule Language (§ 60.15)

a. For each simulator, the sponsor must submit a request through the TPAA to have the NSPM evaluate the simulator for initial qualification at a specific level. The request must be submitted in the form and manner described in the appropriate QPS.

b. The request must include all of the following:

(1) A statement that the simulator meets all of the applicable provisions of this part.

(2) A statement that the sponsor has established a procedure to verify that the configuration of hardware and software present during the evaluation for initial qualification will be maintained, except where modified as authorized in § 60.23. The statement must include a description of the procedure.

(3) A statement signed by at least one pilot who meets the requirements of paragraph (c) of this section asserting that each pilot so approved has determined that the following requirements have been met:

(i) The simulator systems and sub-systems function equivalently to those in the helicopter.

(ii) The performance and flying qualities of the simulator are equivalent to those of the helicopter.

(iii) The cockpit configuration conforms to the configuration of the helicopter make, model, and series being simulated.

(4) A list of all of the operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the simulator has not been subjectively tested (*e.g.*, circling approaches, windshear training, *etc.*) and for which qualification is not sought.

(5) A qualification test guide (QTG) that includes all of the following:

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

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

(iii) The general simulator performance or demonstration results prescribed in the appropriate QPS.

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

c. The pilot or pilots who make the statement required by paragraph (b)(3) of this section must—

(1) Be designated by the sponsor;

(2) Be approved by the TPAA; and

(3) Be qualified in—

(i) The helicopter being simulated; or

(ii) For helicopter types not yet issued a type certificate, a helicoptertype similar in size and configuration.

d. The subjective tests that form the basis for the statements described in paragraph (b)(3) of this section and the objective tests referenced in paragraph (b)(5) of this section must be accomplished at the sponsor's training facility except as provided for in the appropriate QPS.

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

f. When the simulator passes an evaluation for initial qualification, the NSPM issues a Statement of Qualification that includes all of the following:

(1) Identification of the sponsor.

(2) Identification of the make, model, and series of the helicopter being simulated.

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

(4) A statement that the simulator is qualified.

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

(6) A list of all of the operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the simulator has not been subjectively tested and for which the simulator is not qualified (e.g., circling approaches, windshear training, etc.).

g. After the NSPM completes the evaluation for initial qualification, the sponsor must update the QTG, with the results of the FAA-witnessed tests and demonstrations together with the results of all the objective tests and demonstrations described in the appropriate QPS.

h. Upon issuance of the Statement of Qualification the updated QTG becomes the MQTG and must then be made available to the FAA upon request.

End Rule Language (§ 60.15)

Begin QPS Requirements

i. The QTG described in paragraph 11.b.(4) of this appendix, must provide the documented proof of compliance with the simulator objective tests in attachment 2 of this appendix.

j. The QTG is prepared and submitted by the sponsor, or the sponsor's agent on behalf of the sponsor, through the TPAA 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 automatically and manually conducted tests;

(3) a means of comparing the simulator's test results to the objective data;

(4) statements of how a particular test was accomplished or that certain requirements have been met (see appendices to this document for additional information);

(5) other information appropriate to the qualification level of the simulator.

k. The QTG described in paragraph 11.b(4) of this appendix, must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see attachment 5, Figure 2, of this appendix for a sample QTG cover page).

(2) A recurrent evaluation schedule requirements page—to be used by the NSPM to establish and record the frequency with which recurrent evaluations must be conducted and any subsequent changes that may be determined by the NSPM. See attachment 5, Figure 4, of this appendix for a sample Recurrent Evaluation Schedule Requirements page.

(3) A simulator information page that provides the information listed below (see attachment 5, Figure 3, of this appendix for a sample simulator information page). For convertible simulators, a separate page is submitted for each configuration of the simulator.

(a) The sponsor's simulator 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 simulator model and manufacturer.

(h) The date of simulator manufacture.

(i) The simulator 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) The source data.

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

(8) Statements of compliance and capability (SOC's) with certain requirements.

SOC's must provide references to the sources of information for showing the capability of the simulator to comply with the requirement, a rationale explaining how the referenced material is used, mathematical equations and parameter values used, and the conclusions reached; i.e. that the simulator complies with the requirement. Refer to the "Additional Details" column in attachment 1 of this appendix, "Simulator Standards," or in the "Test Details" column in attachment 2 of this appendix, "Simulator Objective Tests," to see when SOC's 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 of this appendix, as applicable to the qualification level sought.

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating simulator objective test results.

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

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

(i) Tolerances for relevant parameters.

(j) Source of Helicopter Test Data (document and page number).

(k) Copy of the Helicopter Test 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.

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

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

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

(3) Helicopter 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 of this appendix.

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

m. The sponsor may elect to complete the QTG objective tests at the manufacturer's facility. Tests performed at this location must be conducted after assembly of the simulator has been essentially completed, the systems and sub-systems are functional and operate in an interactive manner, and prior to the initiation of disassembly for shipment. The sponsor must substantiate simulator performance at the sponsor's training facility by repeating a representative sampling of all the objective tests in the QTG and submitting these repeated test results to the NSPM. This sample must consist of at least one-third of the QTG objective tests. The QTG must be clearly annotated to indicate when and where each test was accomplished.

n. The sponsor may elect to complete the subjective tests at the manufacturer's facility. Tests performed at this location will be conducted after assembly of the simulator has been essentially completed, the systems and sub-systems are functional and operate in an interactive manner, and prior to the initiation of disassembly for shipment. The sponsor must substantiate simulator performance at the sponsor's training facility by having the pilot(s) who performed these tests originally (or similarly qualified pilot(s)), repeat a representative sampling of these subjective tests and submit a statement to the NSPM that the simulator has not changed from the original determination. The report must clearly indicate when and where these repeated tests were completed, but need not take more than one normal simulator period (e.g., 4 to 8 hours) to complete.

o. The sponsor must maintain a copy of the MQTG at the simulator location. After [date 6 years from the effective date of this rule] all MQTG's, regardless of initial qualification date of the simulator, must be available in an electronic format, acceptable to the NSPM. The electronic MQTG must include 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 simulator (reformatted or digitized) as prescribed in this document, the general simulator performance or demonstration results (reformatted or digitized) prescribed in this document, and a description of the equipment necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification. This electronic MQTG must include the original helicopter flight test data used to validate simulator performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original flight test time-history plots that were provided by the data supplier. An electronic copy of MQTG must be provided to the NSPM.

End QPS Requirements

Begin Information

p. Problems with objective test results are handled according to the following:

(1) If a problem with an objective test result is detected by the NSP evaluation team

during an evaluation, the test may be repeated and/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 simulator at that lower level. For example, if a Level D evaluation is requested and the simulator fails to meet sound test tolerances, it could be qualified at Level C.

q. After the NSPM issues a statement of qualification to the sponsor when a simulator is successfully evaluated, the simulator is recommended to the TPAA, who will exercise authority on behalf of the Administrator in approving the simulator in the appropriate helicopter flight training program.

r. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within 10 working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made; however, once a schedule is agreed to, any slippage of the evaluation date at the sponsor's request may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation. A sponsor may commit to an initial evaluation date under this early process, in coordination with and the agreement of the NSPM, but the request must be in writing and must include an acknowledgment of the potential schedule impact if the sponsor slips the evaluation from this early-committed date. See Attachment 5, figure 5 of this appendix, Sample Request for Initial Evaluation Date.

s. A convertible simulator is addressed as a separate simulator for each model and series helicopter to which it will be converted and for the FAA qualification level sought. An NSP evaluation is required for each configuration. For example, if a sponsor seeks qualification for two models of a helicopter type using a convertible simulator, two QTG's, or a supplemented QTG, and two evaluations are required.

t. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in attachment 2 of this appendix, Simulator Objective Tests.

End Information

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12. Additional Qualifications for a Currently Qualified Simulator

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Begin Rule Language (§60.16)

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

(1) The sponsor:

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

(ii) Must describe to the NSPM all modifications to the simulator that are

required to support the additional qualification.

(iii) Must submit a statement to the NSPM that a pilot, designated by the sponsor in accordance with § 60.15(c) and approved by the TPAA for the user, has subjectively evaluated the simulator in those areas not previously evaluated.

(2) The simulator must successfully pass an evaluation—

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

(ii) For those elements of an evaluation for initial qualification (e.g., objective tests, performance demonstrations, or subjective tests) designated as necessary by the NSPM.

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

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

d. The sponsor may not modify the simulator except as described in § 60.23.

End Rule Language (§ 60.16)

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13. Previously Qualified Simulators

Begin Rule Language (§60.17)

a. Unless otherwise specified by an FSD Directive, further referenced in the appropriate QPS, or as specified in paragraph (e) of this section, a simulator qualified before [the effective date of the final rule] will retain its qualification as long as it continues to meet the standards, including the performance demonstrations and the objective test results recorded in the MQTG, under which it was originally evaluated, regardless of sponsor, and as long as the sponsor complies with the applicable provisions of this part.

b. If the simulator qualification is lost under § 60.27 and not restored under § 60.27 for two (2) years or more, the qualification basis for the re-qualification will be those standards in effect and current at the time of re-qualification application.

c. Except as provided in paragraph (d) of this section, any change in simulator qualification level initiated on or after [the effective date of this rule] requires an evaluation for initial qualification in accordance with this part.

d. The NSPM may downgrade a qualified simulator without requiring and without conducting an initial evaluation for the new qualification level. Subsequent recurrent evaluations will use the existing MQTG, modified as necessary to reflect the new qualification level.

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

End Rule Language (§ 60.17)

Begin Information

f. Other certificate holders or persons desiring to use a flight simulator may contract with simulator sponsors to use those simulators already qualified at a particular level for a helicopter type and approved for use within an FAA-approved flight training program. Such simulators are not required to undergo an additional qualification process, except as described in paragraph 12, above.

Note: The reader is reminded of the requirement that each simulator user obtain approval for use of each simulator in an FAA-approved flight training program from the appropriate TPAA.

End Information

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14. Inspection, Maintenance, and Recurrent Evaluation Requirements.

Begin Rule Language (§60.19)

a. Inspection. No sponsor may use or allow the use of or offer the use of a simulator for meeting training, evaluation, or flight experience requirements of this chapter for flightcrew member certification or qualification unless the sponsor does the following:

(1) Accomplishes all appropriate QPS Attachment 1 performance demonstrations and all appropriate QPS Attachment 2 objective tests each year. To do this, the sponsor must conduct a minimum of four evenly spaced inspections throughout the year, as approved by the NSPM. The performance demonstrations and objective test sequence and content of each inspection in this sequence will be developed by the sponsor and submitted to the NSPM for approval. In deciding whether to approve the test sequence and the content of each inspection, the NSPM looks for a balance and a mix from the performance demonstrations and objective test requirement areas listed below as follows:

(i) Performance.
(ii) Handling qualities.
(iii) Motion system.
(iv) Visual system.
(v) Sound system (where appropriate).
(vi) Other simulator systems.

(2) Completes a functional preflight check in accordance with the appropriate QPS each calendar day prior to the start of the first simulator period of use that begins in that calendar day.

(3) Completes at least one functional preflight check in accordance with the appropriate QPS in every 7 consecutive calendar days.

(4) Maintains a discrepancy log.

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

(i) Each discrepancy entry must be maintained in the log until the discrepancy is corrected as specified in § 60.25(b) and for at least 30 days thereafter.

(ii) The corrective action taken for each discrepancy and the date that action is taken must be entered in the log. This entry concerning the corrective action must be maintained for at least 30 days thereafter.

(iii) The discrepancy log is kept in a form and manner acceptable to the Administrator and is kept in or immediately adjacent to the simulator.

b. Recurrent evaluation.

(1) This evaluation consists of performance demonstrations, objective tests, and subjective tests, including general simulator requirements, as described in the appropriate QPS or as may be amended by an FSD Directive.

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

(3) The sponsor must provide the NSPM access to the objective test results and general simulator performance or demonstration results in the MQTG, and access to the simulator for the length of time necessary for the NSPM to complete the required recurrent evaluations, weekdays between 6 o'clock AM (local time) and 6 o'clock PM (local time).

(4) No sponsor may use, or allow the use of, or offer the use of, a simulator for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet the requirements of this chapter unless the simulator has passed an NSPM-conducted recurrent evaluation within the previous 12 calendar months or as otherwise provided for in the MQTG.

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

c. Maintenance. The sponsor is responsible for continuing corrective and preventive maintenance on the simulator to ensure that it continues to meet the requirements of § 60.15(b).

End Rule Language (§ 60.19)

Begin QPS Requirements

d. The preflight inspections described in paragraphs 14.a(2) and (3) of this appendix must consist of, as a minimum—

(1) an exterior inspection of the simulator for appropriate hydraulic, pneumatic, and electrical connections (e.g., in place, not leaking, appear serviceable);

(2) a check that the area around the simulator is free of potential obstacles throughout the motion system range;

(3) a review of the simulator discrepancy log;

(4) a functional check of the major simulator systems and simulated helicopter systems (e.g., visual, motion, sound, cockpit instrumentation, and control loading, including adequate air flow for equipment cooling) by doing the following:

(i) Turn on main power, including motion system, and allow to stabilize.

(ii) Connect helicopter power. This may be connected through "quick start" of helicopter engines, auxiliary power unit, or ground power. Helicopter operations will require operating engines.

(iii) A general look for light bulb function, lighted instruments and switches, etc., as well as inoperative "flags" or other such indications.

(iv) Check Flight Management System(s) (and other date-critical information) for proper date range.

(v) Select takeoff position and from either pilot position, observe the visual system, for proper operation; e.g., light-point color balance and convergence, edge-matching and blending, etc.

(vi) Adjust visibility value to inside of the far end of the runway and release "position freeze or flight freeze." From either pilot position, add power to taxi (or hover taxi as applicable) down the runway (observe visual system, check sound system and engine instrument response) and apply wheel brakes if appropriate (to check wheel brake operation as applicable and to exercise simulator motion system); check normal operation.

(vii) Select position on final approach, at least five (5) miles out (observe visual scene). From either pilot position, adjust helicopter configuration appropriately (check for normal gear operation as applicable). Adjust visibility to see entire airport. Release "position freeze" or "flight freeze." Make a rapid left and right bank (check control feel and freedom; observe proper helicopter response; and exercise motion system). Observe visual system and simulated helicopter systems operation.

(viii) Extend gear, as applicable

(ix) Fly to and land at airport, or select takeoff position.

(x) Shut down engines, turn off lights, turn off main power supply and motion system.

(xi) Record "functional preflight" in the simulator discrepancy log book, including any item found to be missing, malfunctioning, or inoperative.

End QPS Requirements

Begin Information

e. If the NSP evaluator plans to accomplish specific tests during a normal recurrent evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; usually not less than 24 hours. These tests include latencies, control dynamics, sounds and vibrations, motion, and/or some visual system tests.

f. The recurrent evaluations described in paragraph 13.a(7), of this appendix require approximately eight (8) hours of simulator time and consist of the following:

(1) a review of the results of the objective tests and all the designated simulator performance demonstrations conducted by the sponsor since the last scheduled recurrent evaluation.

(2) at the discretion of the evaluator, a selection of approximately 20 percent of those objective tests conducted since the last scheduled recurrent evaluation and a selection of approximately 10 percent of the remaining objective tests in the MQTG. The tests chosen will be performed either automatically or manually, at the discretion of the evaluator.

(3) a subjective test of the simulator to perform a representative sampling of the tasks set out in attachment 3 of this appendix, selected at the discretion of the evaluator.

(4) an examination of the functions of the simulator, including, but not necessarily limited to the motion system, visual system, sound system, instructor operating station, and the normal and simulated malfunctions of the simulated helicopter systems.

End Information

15. Logging Simulator Discrepancies.

Begin Rule Language (§ 60.20)

Each instructor, check airman, or representative of the Administrator conducting training or evaluation, or observing flight experience for flightcrew member certification or qualification, and each person conducting the preflight inspection (§ 60.19(a)(2), (3), and (4)), who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the simulator, must write or cause to be written a description of that discrepancy into the discrepancy log at the end of the simulator preflight or simulator use session.

End Rule Language (§ 60.20)

16. [Reserved]

17. Modifications to Simulators

Begin Rule Language (§ 60.23)

a. When the sponsor or the FAA determines that any of the following circumstances exist and the FAA determines that the simulator cannot be used adequately to train, evaluate, or provide flight experience for flightcrew members, the sponsor must modify the simulator accordingly:

(1) The helicopter manufacturer or another approved source develops new data regarding the performance, functions, or other characteristics of the helicopter being simulated;

(2) A change in helicopter performance, functions, or other characteristics occurs;

(3) A change in operational procedures or requirements occurs; or

(4) Other circumstances as determined by the NSPM.

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

c. Before modifying a qualified simulator, the sponsor must notify the NSPM and the TPAA as follows:

(1) The notification must include a complete description of the planned modification, including a description of the operational and engineering effect the proposed modification will have on the operation of the simulator.

(2) The notification must be submitted in a form and manner as specified in the appropriate QPS.

d. If the sponsor intends to add additional equipment or devices intended to simulate helicopter appliances; modify hardware or software which would affect flight or ground dynamics, including revising simulator programming or replacing or modifying the host computer; or if the sponsor is changing or modifying the motion, visual, or control loading systems (or sound system for simulator levels requiring sound tests and measurements), the following applies:

(1) The sponsor must meet the notification requirements of paragraph (c) of this section and must include in the notification the results of all objective tests that have been re-run with the modification incorporated, including any necessary updates to the MQTG.

(2) However, the sponsor may not use, or allow the use of, or offer the use of, the simulator with the proposed modification for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet the requirements of this chapter unless or until the sponsor receives written notification from the NSPM approving the proposed modification. Prior to approval, the NSPM may require that the modified simulator be evaluated in accordance with the standards for an evaluation for initial qualification or any part thereof before it is placed in service.

e. The sponsor may not modify a qualified simulator until one of the following has occurred:

(1) For circumstances described in paragraphs (b) or (d) of this section, the sponsor receives written approval from the NSPM that the modification is authorized.

(2) For circumstances other than those described in paragraphs (b) or (d) of this section, either:

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

(ii) The NSPM or TPAA approves the proposed modification in fewer than 21 days since the sponsor notified the NSPM and the TPAA of the proposed modification.

f. When a modification is made to a simulator, the sponsor must notify each certificate holder planning to use that simulator of that modification prior to that certificate holder using that simulator the first time after the modification is complete.

g. The MQTG must be updated with current objective test results in accordance with § 60.15(b)(5) and appropriate flight test data in accordance with § 60.13, each time a simulator is modified and an objective test is affected by the modification. If this update is initiated by an FSD Directive, the direction

to make the modification and the record of the modification completion must be filed in the MQTG.

End Rule Language (§ 60.23)

Begin QPS Requirements

h. The notification described in paragraph 17.c.(1) of this appendix will include a statement signed by a pilot, qualified in the helicopter type being simulated and designated by the sponsor, that, with the modification proposed—

(1) the simulator systems and sub-systems function equivalently to those in the helicopter being simulated;

(2) the performance and flying qualities of the simulator are equivalent to those of the helicopter being simulated; and

(3) the cockpit configuration conforms to the configuration of the helicopter being simulated.

End QPS Requirements

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18. Operations With Missing, Malfunctioning, or Inoperative Components

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Begin Rule Language (§60.25)

a. No person may use or allow the use of or offer the use of a simulator with a missing, malfunctioning, or inoperative component for meeting training, evaluation, or flight experience requirements of this chapter for flightcrew member certification or qualification during maneuvers, procedures, or tasks that require the use of the correctly operating component.

b. Each missing, malfunctioning, or inoperative component must be repaired or replaced within 30 calendar days unless otherwise authorized by the NSPM. Failure to repair or replace this component within the prescribed time may result in loss of simulator qualification.

c. Each missing, malfunctioning, or inoperative component must be placarded as such on or adjacent to that component in the simulator and a list of the currently missing, malfunctioning, or inoperative components must be readily available in or immediately adjacent to the simulator for review by users of the device.

End Rule Language (§ 60.25)

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19. Automatic Loss of Qualification and Procedures for Restoration of Qualification.

Begin Rule Language (§60.27)

a. A simulator is not qualified if any of the following occurs:

(1) The simulator is not used in the sponsor's FAA-approved flight training program in accordance with § 60.9(b)(4).

(2) The simulator is not maintained and inspected in accordance with § 60.19.

(3) The simulator is physically moved from one location to another, regardless of distance.

(4) The simulator is disassembled (*e.g.*, for repair or modification) to such an extent that it cannot be used for training, evaluation, or experience activities.

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

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

(1) The simulator successfully passes an evaluation:

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

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

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

c. In making the determinations described in paragraph (b) of this section, the NSPM considers factors including the number of inspections and recurrent evaluations missed, the amount of disassembly and re-assembly of the simulator that was accomplished, and the care that had been taken of the device since the last evaluation.

End Rule Language (§ 60.27)

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20. Other Losses of Qualification and Procedures for Restoration of Qualification

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Begin Rule Language (§60.29)

a. Except as provided in paragraph (c) of this section, when the NSPM or the TPAA notifies the sponsor that the simulator no longer meets qualification standards, the following procedure applies:

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

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

(3) After considering all material presented, the NSPM or the TPAA notifies the sponsor of the simulator qualification.

(4) If the NSPM or the TPAA notifies the sponsor that some or all of the simulator is no longer qualified, it becomes effective not less than 30 days after the sponsor receives notice of it unless—

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

(ii) The sponsor petitions for reconsideration of the NSPM or the TPAA finding under paragraph (b) of this section.

b. When a sponsor seeks reconsideration of a decision from the NSPM or the TPAA concerning the simulator qualification, the following procedure applies:

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

(2) The sponsor must address its petition to the Director, Flight Standards Service.

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

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

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

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

End Rule Language (§ 60.29)

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21. Recordkeeping and Reporting

Begin Rule Language (§60.31)

a. The simulator sponsor must maintain the following records for each simulator it sponsors:

(1) The MQTG and each amendment thereto.

(2) A copy of the programming used during the evaluation of the simulator for initial qualification and for any subsequent upgrade qualification, and a copy of all programming changes made since the evaluation for initial qualification.

(3) A copy of all of the following:

(i) Results of the evaluations for the initial and each upgrade qualification.

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

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

(iv) Comments obtained in accordance with § 60.9(b)(1) for a period of at least 18 months.

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

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

(ii) The action taken to correct the discrepancy.

(iii) The date the corrective action was taken.

(5) A record of all modifications to simulator hardware configurations made since initial qualification.

b. The simulator sponsor must keep a current record of each certificate holder using the simulator. The sponsor must provide a

copy of this list to the NSPM at least semiannually.

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

d. The sponsor must submit an annual report, in the form of a comprehensive statement signed by the quality assurance primary contact point, certifying that the simulator continues to perform and handle as qualified by the NSPM.

End Rule Language (§ 60.31)

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22. Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements

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Begin Rule Language (§60.33)

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

(1) A fraudulent or intentionally false statement in any application or any amendment thereto, or any other report or test result required by this part or the QPS.

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

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

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

(1) A civil penalty.

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

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

c. The following may serve as a basis for removal of qualification of a simulator including the withdrawal of authorization for use of a simulator; or denying an application for a qualification.

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

(2) An incorrect entry, upon which the FAA relied or could have relied, made in any

logbook, record, or report that is kept, made, or used to show compliance with any requirement for a simulator qualification or an approval for use.

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23. [Reserved]

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24. [Reserved]

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25. [Reserved]

End Rule Language (§60.33)

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

1. General

Begin QPS Requirements

a. Requirements.

(1) Certain simulator and visual system requirements included in this appendix must be supported with a Statement of Compliance and Capability (SOC) and, in designated cases, simulator performance must be recorded and the results made part of the QTG. In the following tabular listing of simulator standards, requirements for SOC's are indicated in the "Additional Details" column.

(2) Airports (or landing areas) represented in visual scenes required by this document must be representations of real-world, operational airports (or landing areas) or representations of fictional airports (or landing areas), designed specifically for use in training, testing, and/or checking of flight crewmembers.

(a) If real-world, operational airports (or landing areas) are simulated, the visual representation and scene content is compared to that of the actual airport (or landing area). This comparison requires accurate simulation of that airport (or landing area) to the extent set out in this document and as required by the qualification level sought. It also requires the visual scene to be modified when the airport (or landing area) is modified; *e.g.*, when additional runways or taxiways are added; when existing runway(s) are lengthened or permanently closed; when magnetic bearings to or from a runway or landing area are changed; when significant

and recognizable changes are made to the landing area or surrounding terrain; etc.

(b) If fictional airports (or landing areas) are used, the navigational aids and all appropriate maps, charts, and other navigational reference material for such airports (or landing areas and surrounding areas as necessary), are evaluated for compatibility, completeness, and accuracy. These items are compared to the visual presentation and scene content of the fictional airport (or landing area) and require simulation to the extent set out in this document and as required by the qualification level sought. An SOC must be submitted that addresses navigation aid installation and performance (including obstruction clearance protection, etc.) and other criteria for all instrument approaches that are available in the simulator. The SOC must reference and account for information in the Terminal Instrument Procedures Manual ("Terps" Manual, FAA Handbook 8260.3, as amended) and the construction and availability of the required maps, charts, and other navigational material. This material must be appropriately marked "for training purposes only."

End QPS Requirements

Begin Information

b. Discussion.

(1) This attachment describes the minimum simulator requirements for qualifying helicopter simulators. To determine the complete requirements for a specific level simulator the objective tests in attachment 2 of this appendix and the examination of functions and subjective tests listed in attachment 3 of this appendix must also be consulted.

(2) The material contained in this attachment is divided into the following categories:

(a) General cockpit configuration.

(a) Simulator programming.

(a) Equipment operation.

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

(a) Motion system.

(a) Visual system.

(g) Sound system.

End Information

TABLE OF MINIMUM SIMULATOR REQUIREMENTS

General simulator requirements	Simulator level				Additional details	Information notes
	A	B	C	D		
2. General Cockpit Configuration						
a. The simulator must have a cockpit that is a full-scale 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.		X	X	X	Pilot seats must afford the capability for the occupant to be able to achieve the design "eye position" established for the helicopter being simulated.	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 additional, required crewmember duty stations and those required bulkheads aft of the pilot seats.
b. Those circuit breakers that affect procedures and/or result in observable cockpit indications must be properly located and functionally accurate.		X	X	X	....	
3. Programming						
a. The effect of aerodynamic changes 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, center of gravity location, and configuration.		X	X	X	....	
b. The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought.						
c. Simulator hardware and programming must be updated within 6 months of any helicopter modifications or appropriate data releases unless, with prior coordination, the NSPM authorizes otherwise.		X	X	X		
d. Ground handling and aerodynamic programming must include the following:		X	X	X	An SOC is required. Simulator performance must be recorded and the results made part of the QTG.	
(1) Ground effect.					Level B does not require hover programming. Flare and touch down from a running landing as well as for in-ground-effect (IGE) hover.	
(2) Ground reaction.					Reaction of the helicopter upon contact with the landing surface during landing, (e.g., strut deflection, tire or skid friction, side forces, etc.) and may differ with changes in gross weight, airspeed, rate of descent on touchdown, etc.	Data is required to identify the flight condition and helicopter configuration.
(3) Ground handling characteristics.					Control inputs required during operations in crosswind, during braking and deceleration, and for turning radius.	
e. The simulator must include a means for quickly and effectively testing simulator programming and hardware.			X	X	An SOC is required	This may include an automated system, which could be used for conducting at least a portion of the QTG tests.

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	Simulator level				Additional details	Information notes
QPS requirement	A	B	C	D		
f. The simulator must provide for automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests as prescribed in attachment 2.			X	X	An SOC is required. .... Simulator to test results must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the helicopter standard.	Automatic "flagging" of out-of-tolerance situations is encouraged.
g. Relative responses of the motion system, visual system, and cockpit instruments must be coupled closely to provide integrated sensory cues.		X	X	X	For Level B, response must be within 150 milliseconds of the helicopter response. For Levels C and D, response must be within 100 milliseconds of the helicopter response.	
(1) Latency: These systems must respond to abrupt input at the pilot's position. The response must not be prior to that time when the helicopter responds and may respond up to 150 milliseconds (for a Level B simulator) or 100 milliseconds (for Level C and D simulators) after that time. Visual change may start before motion response, but motion acceleration must be initiated before completion of the visual scan of the first video field containing different information.					Simultaneously record: the analog output from the pilot's cyclic, collective, and pedals; the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots' seats; the output signal to the visual system display (including visual system analog delays); and the output signal to the pilot's attitude indicator or an equivalent test approved by the Administrator. Simulator performance must be recorded and the results must be compared to helicopter response data in the hover (for Levels C and D only), climb, cruise, and autorotation. The results must be recorded in the QTG.	The intent is to verify that the simulator provides instrument, motion, and visual cues that are, within the stated time delays, like the helicopter responses. Acceleration in the appropriate rotational axis is preferred. Simulator Latency is measured from the start of a control input to the appropriate perceivable change in: flight instrument indication; visual system response; or motion system response.
(2) Transport Delay: As an alternative to the Latency requirement, above, a transport delay demonstration may be used to demonstrate that the simulator system does not exceed the specified limit of 150 milliseconds for Level B simulators or 100 milliseconds for Level C or D simulators. The sponsor must measure all the delay encountered by a step signal migrating from the pilot's control through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a hand-shaking protocol, finally through the normal output interfaces to the instrument displays, the motion system, and the visual system					An SOC is required. A recordable start time for the test must be provided with the pilot flight control input. The migration of the signal must permit normal computation time to be consumed and must not alter the flow of information through the hardware/software system. While transport delay need only be measured once in each axis, independent of flight conditions, if this method is chosen, the sponsor must also demonstrate the latency of the simulator with respect to that of the helicopter with at least one demonstration in pitch, in roll, and in yaw as described above. Simulator performance must be recorded and the results must be recorded in the QTG.	The transport delay is the time between the control input and the individual hardware (*i.e.,* instruments, motion system, visual system) responses.
h. The simulator must accurately reproduce the stopping and directional control forces for at least the following landing surface conditions for a running landing: (1) Wet .... (2) Icy (3) Patchy Wet. (4) Patch Icy			X	X	An SOC is required Simulator performance must be recorded and the results made part of the OTG.	Objective tests are described in attachment 2 for dry runway conditions.

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	Simulator level				Additional details	Information notes
	A	B	C	D		
i. The simulator must accurately simulate brake and tire failure dynamics and decreased brake efficiency due to brake temperatures.			X	X	An SOC is required. A demonstration is required for initial and recurrent evaluations. Simulator performance must be recorded for decreased braking efficiency due to brake temperature and the results made part of the OTG	Simulator pitch, side loading, and directional control characteristics should be representative of the the helicopter.
j. The simulator must have aerodynamic modeling, including ground effect, the effects of airframe icing (if applicable), aerodynamic interference effects between the rotor wake and fuselage, influence of the rotor on control and stabilization systems, and representations on non linearties due to sideslip.			X	X	An SOC is required and must include references to computations of aeroelastic representations and nonlinearities due to sideslip. An SOC and a demonstration of icing effects (if applicable) are required.	See Attachment #2, paragraph 4, for further information on ground effect.
k. The simulator must have a software and hardware control methodology that is supported by diagnostic analysis program(s) and resulting printouts.				X	An SOC is required.	
4. Equipment Operation a. All relevant cockpit instrument indications involved in the simultation of the helicopter must automatically respond to control movement or external disturbances to the simulated helicopter; e.g., turbulence or windshear.		X	X	X	Numerical values must be presented in the appropriate units for US operations: for example, fuel in pounds, speed in knots, and altitude in feet.	
b. Communications and navigation equipment must be installed and operate within the tolerances applicable for the helicopter.		X	X	X	....	See Attachment paragraph 1c for further information regarding long-range navigation equipment.
c. Simulated helicopter systems must operate as the helicopter systems would operate under normal, abnormal, and emergency operating conditions on the ground and in flight.		X	X	X		
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 condition.		X	X	X		
5. Instructor or Evaluator Facilities a. In addition to the flight crew member stations, the simulator must have 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.		X	X	X	All seats other than flight crew seats need not represent those found in helicopter but must be equipped with similar positive restraint devices.	The NSPM will consider alternatives to this standard for additional seats based on unique cockpit configurations.
b. The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions described in the sponsor's pilot operating manual into the simulated helicopter system.		X	X	X		

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirement				Additional details	Information notes
	Simulator level					
	A	B	C	D		
c. The Simulator must have instructor controls for wind speed and direction.		X	X	X		
d. The simulator must provide the instructor or evaluator the ability to present ground and air hazards.			X	X	....	For example, another helicopter crossing the active runway and converging airborne traffic; etc.
6. Motion System						
a. The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in a helicopter.		X	X	X	....	For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated helicopter.
b. The simulator must have a motion system with a minimum of three degrees of freedom (at least pitch, roll, sway, and heave).		X			An SOC is required.	
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.			X	X	An SOC is required.	
d. The simulator must provide special effects programming that includes the following: (1) Runway rumble, eleo deflections, effects of ground speed and uneven runway characteristics. (2) Buffet due to transverse flow effect. (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.		X	X	X	A qualitative assessment is required to determine that the effect is representative of the helicopter simulated.	
e. The simulator must provide characteristic buffet motions that result from operation of the helicopter (for example, retreating blade stall, extended landing gear, settling with power) which can be sensed in the cockpit.				X	Simulator performance (with emphasis on amplitude and frequency) must be recorded and compared to helicopter data. The results must be made a part of the QTG. For air turbulence, general purpose disturbance models that approximate demonstrable flight test data are acceptable.	The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to helicopter data.
7. Visual System						
a. The simulator must have a visual system providing an out-of-the-cockpit view.		X	X	X	A demonstration is required for initial and recurrent evaluations.	
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.		X			An SOC is required.	
c. The simulator must provide a continuous minimum collimated visual field of view of 150° horizontally and 40° vertically for each pilot.			X		An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.	
d. The simulator must provide a continuous minimum collimated visual field of view of 180° horizontally and 60° vertically for each pilot.				X	An SOC is required. Horizontal field of view is centered on the zero degree azimuth line relative to the aircraft fuselage.	

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	Simulator level				Additional details	Information notes
	A	B	C	D		
e. The simulator must have operational landing lights (if applicable) for night scenes.		X	X	X	A demonstration is required for initial and recurrent evaluations. Where used, dusk (or twilight) secenes require operational landing lights.	
f. The simulator provide visual cues to assess rate of change of height, height AGL, as well as translational displacement and rates, during takeoff and landing.		X			An SOC is required.	
g. The simulator must have night and dusk (or twilight) visual scene capability, including general terrain characteristics and significant landmarks, free from apparent quantization.			X	X	A demonstration is required for initial and recurrent evaluations. Dusk (or twilight) scene must enable identification of a visible horizon and general terrain characteristics.	Examples of general terrain characteristics are fields, roads, and bodies of water.
h. The simulator provide visual cues to assess rate of change of height, height AGL, as well as translational displacements and rates, during takeoff, low altitude/low airspeed maneuvering, hover, and landing.			X	X	An SOC is required.	
i. The simulator must have instructor controls for the following: (1) Cloudbase. (2) Visibility in statute miles (km) and runway visual range (RVR) in ft. (m). (3) Selection of airport or landing area. (4) Lighting at airport or landing area.		X	X	X	A demonstration is required for initial and recurrent evaluations.	
j. 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. (c) Taxiway lights.		X	X	X	A demonstration is required for initial and recurrent evaluations.	

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirement				Additional details	Information notes
	Simulator level					
	A	B	C	D		
k. The distances at which runway features are visible, as measured from a runway threshold to a helicopter aligned with the runway on an extended 3° glide slope must not be less than listed below: (1) Runway definitions, trobe lights, approach lights, runway edge white lights and Visual Approach Slope Indicator (VASI) or Precision Approach Path Indicator (PAPI) system lights from 5 statute miles (8 kilometers (km)) of the runway threshold. (2) Runway centerline lights and taxiway definition from 3 statute miles (4.8 km). (3) Threshold lights and touchdown zone lights from 2 statute miles (3.2 km). (4) Runway marking within range of landing lights for night scenes; as required by three (3) arc-minutes resolution on day scenes.		X	X	X	A demonstration is required for initial and recurrent evaluations.	
l. The simulator must provide visual system compatibility with aerodynamic programming.		X	X	X	....	
m. The simulator must be verified for visual ground segment and visual scene content for the helicopter in landing configuration and a main wheel (or landing skid) height or 100 feet (30 meters) above the touchdown zone. Data submitted must include at least the following: (1) Static helicopter dimensions as follows: (a) Horizontal and vertical distance from main landing gear (MLG) or landing skids to glideslope reception antenna. (b) Horizontal and vertical distance form MLG or skids to pilot's eyepoint. (c) Static cockpit cutoff angle. (2) Approach data as follows: (a) Identification of runway. (b) Horizontal distance from runway threshold to glideslope intercept with runway. (c) Glideslope angle. (d) Helicopter pitch angle on approach. (3) Helicopter data for manual testing: (a) Gross weight. (b) Helicopter configuration. (c) Approach airspeed.		X	X	X	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.	
n. The simulator must provide for: (1) Accurate portrayal of the environment relating to the simulator attitude.		X	X	X	An SOC is required.	Visual attitude vs. simulator is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indictor.

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

QPS requirement						Information notes
General simulator requirements	Simulator level				Additional details	
	A	B	C	D		
(2) Quick confirmation of visual system color, RVR, focus, and intensity.			X	X	An SOC is required. In both of the above cases, a demonstration is required for initial evaluations. However, if there is any question regarding these functions, the NSPM may require the demonstration be repeated during any inspection or subsequent recurrent evaluation.	
o. The simulator must provide a minimum of three airport (or landing area) scenes including: (1) Surfaces on landing areas. (2) Lighting of appropriate color for all landing surfaces, including, for runways—runway threshold, edge, centerline, VASI (or PAPI), and approach lighting for the runway in use. (3) Taxiway lighting at airports. (4) Terrain, including ramps and buildings that are in the sponsor's Line Oriented scenarios.			X	X	A demonstration is required for initial and recurrent evaluations.	
p. The simulator must be capable of producing at least 10 levels of occulting.			X	X	A demonstration is required for initial evaluation. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	
q. The 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 break out. (4) Patchy fog. (5) The effect of fog on airport lighting.			X	X	A demonstration is required for initial and recurrent evaluations. 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.	
r. The surface resolution must be demonstrated by a test pattern of objects shown to occupy a visual angle of three (3) arc-minutes in the visual scene from the pilot's "eye point.'.			X	X	An SOC is required and must include the relevant calculations. A demonstration is required on initial evaluations. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection of subsequent recurrent evaluation.	
5. The lightpoint size must not be greater than six (6) arc-minutes.			X	X	An SOC is required and must include the relevant calculations. A demonstration is required on initial evaluations. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	Simulator level				Additional details	Information notes
	A	B	C	D		
t. The lightpoint contrast ratio must not be less than 25:1			X	X	An SOC is required and must include the relevant calculations. A 1-degree spot photometer is used to measure a square of at least 1 degree, filled with lightpoints (where lightpoint modulation is just discernible) and compare the results to the measured adjacent background. A demonstration is required on initial evaluations. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	
u. The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots				X	A demonstration is required for initial and recurrent evaluations.	For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features, etc.
v. The simulator must have daylight, night, and either 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. The simulator cockpit ambient lighting must be dynamically consistent with the visual scene displayed.				X	A demonstration is required for initial and recurrent evaluations. The daylight visual scene must be a part of a total daylight cockpit environment which at least represents the amount of light in the cockpit on an overcast day. For daylight scenes, such ambient lighting must not "washout" the displayed visual scene nor fall below 5 foot-lamberts (17 cd/m²) of light as reflected from an instrument approach plate at knee height at both pilots' station. These requirements are applicable to any level of simulator equipped with a "daylight" visual system.	Brightness capability may be demonstrated with a test pattern of white light using a spot photometer. Daylight visual system is defined as a visual system capable of producing, at a minimum, full color presentations, scene content comparable in detail to that produced by 4,000 edges or 1,000 surfaces for daylight and 4,000 lightpoints for night and dusk scenes, 6 foot-lamberts (20 cd/m²) of light measures at the pilot's eye position (highlight brightness) and a display which is free of apparent quantization and other distracting visual effects while the simulator is in motion.
(1) The simulator visual system must provide a minimum contrast ratio of 5:1.					A raster-drawn pattern must be displayed that fills the entire visual scene (3 or more channels) consisting of a matrix of black and white squares no larger than 10° and no smaller than 5° per square, with a white square having a minimum threshold value of 2 foot-lamberts, or 7 cd/m² in the center of each channel. The contrast ratio is the numerical value of the brightness measures for the center (white) square divided by the brightness value for any adjacent (dark) square.	A 1° spot photometer is used to measure the brightness values.
(2) The simulator visual system must provide a highlight brightness of not less than six (6) foot-lamberts (20 cd/m²).					The test must use the full pattern described above, measuring the brightness of a white square, superimposed completely with a highlighted area covering the square. Use of calligraphic capabilities to enhance raster brightness is acceptable; however, individual light points or light point arrays are not acceptable.	A 1° spot photometer is used to measure the brightness values.

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	Simulator level				Additional details	Information notes
	A	B	C	D		
w. The simulator must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on take-off and during approach and landing.					A demonstration is required for initial and recurrent evaluations. Representations need only be present at and below an altitude of 22,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport.	
x. The simulator must present visual scenes of wet and snow-covered landing areas, including lighting reflections for wet conditions, partially obscured lights for snow conditions, or suitable alternative effects.					A demonstration is required for initial and recurrent evaluations.	
y. The simulator must present realistic color and directionality of all landing area lighting.					A demonstration is required for initial and recurrent evaluations.	
8. Sound System.						
a. The simulator must provide cockpit sounds that result from pilot actions that correspond to those that occur in the helicopter.		X	X	X		
b. The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant helicopter noises perceptible to the pilot during normal operations, and include the sound of a crash (when the simulator is landed in an unusual attitude or in excess of the structural gear limitations); normal engine and thrust reversal sounds; and the sounds of flap, gear, and spoiler extension and retraction.			X	X	An SOC is required. A demonstration is required for initial and recurrent evaluations.	
c. The simulator must provide realistic amplitude and frequency of cockpit noises and sounds.				X	Simulator performance must be recorded and must be compared to amplitude and frequency of the same sounds recorded in the helicopter. These results must be made a part of the QTG. These noises and sounds must include, at least, the sound of precipitation, windshield wipers, engine, and airframe sounds. When appropriate, the sounds must be coordinated with the weather representations required in paragraph 4.w.	

Attachment 2 to Appendix C to Part 60—Simulator Objective Tests

1. General

_____

Begin QPS Requirements

a. Test Requirements.

(1) The ground and flight tests required for qualification are listed in the following Table of Objective Tests. Computer generated simulator test results must be provided for each test. If a flight condition or operating condition is required for the test but which does not apply to the helicopter being simulated or to the qualification level sought,

it may be disregarded (for example: an engine out missed approach for a single-engine helicopter; a hover test for a Level B simulator; etc.). Each test result is compared against Flight Test Data described in § 60.13, and Paragraph 9 in the main body of 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 a multi-channel recorder, line printer, or other appropriate recording device acceptable to the NSPM. Time histories are

required unless otherwise indicated in the Table of Objective Tests. All results must be labeled using the tolerances and units given.

(2) The Table of Objective Tests in this attachment sets out the test results required, including the parameters, tolerances, and flight conditions for simulator validation. Tolerances are provided for the listed tests because aerodynamic 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.

(3) Certain tests included in this attachment must be supported with a Statement of Compliance and Capability (SOC). In the following tabular listing of simulator tests, requirements for SOC's are indicated in the "Test Details" column.

(4) 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.

(5) 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. Tests of handling qualities must include validation of augmentation devices.

(6) 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 pounds (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. For example: 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 clearly annotated as to indicated, calibrated, etc., and like values used for comparison.

(7) The QTG provided by the sponsor must describe clearly and distinctly how the simulator will be set up and operated for each test. Overall integrated testing of the simulator must be accomplished to assure that the total simulator system meets the prescribed standards; *i.e.*, it is not acceptable to test only each simulator subsystem independently. A manual test procedure with explicit and detailed steps for completion of each test must also be provided.

(8) In those cases where the objective test results authorize a "snapshot" result in lieu of a time-history result, the sponsor must ensure that a steady state condition exists from 5 seconds prior to, through 2 seconds after, the instant of time captured by the "snapshot."

(9) For previously qualified simulators, the tests and tolerances of this appendix may be used in subsequent recurrent evaluations for any given test providing the sponsor has submitted a proposed MQTG revision to the NSPM and has received NSPM approval.

(10) 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.

(11) Simulators for 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 form failure states, validation of the effect of the failure is necessary. For those

performance and static handling qualities tests where the primary concern, in the unaugmented configuration, is control position, 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 to between the sponsor and the NSPM on a case-by-case basis.

(12) For highly augmented helicopters using helicopter hardware (*i.e.*, "helicopter modular controllers") in the simulator cockpit, some tests will not be required. Those tests are annotated in the "Additional Requirements" column. However, in these cases the sponsor must supply a statement that the helicopter hardware meets and will continue to meet the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

End QPS Requirements

Begin Information

b. Discussion

(1) 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.

(2) 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 paragraph 4, Motion System, in the following table).

End Information

TABLE OF OBJECTIVE TESTS

	QPS requirements		Simulator level					Information notes
Test	Tolerance	Flight conditions	A	B	C	D	Test details	
2. Performance **a. Engine Assessment** (1) Start Operations:								
(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.		X	X	X	Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM.	
(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		X	X	X	Record both steady state idle and operating RPM conditions. May be a series of snapshot tests.	
(2) Power Turbine Speed Trim.	±10% of total change of power turbine speed.	Ground		X	X	X	Record engine response to trim system actuation in both directions.	

TABLE OF OBJECTIVE TESTS—Continued

QPS requirements								Information notes
Test	Tolerance	Flight conditions	Simulator level				Test details	
			A	B	C	D		
(3) Engine and Rotor Speed Governing.	Torque—±5%, Rotor Speed—1.5%.	Climb, descent		X	X	X	Record results using a step input to the collective. May be conducted concurrently with climb and descent performance tests.	
b. Ground Operations								
(1) Minimum Radius Turn	±3 ft. (0.9m) or 20% of helicopter turn radius.	Ground		X	X	X	If brakes are used, brake force must be matched to the helicopter flight test value..	
(2) Rate of Turn vs. Pedal Deflection or Nosewheel Angle.	±10% or ±2d°/sec. Turn Rate.	Ground Takeoff		X	X	X		
(3) Taxi	Pitch Angle—±1.5°, Torque—±3%, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%.	Ground		X	X	X	Record results for control position and pitch attitude during ground taxi for a specific ground speed, wind speed and direction, and density altitude.	
(4) Brake Effectiveness	±10% of time and distance ..	Ground		X	X	X		
c. Takeoff								
(1) Engines	Airspeed—±3 kt, Altitude—±20ft (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.		X	X	X	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.	
(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.		X	X	X	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.	
d. Hover								
Performance	Torque—±3%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%.	In Ground Effect (IGE); and Out of Ground Effect (OGE).			X	X	Record results for light and heavy gross weights. May be a series of snapshot tests.	
e. Vertical Climb								
Performance	Vertical Velocity—±100 fpm (0.50m/sec) or ±10%, Directional Control Position—±5%, Collective Control Position—±5%.	From OGE Hover			X	X	Record results for light and heavy gross weights. May be a series of snapshot tests.	
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).		X	X	X	Record results for two gross weight and CG combinations with varying trim speeds throughout the airspeed envelope. May be a series of snapshot tests.	

TABLE OF OBJECTIVE TESTS—Continued

Test	Tolerance	Flight conditions	Simulator level				Test details	Information notes
			A	B	C	D		
g. Climb Performance and Trimmed Flight Control Positions.	Vertical Velocity—±100 fpm (61m/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.		X	X	X	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.	
h. Descent (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.		X	X	X	Results must be recorded for two gross weight and CG combinations. May be a series of snapshot tests.	
(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.	Steady descents. Augmentation System(s) On and Off.		X	X	X	Record results for two gross weight conditions. Data must be recorded for normal operating RPM. (Rotor speed tolerance applies only if collective control position is full down.) Data must be recorded for speeds from approximately 50 kts. through at least maximum glide distance airspeed. May be a series of snapshot tests.	
i. Autorotation Entry	Rotor Speed—±3%, Pitch Attitude—±2°, Roll Attitude—±3°, Yaw Attitude—±5°, Airspeed—±5 kts. Vertical Velocity—±200 fpm (1.00 m/sec) or 10%.	Cruise; or Climb			X	X	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.	
j. Landing (1) All Engines	Airspeed—±3 kts., Altitude—±20 ft. (6.1 m), Torque—±3%, Rotor Speed—±1.5%, Pitch Attitude—±1.5°, Bank Attitude—±1.5°, Heading—±2°, Longitudinal Control Position—±10%, Lateral Control Position—±10%, Directional Control Position—±10%, Collective Control Position—±10%.	Approach		X	X	X	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 Levels C and D). For Level B, the criteria apply only to those segments at airspeeds above effective translational lift.	
(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		X	X	X	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.	

TABLE OF OBJECTIVE TESTS—Continued

Test	QPS requirements		Simulator level				Test details	Information notes
	Tolerance	Flight conditions	A	B	C	D		
(B) Balked Landing	Airspeed-±3 kts, Altitude -±20 ft. (6.1m), Torque-±3%, Rotor Speed-±1.5%, Pitch Atitude-±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		X	X	X	Record the results for the maneuver initiated from a stablized approach at the landing decision point (LDP).	
(4) Autorotational Landing. ...	Torque-±3%, Rotor Speed-±3%, Vertical Velocity-±100 fpm (0.50m/sec) or 10%, Pitch Attitude-±2°, Bank Attitude-±2°, Heading—±5°, Longitudinal Control Position-±10%, Lateral Control Position-±10%, Directional Control Position-±10%, Collective Control Position-±10%.	Landing			X	X	Record the results of an autorotational deceleration and landing from a stabilized autorotational descent, to touch down.	
3. HANDLING QUALITIES. **a. Control System Mechanical Characteristics.**								
For simulators requiring Static or Dynamic tests at the controls (ie., 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, that show satisfactory agreement. Repeat of the alternative method during the initial or upgrade evaluaiton would then satisfy this test requirement. For initial and upgrade evaluaitons, 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 clarificaiton of any issue regarding helicopters with reversible controls
(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.		X	X	X	Record results for an uninterrupted control sweep to the stops. (This test does not apply if aircraft hardware modular controllers are used.).	
(2) Collective/Pedals	Breakout—±0.5 lbs. (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.		X	X	X	Record results for an uninterrupted control sweep to the stops..	
(3) Brake Pedal Force vs. Position.	±5 lbs. (2.224 daN) or 10%	Ground; Static conditions		X	X	X		
(4) Trim System Rate (all applicable systems).	Rate—±10%	Ground; Static conditions. Trim On, Friction Off.		X	X	X	The tolerance applies to the recorded value of the trim rate.	

TABLE OF OBJECTIVE TESTS—Continued

QPS requirements			Simulator level					Information notes
Test	Tolerance	Flight conditions	A	B	C	D	Test details	
(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.			X	X	Results must be recorded for a normal control displacement in both directions in each axis (approximately 25% to 50% of full throw).	Control Dynamics for irreversible control systems may be evaluated in a ground/static condition. Refer to paragraph 5 of this attachment for additional information. "N" is the sequential period of a full cycle of oscillation.
(6) Freeplay	±0.10 in.	Ground; Static conditions		X	X	X	Record and compare results for all controls.	
b. Low Airspeed Handling Qualities:								
(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%.	Transitional Flight IGE-Sideward, rearward, and forawrd flight. Augmentation On and Off.			X	X	Record results for several airspeed increments to the translational airspeed limits and for 45 kts. forward airspeed. May be a series of snapshot tests.	
(2) Critical Azimuth	Torque—±3% Pitch Attitude+±1.5°, Bank Attitude—±2°, Longitudinal Control Position—±5%, Lateral Control Position—±5%, Directional Control Position—±5%, Collective Control Position—±5%.	Stationary Hover Augmentation On and Off.			X	X	Record results for three relative wind directions (including the most critical case) in the critical quadrant. May be a series of snapshot tests.	
(3) Control Response: (a) Longitudinal	Pitch Rate—±10% or ±2°/sec. Pitch Attitude Change—±10% or 1.5°.	Hover Augmentation On and Off.			X	X	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases..	
(b) Lateral	Roll Rate—±10% or ±3°/sec. Roll Attitude Change—±10% or ±3°.	Hover Augmentation On and Off.			X	X	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.	
(c) Directional	Yaw Rate—±10% or ±2°/sec. Heading Change—±10% or ±2°.	Hover Augmentation On and Off..			X	X	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.	
(d) Vertical	Normal Acceleration—±0.1 ..	Hover			X	X	Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.	

TABLE OF OBJECTIVE TESTS—Continued

Test	Tolerance	Flight conditions	Simulator level				Test details	Information notes
			A	B	C	D		
c. Longitudinal Handling Qualities:								
(1) Control Response	Pitch Rate—±10% or ±2°/sec., Pitch Attitude Change—±10% or ±1.5°.	Cruise Augmentation On and Off.		X	X	X	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.	
(2) Static Stability	Longitudinal Control Position: ±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Force: ±0.5lb. (0.223 daN) or ±10%.	Cruise or Climb. Autorotation. Augmentation On and Off.		X	X	X	Record results for a minimum of two speeds on each side of the trim speed. May be a series of snapshot tests.	
(3) Dynamic Stability: (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.		X	X	X	Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. For non-periodic responses, the time history must be matched.	
(b) Short Term Response.	±1.5° Pitch or ±2°/sec. Pitch Rate. ±0.1 g Normal Acceleration.	Cruise or Climb. Augmentation On and Off.		X	X	X	Record results for at least two airspeeds.	
(4) Maneuvering Stability.	Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Longitudinal Control Forces—±0.5 lb. (0.232 daN) or ±10%.	Cruise or Climb. Augmentation On and Off..		X	X	X	Record results for at least two airspeeds. Record results for Approximately 30°–45° bank angle. The force may be shown as a cross plot for irreversible systems. May be a series of snapshot tests.	
(5) Landing Gear Operating Times.	±1 sec.	Takeoff (Retraction) Approach (Extension).		X	X	X		
d. Lateral and Directional Handling Qualities: (1) Control Response (a) Lateral	Roll Rate—±10% or ±3°/sec., Roll Attitude Change—±10% or ±3°.	Cruise Augmentation On and Off.		X	X	X	Record results for at least two airspeeds, including the speed at or near the minimum power required airspeed. Record results for a step control input. The Off-axis response must show correct trend for unaugmented cases.	
(b) Directional	Yaw Rate—±10% or ±2°/sec., Yaw Attitude Change—±10% or ±2°.	Cruise Augmentation On and Off.		X	X	X	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.	

TABLE OF OBJECTIVE TESTS—Continued

QPS requirements							Information notes
Test	Tolerance	Flight conditions	Simulator level				
			A	B	C	D	Test details	

Test	Tolerance	Flight conditions	A	B	C	D	Test details	Information notes
(2) Directional Static Stability.	Lateral Control Position—±10% of change from trim or ±0.25 in, (6.3 mm) or Lateral Control Force—±0.5 lb. (0.223 daN) or 10%, Roll Attitude—±1.5, Directional Control Position—±10% of change from trim or ±0.25 in. (6.3 mm) or Directional Control Force—±1 lb. (0.448 daN) or 10%., Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm), Vertical Velocity—±100 fpm (0.50m/sec) or 10%.	Cruise; or Climb (may use Descent instead of Climb if desired), Augmentation On and Off.		X	X	X	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.	This is a steady heading sideslip test.
(3) Dynamic Lateral and Directional Stability: (a) Lateral—Directional Oscillations.	±0.5 sec. or ±10% of period, ±10% of time to ½ or double amplitude of ±0.02 of damping ratio, ±20% or ±1 sec of time difference between peaks of bank and sideslip.	Cruise or Climb. Augmentation On/Off.		X	X	X	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.	
(b) Spiral Stability ..	Correct Trend, ±2° bank or ±10% in 20 sec.	Cruise or Climb Augmentation On and Off.		X	X	X	Record the results of a release from pedal only or cyclic only turns. Results must be recorded from turns in both directions.	
(c) Adverse/ Proverse Yaw.	Correct Trend, ±2° transient sideslip angle.	Cruise or Climb Augmentation On and Off.		X	X	X	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.	
4. Motion System: a. Motion Envelope: (1) Pitch (a) Displacement— TBD° .... ±25° .... (b) Velocity— TBD°/sec .... ±20°/sec .... (c) Acceleration— TBD°/sec² .... ±100°/sec²	....	....		X X X	X X X	X X X		
(2) Roll (a) Displacement— TBD° .... ±25° .... (b) Velocity— TBD°/sec .... ±20°/sec .... (c) Acceleration— TBD°/sec² .... ±100°/sec²	....	....		X X X	X X X	X X X		
(3) Yaw (a) Displacement—±25° (b) Velocity—±20°/sec .. (c) Acceleration—±100°/sec².	....	....			X X X	X X X		

TABLE OF OBJECTIVE TESTS—Continued

QPS requirements			Simulator level				Test details	Information notes
Test	Tolerance	Flight conditions	A	B	C	D		
(4) Vertical								
(a) Displacement—								
TBD in.	....	....		X				
±34 in.	....	....			X	X		
(b) Velocity—								
TBD in.	....	....		X				
±24 in.	....	....			X	X		
(c) Acceleration—								
TBD g	....	....		X			....	
±0.8 g	....	....			X	X	....	
(5) Lateral								
(a) Displacement—								
±45 in	....	....			X	X	....	
3(b) Velocity—								
±28 in/sec	....	....			X	X	....	
(c) Acceleration—								
±0.6 g	....	....			X	X	....	
(6) Longitudinal								
(a) Displacement—								
±34 in	....	....			X	X	....	
(b) Velocity—								
±28 in/sec	....	....			X	X	....	
(c) Acceleration—								
±0.6 g	....	....			X	X	....	
(7) Initial Rotational Acceleration Ratio. All axes:								
TBD°/sec^2/sec	....	....		X			....	
All axes:								
300°/sec^2/sec	....	....			X	X	....	
(8) Initial Linear Acceleration Ratio								
(a) Vertical—								
±TBD g/sec	....	....		X			....	
±6g/sec	....	....			X	X	....	
(b) Lateral—								
±3g/sec	....	....			X	X	....	
(c) Longtudial—								
±3g/sec	....	....					X	X
b. Frequency Response:								
Band, Hz Phase, deg.	Amplitude Ratio, db	....		X	X	X	....	
0.10 to 0.5 −15 to −20.	±2	....					....	
0.51 to 1.0 −15 to −20.	±2	....					....	
1.1 to 2.0 −20 to −40.	±4	....					....	
2.1 to 5.0 −20	±4	....					....	
c. Leg Balance:								
Leg Balance	1.5°	....		X	X	X	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.	
d. Turn Around:								
Turn Around	0.05 g	....		X	X	X	The motion base must be driven sinusoidally in heave through a displacement of 6 inches (150 mm) peak to peak at a frequency of 0.5 Hz. Deviation from the desired sinusoidal acceleration must be measured.	

Begin Information

5. Control Dynamics.

a. The characteristics of a helicopter flight control system have a major effect on the handling qualities. A significant consideration in pilot acceptability of a helicopter is the ''feel'' provided through the cockpit controls. Considerable effort is expended on helicopter feel system design in order to deliver a system with which pilots will be comfortable and consider the helicopter desirable to fly. In order for a simulator to be representative, it too must present the pilot with the proper feel; that of the respective helicopter

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

c. For helicopters with irreversible control systems, measurements may be obtained on the ground. However, proper pitot-static inputs (if applicable) must be provided to represent conditions 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 must be submitted as justification for ground tests or for eliminating a configuration.

(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 which can be found in texts on control systems. In order to establish a consistent means of validating test results for simulator control loading, criteria are needed that will clearly define the interpretation of the measurements and the tolerances to be applied. Criteria are needed for both the underdamped system and the overdamped system, including the critically damped case. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and damping. In critically damped or overdamped systems, the frequency and damping is not readily measured from a response time history. Therefore, some other measurement must be used.

(2) For Levels C and D Simulators. Tests to verify that control feel dynamics represent the helicopter show that the dynamic damping cycles (free response of the control) match that of the helicopter within the specified tolerances. An acceptable method of evaluating the response and the tolerance to be applied are described below for the underdamped and critically damped cases.

d. Tolerances: (1) Underdamped Response. (a) Two measurements are required for the period, the time to first zero crossing (in case a rate limit is present) and the subsequent frequency of oscillation. It is necessary to measure cycles on an individual basis in case there are nonuniform periods in the response. Each period will be independently compared to the respective period of the helicopter control system and, consequently, will enjoy the full tolerance specified for that period.

(b) The damping tolerance will be applied to overshoots on an individual basis. Care must be taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 percent of the total initial displacement will be considered significant. The residual band, labeled $T(A_d)$ on Figure 1 of this attachment is ±5 percent of the initial displacement amplitude A_d from the steady state value of the oscillation. Oscillations within the residual band are considered insignificant. When comparing simulator data to helicopter data, the process would begin by overlaying or aligning the simulator and helicopter steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual periods of oscillation. To be satisfactory, the simulator would show the same number of significant overshoots to within one when compared against the helicopter data. This procedure for evaluating the response is illustrated in Figure 1 of this attachment.

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

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

$T(P_0)$ ±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

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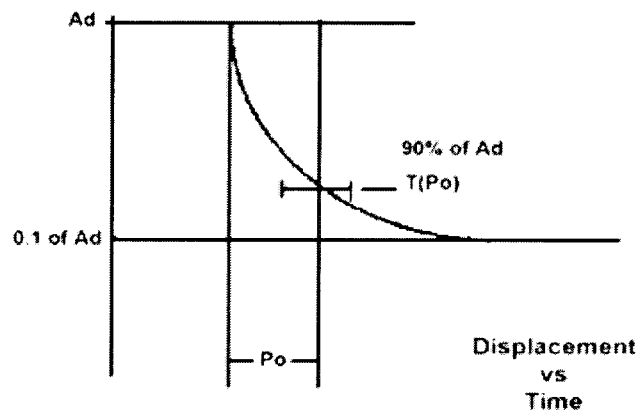
$T(P_n)$ ±10%(n+1)% of P_n, where ''n'' is the next in sequence.

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**Attachment 2 to Appendix C to Part 60—
Figure 1. Under-Damped Step Response**
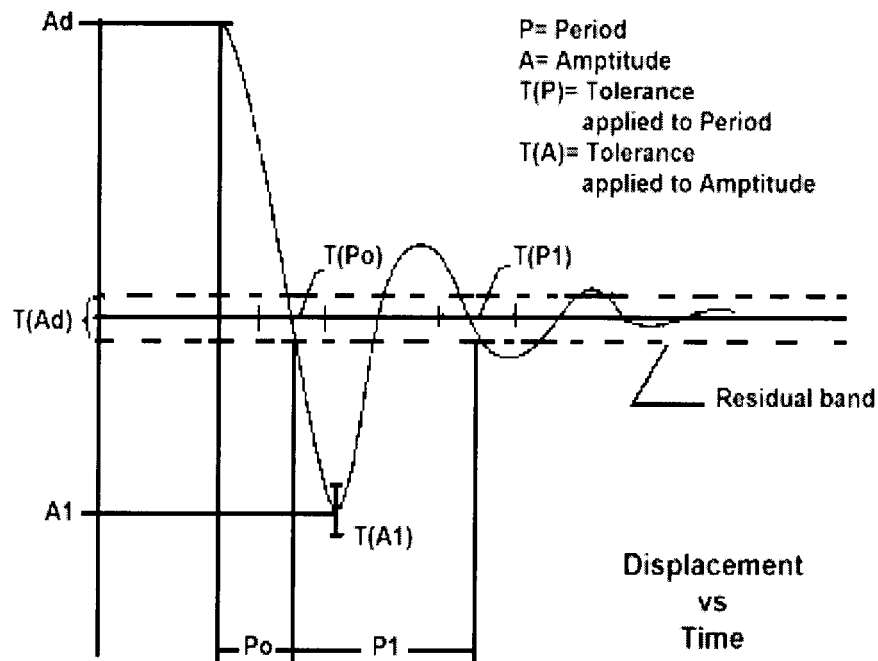
**Attachment 2 to Appendix C to Part 60—
Figure 2. Critically-Damped Step Response**

6. Motion Cue Repeatability Testing.

a. The motion system characteristics in the Table of Objective Tests address basic system capability, but not pilot cueing capability. Until there is an objective procedure for determination of the motion cues necessary to support pilot tasks and stimulate the pilot response which occurs in a helicopter for the same tasks, motion systems will continue to

be "tuned" subjectively. Having tuned a motion system, however, it is important to involve a test to ensure that the system continues to perform as originally qualified. Any motion performance change from the initially qualified baseline can be measured objectively.

b. An objective assessment of motion performance change is accomplished at lease

annually using the following testing procedure:

(1) The current performance of the motion system is assessed by comparison with the initial recorded test data.

(2) The parameters to be recorded are the outputs of the motion drive algorithms and the jack position transducers.

(3) The test input signals are inserted at an appropriate point prior to the integrations in the equations of motion (see figure 3 of this attachment).

(4) The characteristics of the test signal (see figure 4 of this attachment) are adjusted to ensure that the motion is exercised through approximately 2/3 of the maximum

displacement capability in each axis. The time segment T_0—T_1 , must be of sufficient duration to ensure steady initial conditions.

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Attachment 2 to Appendix C to Part 60—
Figure 3. Acceleration Test Signals
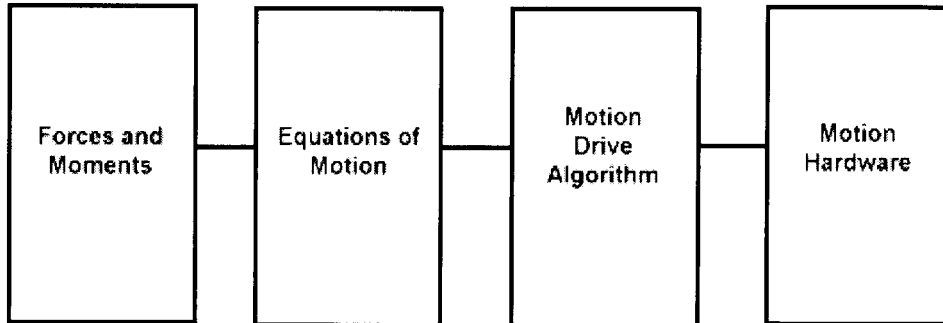
Attachment 2 to Appendix C to Part 60—
Figure 4. Test Signal Characteristics
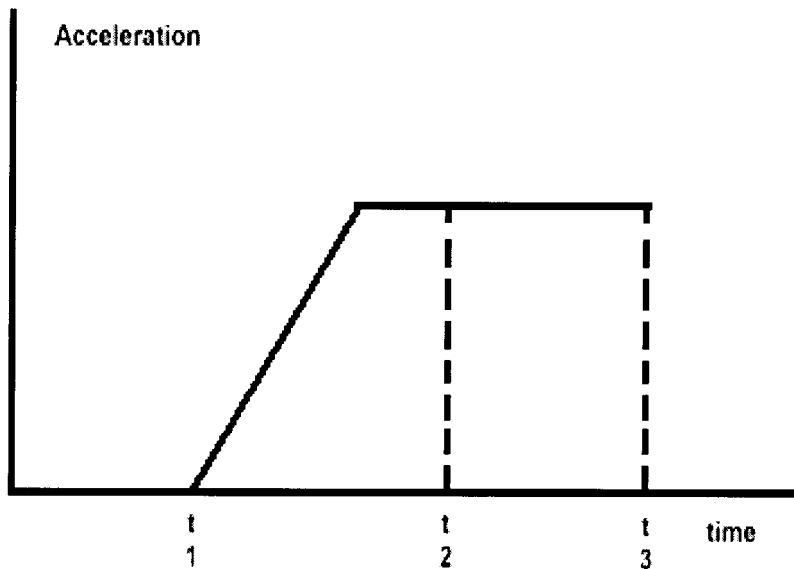
NOTE: If the simulator weight changes for any reason (i.e., visual change, or structural change), then the motion system baseline performance repeatability tests must be rerun and the new results used for future comparison.

End Information

Attachment 3 to Appendix C to Part 60—Simulator Subjective Tests

1. Discussion

Begin Information

a. The subjective tests and the examination of functions provide a basis for evaluating the capability of the FTD to perform over a typical utilization period; determining that the FTD satisfactorily meets the appropriate training/testing/checking objectives and competently simulates each required maneuver, procedure, or task; and verifying

correct operation of the FTD controls, instruments, and systems. The items in the list of operations tasks are for FTD evaluation purposes only. They must not be used to limit or exceed the authorizations for use of a given level of FTD as found in the Practical Test Standards or as may be approved by the TPAA. All items in the following paragraphs are subject to an examination of function.

b. The List of Operations Tasks addressing pilot functions and maneuvers is divided by flight phases. All simulated helicopter systems functions will be assessed for normal and, where appropriate, alternate operations. Normal, abnormal, and emergency operations associated with a flight phase will be assessed during the evaluation of maneuvers or events within that flight phase.

c. Systems to be evaluated are listed separately under "Any Flight Phase" to ensure appropriate attention to systems checks. Operational navigation systems (including inertial navigation systems, global positioning systems, or other long-range systems) and the associated electronic display systems will be evaluated if installed. The NSP pilot will include in his report to the TPAA, the effect of the system operation and any system limitation.

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

End Information

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2. List of Operations Tasks

Begin QPS Requirements

The NSP pilot, or the pilot designated by the NSPM, will evaluate the FTD in the following Operations Tasks, as applicable to the helicopter and FTD level, using the sponsor's approved manuals and checklists.

a. Preparation for Flight

(1) Preflight. Accomplish a functions check of all switches, indicators, systems, and equipment at all cockpit crewmembers' and instructors' stations, and determine that the cockpit design and functions are identical to that of the helicopter simulated.
(2) APU/Engine start and run-up.
  (a) Normal start procedures.
  (b) Alternate start procedures.
  (c) Abnormal starts and shutdowns (hot start, hung start, etc.)
  (d) Rotor engagement.
  (e) System checks.
  (f) Other.

b. Takeoff

(1) Normal.
  (a) From ground.
  (b) From hover.
  (i) Cat A.
  (ii) Cat B.

(c) Running.
(d) Crosswind/tailwind.
(e) Maximum performance.
(f) Instrument.
(2) Abnormal/emergency procedures:
  (a) Takeoff with engine failure after critical decision point (CDP).
  (i) Cat A.
  (ii) Cat B.
  (b) Other

A. Climb

(1) Normal.
(2) One engine inoperative.
(3) Other.

d. Cruise

(1) Performance.
(2) Flying qualities.
(3) Turns.
  (a) Timed.
  (b) Normal.
  (c) Steep.
(4) Accelerations and decelerations.
(5) High speed vibrations.
(6) Abnormal/emergency procedures, for example:
  (a) Engine fire.
  (b) Engine failure.
  (c) Inflight engine shutdown and restart.
  (d) Fuel governing system failures.
  (e) Directional control malfunction.
  (f) Hydraulic failure.
  (g) Stability system failure.
  (h) Rotor vibrations.
  (i) Other.

e. Descent

(1) Normal.
(2) Maximum rate.
(3) Other.

f. Approach

(1) Non-precision.
  (a) All engines operating.
  (b) One or more engines inoperative.
  (c) Approach procedures:
  (i) NDB
  (ii) VOR, RNAV, TACAN
  (iii) ASR
  (iv) Helicopter only.
  (v) Other.
  (d) Missed approach.
  (i) All engines operating.
  (ii) One or more engines inoperative.
(2) Precision.
  (a) All engines operating.
  (b) One or more engines inoperative.
  (c) Approach procedures:
  (i) PAR
  (ii) MLS
  (iii) ILS
  (iv) Manual (raw data).
  (v) Flight director only.
  (vi) Autopilot coupled.
  (A) Cat I
  (B) Cat II
  (vii) Other.
  (d) Missed approach.
  (i) All engines operating.
  (ii) One or more engines inoperative.
  (iii) Stability system failure.
  (e) Other

g. Any Flight Phase

(1) Helicopter and powerplant systems operation.

(a) Air conditioning.
(b) Anti-icing/deicing.
(c) Auxiliary power plant.
(d) Communications.
(e) Electrical.
(f) Fire detection and suppression
(g) Stabilizer.
(h) Flight controls.
(i) Fuel and oil.
(j) Hydraulic.
(k) Landing gear.
(l) Oxygen.
(m) Pneumatic.
(n) Powerplant.
(o) Flight control computers.
(p) Stability and control augmentation.
(q) Other.
(2) Flight management and guidance system.
  (a) Airborne radar.
  (b) Automatic landing aids.
  (c) Autopilot.
  (d) Collision avoidance system.
  (e) Flight data displays.
  (f) Flight management computers.
  (g) Head-up displays.
  (h) Navigation systems.
  (i) Other.
(3) Airborne procedures.
  (a) Holding.
  (b) Air hazard avoidance.
  (c) Retreating blade stall recovery.
  (d) Mast bumping.
  (e) Other.

h. Engine Shutdown and Parking

(1) Engine and systems operation.
(2) Parking brake operation.
(3) Rotor brake operation.
(4) Abnormal/emergency procedures.

3. FTD Systems

a. Instructor Operating Station (IOS)

(1) Power switch(es).
(2) Helicopter conditions.
  (a) Gross weight, center of gravity, fuel loading and allocation, etc.
  (b) Helicopter systems status.
  (c) Ground crew functions (e.g., external power connections, push back, etc.)
  (d) Other.
(3) Airports or Landing Areas.
  (a) Number and selection.
  (b) Runway or landing area selection.
  (c) Landing surface condition (e.g., rough, smooth, icy, wet, dry, etc.)
  (d) Preset positions (e.g. ramp, gate, #1 for takeoff, takeoff position, over FAF, etc.)
  (e) Lighting controls.
  (f) Other.
(4) Environmental controls.
  (a) Temperature.
  (b) Climate conditions (e.g., ice, snow, rain, etc.).
  (c) Wind speed and direction.
  (d) Other.
(5) Helicopter system malfunctions.
  (a) Insertion/deletion.
  (b) Problem clear.
  (c) Other
(6) Locks, freezes, and repositioning.
  (a) Problem (all) freeze / release.
  (b) Position (geographic) freeze / release.
  (c) Repositioning (locations, freezes, and releases).
  (d) Two times or one-half ground speed control.

(e) Other
(7) Remote IOS.
(8) Other.

b. Sound Controls. On/off/rheostat

c. Control Loading System. On/off/emergency stop.

d. Observer Stations.

(1) Position.
(2) Adjustments.

End QPS Requirements 10

Attachment 4 to Appendix C to Part 60—Definitions and Abbreviations

1. Definitions

Begin Regulatory Language (14 CFR Part 1 and §60.3)

(From Part 1—Definitions)

Flight simulation device (FSD) means a flight simulator or a flight training device.

Flight simulator means a full size replica of a specific type or make, model, and series aircraft cockpit. It includes the assemblage of equipment and computer programs necessary to represent the aircraft in ground and flight operations, a visual system providing an out-of-the-cockpit view, a system that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and having the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standards (QPS) for a specific qualification level.

Flight training device (FTD) means a full size replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft cockpit replica. It includes the equipment and computer programs necessary to represent the aircraft or set of aircraft in ground and flight conditions having the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standard (QPS) for a specific qualification level.

(From Part 60—Definitions)

Certificate holder. A person issued a certificate under parts 119, 141, or 142 of this chapter or a person holding an approved course of training for flight engineers in accordance with part 63 of this chapter.

Flight test data. Actual aircraft performance data obtained by the aircraft manufacturer (or other supplier of data acceptable to the NSPM) during an aircraft flight test program.

FSD Directive. A document issued by the FAA to an FSD sponsor, requiring a modification to the FSD due to a recognized safety-of-flight issue and amending the qualification basis for the FSD.

Master Qualification Test Guide (MQTG). The FAA-approved Qualification Test Guide with the addition of the FAA-witnessed test, performance, or demonstration results, applicable to each individual FSD.

National Simulator Program Manager (NSPM). The FAA manager responsible for

the overall administration and direction of the National Simulator Program (NSP), or a person approved by the NSPM .

Objective test. A quantitative comparison of simulator performance data to actual or predicted aircraft performance data to ensure FSD performance is within the tolerances prescribed in the QPS.

Predicted data. Aircraft performance data derived from sources other than direct physical measurement of, or flight tests on, the subject aircraft. Predicted data may include engineering analysis and simulation, design data, wind tunnel data, estimations or extrapolations based on existing flight test data, or data from other models.

Qualification level. The categorization of the FSD, based on its demonstrated technical and operational capability as set out in the QPS.

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

Qualification Test Guide (QTG). The primary reference document used for evaluating an aircraft FSD. It contains test results, performance or demonstration results, statements of compliance and capability, the configuration of the aircraft simulated, and other information for the evaluator to assess the FSD against the applicable regulatory criteria.

Set of aircraft. Aircraft that share similar handling and operating characteristics and similar operating envelopes and have the same number and type of engines or power plants.

Sponsor. A certificate holder who seeks or maintains FSD qualification and is responsible for the prescribed actions as set out in this part and the QPS for the appropriate FSD and qualification level.

Subjective test. A qualitative comparison to determine the extent to which the FSD performs and handles like the aircraft being simulated.

Training Program Approval Authority (TPAA). A person authorized by the Administrator to approve the aircraft flight training program in which the FSD will be used.

Upgrade. The improvement or enhancement of an FSD for the purpose of achieving a higher qualification level.

End Regulatory Language (14 CFR Part 1 and §60.3)

Begin QPS Requirements

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

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

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

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

Breakout—is the force required at the pilot's primary controls to achieve initial movement of the control position.

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

Computer Controlled Helicopter—is a helicopter where all pilot inputs to the control surfaces are transferred and augmented by computers.

Control Sweep—is movement of the appropriate pilot controller from neutral to an extreme limit in one direction (Forward, Aft, Right, or Left), a continuous movement back through neutral to the opposite extreme position, and then a return to the neutral position.

Convertible Flight Simulator—is a simulator in which hardware and software can be changed so that the simulator becomes a replica of a different model, usually of the same type helicopter. The same simulator platform, cockpit shell, motion system, visual system, computers, and necessary peripheral equipment can thus be used in more than one simulation.

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

Deadband—is the amount of movement of the input for a system for which there is no reaction in the output or state of the system observed.

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

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

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

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

Fuel used—is the amount or mass of fuel used (kilograms or pounds).

Ground Effect—is the change in aerodynamic characteristics due to modification of the air flow past the aircraft caused by the proximity of the earth's surface to the helicopter.

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

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

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

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

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

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

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

Manual Testing—is simulator testing wherein the pilot conducts the test without computer inputs except for initial setup and all modules of the simulation are active.

Medium—is the normal operational weight for a given flight segment.

Nominal—is the normal operational weight, configuration, speed, etc., for the flight segment specified.

Non-Normal Control—is a term used in reference to Computer Controlled Helicopters and is the state where one or more of the intended control, augmentation, or protection functions are not fully working. NOTE: Specific terms such as ALTERNATE, DIRECT, SECONDARY, BACKUP, etc., may be used to define an actual level of degradation.

Normal Control—is a term used in reference to Computer Controlled Helicopters and is the state where the intended control, augmentation, and protection functions are fully working.

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

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

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

Pulse Input—is a step input to a control followed by an immediate return to the initial position.

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

Roll—is the helicopter attitude with respect to or around the longitudinal axis expressed in degrees.

Sideslip—is the angular difference between the helicopter heading and the direction of movement in the horizontal plane.

Simulation Data—are the various types of data used by the simulator manufacturer and the applicant to design, manufacture, and test the simulator.

Simulator Approval—is the extent to which a simulator may be used by a certificate holder as authorized by the FAA. It takes account of helicopter to simulator differences and the training ability of the organization.

Simulator Latency—is the additional time beyond that of the response time of the helicopter due to the response of the simulator.

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

Source Data—are, for the purpose of this document, performance, stability and control, and other necessary test parameters electrically or electronically recorded in a helicopter using a calibrated data acquisition system of sufficient resolution and verified as accurate by the company performing the test to establish a reference set of relevant parameters to which like simulator parameters can be compared.

Statement of Compliance and Capability (SOC)—is a declaration that specific requirements have been met. It must declare that compliance with the requirement is achieved and explain how the requirement is met (*e.g.*, gear modeling approach, coefficient of friction sources, etc.). It must also describe the capability of the simulator to meet the requirement (*e.g.*, computer speed, visual

system refresh rate, etc.). In doing this, the statement must provide references to needed sources of information for showing compliance, rationale to explain how the referenced material is used, mathematical equations and parameter values used, and conclusions reached.

Step Input—is an abrupt control input held at a constant value.

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

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

Time History—is a presentation of the change of a variable with respect to time.

Training Program Approval Authority (TPAA)—is the person who exercises authority on behalf of the Administrator in approving the aircraft flight training program for the appropriate helicopter in which the simulator will be used. This person is the principal operations inspector (POI) for programs approved under 14CFR parts 63, 121, 125, or 135; or the training center program manager (TCPM) for programs approved under part 141 or 142.

Transport Delay or ''Throughput''—is the total simulator system processing time required for an input signal from a pilot primary flight control until motion system, visual system, or instrument response. It is the overall time delay incurred from signal input until output response. It does not include the characteristic delay of the helicopter simulated.

Validation Data—are data used to determine if the simulator performance corresponds to that of the helicopter.

Validation Test—is a test by which simulator parameters are compared to the relevant validation data.

Visual System Response Time—is the interval from a control input to the completion of the visual display scan of the first video field containing the resulting different information.

Yaw—is helicopter attitude with respect to or around the vertical axis expressed in degrees.

End QPS Requirements

---

2. Abbreviations

Begin QPS Requirements

AFM—Approved Flight Manual.

AGL—Above Ground Level (meters or feet).

AOA—Angle of Attack (degrees).

APD—Aircrew Program Designee.

CCA—Computer Controlled Aircraft.

cd/m ^{2}—candela/meter ^{2}, 3.4263 candela/m ^{2} = 1 ft-Lambert.

CFR—Code of Federal Regulations.

cm(s)—centimeter, centimeters.

daN—decaNewtons, one (1) decaNewton = 2.27 pounds.

deg(s)—degree, degrees.

DOF—Degrees-of-freedom

EPR—Engine Pressure Ratio.

FAA—Federal Aviation Administration (U.S.).

ft—foot/feet, 1 foot = 0.304801 meters.

ft-Lambert—foot-Lambert, 1 ft-Lambert = 3.4263 candela/m ^{2}.

fpm—feet per minute.

g—Acceleration due to Gravity (meters or feet/sec ^{2}); 1g = 9.81 m/sec ^{2} or 32.2 feet/sec ^{2}.

G/S—Glideslope.

IATA—International Airline Transport Association.

ICAO—International Civil Aviation Organization.

ILS—Instrument Landing System.

IQTG—International Qualification Test Guide.

km—Kilometers 1 km = 0.62137 Statute Miles.

kPa—KiloPascal (Kilo Newton/Meters2). 1 psi = 6.89476 kPa.

Kts—Knots calibrated airspeed unless otherwise specified, 1 knot = 0.5148 m/sec or 1.689 ft/sec.

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

M,m—Meters, 1 Meter = 3.28083 feet.

Min(s)—Minute, minutes.

MLG—Main Landing Gear.

Mpa—MegaPascals (1 psi = 6894.76 pascals).

ms—millisecond(s).

N—NORMAL CONTROL Used in reference to Computer Controlled Aircraft.

N1—Low Pressure Rotor revolutions per minute, expressed in percent of maximum.

N2—High Pressure Rotor revolutions per minute, expressed in percent of maximum.

N3—High Pressure Rotor revolutions per minute, expressed in percent of maximum.

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

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

NWA—Nosewheel Angle (degrees).

PAPI—Precision Approach Path Indicator System.

Pf—Impact or Feel Pressure, often expressed as ''q.''.

PLA—Power Lever Angle.

PLF—Power for Level Flight.

psi—pounds per square inch.

QPS—Qualification Performance Standard.

RAE—Royal Aerospace Establishment.

R/C—Rate of Climb (meters/sec or feet/min).

R/D—Rate of Descent (meters/sec or feet/min).

REIL—Runway End Identifier Lights.

RVR—Runway Visual Range (meters or feet).

s—second(s).

sec(s)—second, seconds.

sm—Statute Mile(s) 1 Statute Mile = 5,280 feet.

SOC—Statement of Compliance and Capability.

Tf—Total time of the flare maneuver duration.

Ti—Total time from initial throttle movement until a 10% response of a critical engine parameter.

TIR—Type Inspection Report.

T/O—Takeoff.

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

VASI—Visual Approach Slope Indicator System.

VGS—Visual Ground Segment.

Vmc—Minimum Control Speed.

Vmca—Minimum Control Speed in the air.

Vmcg—Minimum Control Speed on the ground.
Vmcl—Minimum Control Speed—Landing.
Vmu—The speed at which the last main landing gear leaves the ground.
Vr—Rotate Speed.
Vs—Stall Speed or minimum speed in the stall.
WAT—Weight, Altitude, Temperature.

End QPS Requirements 11

_____

Attachment 5 to Appendix C to Part 60—Sample Documents

_____

Begin Information

Table of Contents

Title of Sample

End Information

_____

BILLING CODE 4910–13–P

Attachment 5 to Appendix C to Part 60—
Figure 1 – Sample Letter of Request.

INFORMATION

Date

Name. POI, _____(Certificate Holder)

FAA FSDO _____

Address

City, State, Zip

Dear Mr./Ms. _____ :

(Sponsor's name) _____ requests evaluation of our (type) _____ helicopter

simulator for Level _____ qualification. The (name) _____ simulator with (name)

_____visual system is fully defined on page _____ of the accompanying qualification

test guide (QTG). We have completed tests of the simulator and confirm that it meets all applicable

requirements of Title 14 of the Code of Federal Regulation (14 CFR) part 60 and the requirements of the

Helicopter Flight Simulator Qualification Performance Standards (QPS). Appropriate hardware and

software configuration control procedures have been established.

Our pilot(s) (name) _____ [and (name)_____], who is(are) qualified on

(type) _____ helicopter, has(have) assessed the simulator and found that it conforms to the (sponsor

name) _____ (type) _____ helicopter cockpit configuration and that the simulated

systems and subsystems have been evaluated and found to function equivalently to those in the helicopter.

The above named pilot(s) has(have) found that the simulator represents the respective helicopter in

accordance with the attached Configuration List. He/She(They) has(have) also subjectively assessed the

performance and flying qualities of the simulator and state that it represents the helicopter. He/She(They)

has(have) not subjectively tested the simulator for those tasks on the attached Restrictions-to-Qualification

list and we do not seek qualification in these areas.

(Added comments as desired.)

Sincerely,

(Signature of Appropriate Person)

Attachment 5 to Appendix C to Part 60—
Figure 2 – Sample Qualification Test Guide Cover Page

INFORMATION

SPONSOR NAME

SPONSOR ADDRESS

FAA QUALIFICATION TEST GUIDE

(SPECIFIC HELICOPTER MODEL)
(*for example*   )
(Vertiflite AB-320   )

(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 5 to Appendix C to Part 60—

Figure 3 – Sample FTD Information Page

INFORMATION

SPONSOR NAME	
SPONSOR SIMULATOR CODE:	AB-320 #1
HELICOPTER MODEL:	Vertiflite AB-320
AERODYNAMIC DATA REVISION:	AB-320, CPX-8D, January 1988
ENGINE MODEL(S) AND REVISION:	CPX-8D; RPT-6, January 1988 DRQ-4002, RPT-3, April 1991
FLIGHT CONTROLS DATA REVISION:	AB-320MMM; May 1988
FLIGHT MANAGEMENT SYSTEM:	Berry XP
SIMULATOR MODEL AND MANUFACTURER:	VTF-320, Tinker Simulators, Inc.
DATE OF SIMULATOR MANUFACTURE:	1988
SIMULATOR COMPUTER:	CIA
VISUAL SYSTEM MODEL, MANUFACTURER, and DISPLAY TYPE:	ClearView, Inc. "Real World H6;" Projected Visual System
VISUAL SYSTEM COMPUTER:	LMB-H6
MOTION SYSTEM:	Tinker 6 DOF

Note to Figure 3: Information in Figure 3 must be updated and kept current with any modifications or changes made to the FTD and reflected on the log of revisions and the list of effective pages.

Attachment 5 to Appendix C to Part 60—

Figure 4 – Sample Statement of Qualification

Federal Aviation Administration
National Simulator Program

Statement
of
Qualification

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

Go-Fast Training Center
Vertiflite AB-320 Flight Simulator
FAA Identification Number 888

And found it to meet the standards set forth
In the Qualification Performance Standards
For a simulator at

Level C

_____   _____

(date)   for the NSPM
Subject to the attached
Configuration List and Restrictions

Attachment 5 to Appendix C to Part 60—
Figure 4A – Sample Statement of Qualification; Configuration List

INFORMATION

STATEMENT of QUALIFICATION
CONFIGURATION LIST
Go-Fast Training Center   Vertiflite AB-320 -- Level C -- FAA ID# 888

Configuration		Date Qualified
Helicopter Model:......................	AB-320..	July 12, 1988
Engine Model(s) and Revision:...	☐ CPX-8D, RPT-6.........................	July 12, 1988
	☐ DRQ-4002, RPT-3.....................	April 1, 1991
Flight Management System:.......	Berry XP...	July 12, 1988
Visual System / Manufacturer: ☐ CRT Installation:.................... ☐ Projected System:.....................	Real World H6, Clear View, Inc. .... 210° Horizontal Viewing Angle.......	July 12, 1988
Flight Instruments: ☐ Electro-Mechanical:................. ☐ Display (CRT, LCD, etc.)....... ☐ Combination .... ☐ Heads-Up Display..................	....	July 12, 1988
Flight Director: ☐ Single Cue.............................. ☐ Dual Cue.............................. ☐ None......................................	Sperry..	July 12, 1988
Engine Instruments: ☐ Electro-Mechanical................. ☐ Display (CRT, LCD, etc.)....... ☐ Combination..........................	....	July 12, 1988
Navigation Type(s): ☐ ADF... ☐ VOR/ILS............................... ☐ GPS... ☐ INS... ☐ IRS..	....	July 12, 1988 July 12, 1988 July 12, 1988
Weather Radar:	Jones Industries, Inc.	July 12, 1988
TCAS		
ACARS		

Attachment 5 to Appendix C to Part 60—
Figure 4B – Sample Statement of Qualification; Qualified/Non-Qualified Tasks

INFORMATION

STATEMENT of QUALIFICATION
Qualified/Non-Qualified Tasks
Go-Fast Training Center
Vertiflite AB-320 -- Level C -- FAA ID# 888

*The following are those items listed in the Helicopter Flight Simulator Qualification Performance Standards (QPS), FAA-S-120-63, dated (May 1, 2000) Appendix 3, Subjective Tests, indicating what tasks and systems are qualified (**Q**) and what tasks and systems are not qualified (**NQ**).*

NQ	Q	TASK	NQ	Q	TASK
		A. Preparation for flight.	X		(e) Stability system failure.
	X	1. Preflight.		X	(f) Directional control malfunction.
		2. APU/Engine start.		X	(g) Other.
	X	(a) Normal start procedure.			**D. Translational Flight.**
	X	(b) Alternate start procedure.		X	1. Forward.
	X	(c) Abnormal start/shutdown.		X	2. Sideward.
	X	(d) Rotor engagement.		X	3. Rearward.
	X	(e) System checks.			**E. Takeoff.**
	X	(f) Other.	X		1. Day.
		B. Ground Taxi.		X	2. Dusk (Twilight).
	X	1. Power required to taxi.		X	3. Night.
	X	2. Brake effectiveness.			4. Normal.
	X	3. Ground handling.		X	(a) From ground.
	X	4. Abnormal/emer. procedures.			(b) From hover.
	X	5. Brake system failure.		X	(1) Cat A
	X	6. Ground resonance.		X	(2) Cat B
	X	7. Other.		X	(c) Running.
		C. Hover		X	(d) Crosswind/tailwind.
	X	1. Takeoff to a hover.		X	(e) Maximum performance.
		2. Instrument response.		X	(f) Instrument.
	X	(a) Engine instruments.	X		(g) Confined area.
	X	(b) Flight instruments.	X		(h) Pinnacle/platform.
	X	3. Hovering turns.	X		(i) Slope.
		4. Hover power checks.	X		(j) External load operations.
	X	(a) In ground effect.			5. Abnormal/Emergency.
	X	(b) Out of ground effect.			(a) Takeoff, engine fail prior to DCP.
	X	5. Crosswind/tailwind hover.		X	(1) Cat A
		6. Abnormal/emer. procedures.		X	(2) Cat B
	X	(a) Engine failure.			(b) Rejected takeoff.
	X	(b) Hovering autorotation.		X	(1) Over land.
	X	(c) Fuel governing system failure.		X	(2) Over water.
	X	(d) Settling with power.		X	(c) Other.

Initials _____ Date _____   -- Continued Next Page --

NQ	Q	TASK (Con't.)	NQ	Q	TASK (Con't.)
		F. Climb.	X		(5) SDF.
	X	1. Normal.	X		(6) ASR.
	X	2. Obstacle clearance.	X		(7) Circling.
	X	3. Vertical.		X	(8) Helicopter only.
	X	4. Engine inoperative. -		X	(9) Other.
	X	5. Other.			(d) Missed approach.
		G. Cruise.		X	(1) All engines operating.
	X	1. Performance.		X	(2) Engine inoperative.
	X	2. Flying qualities.			2. Precision.
		3. Turns.		X	(a) All engines operating.
	X	(a) Timed.		X	(b) Engine inoperative.
	X	(b) Normal.			(c) Approach procedures:
	X	(c) Steep.	X		(1) PAR
	X	4. Accelerations/Decelerations.	X		(2) MLS
	X	5. High speed vibrations.			(3) ILS
X		6. External load operations.		X	(i) Manual/raw data.
		7. Abnormal/emergency		X	(ii) Flight director only.
	X	(a) Engine fire.		X	(iii) Autopilot coupled.
	X	(b) Engine failure.		X	(iv) Cat I
	X	(c) Inflight shutdown/restart.		X	(v) Cat II
	X	(d) Fuel governing system fail.			(d) Missed approach.
	X	(e) Direction control malfunction.		X	(1) All engines operating.
	X	(f) Hydraulic failure.		X	(2) Engine inoperative.
X		(g) Stability system failure.			(3) Visual.
	X	(h) Rotor vibrations.		X	(i) Normal.
	X	(i) Other.		X	(ii) Steep.
		H. Descent.		X	(iii) Shallow.
	X	1. Normal.		X	(iv) Cat A profile.
	X	2. Maximum rate.		X	(v) Cat B profile.
		3. Autorotative.		X	(vi) Visual segment from ILS.
	X	(a) Straight in.		X	(vii) Visual segment from circle.
	X	(b) Turn.			(vii) Abnormal/emergency
	X	4. Other.		X	A. Directional control failure.
		I. Approach.		X	B. Hydraulic failure.
		1. Non-precision.		X	C. Fuel governing system failure.
	X	(a) All engines operating.		X	D. Autorotation.
	X	(b) Engine inoperative.	X		E. Stability system failure.
		(c) Approach procedures:		X	F. Other.
	X	(1) NDB			**J. Landing**
	X	(2) VOR			1. Normal.
	X	(3) RNAV		X	(a) From a hover.
X		(4) TACAN		X	(b) Running.

Initials _____ Date _____   -- Continued Next Page --

NQ	Q	TASK (Con't.)		NQ	Q	TASK (Con't.)
X		(c) Pinnacle/platform.				**L. Engine Shutdown / Parking**
X		(d) Confined area.			X	1. Engine and systems operations.
X		(e) Slope.			X	2. Parking brake operation.
	X	(f) Crosswind/tailwind.			X	3. Rotor brake operation.
		2. Abnormal/emergency			X	4. Abnormal/emergency.
	X	(a) From autorotation.				
	X	(b) Engine inoperative.				
	X	(c) Directional control failure.				
	X	(d) Hydraulic failure.				
X		(e) Stability system failure.				
	X	(f) Other.				
		K. Any Flight Phase.				
		1. Helicopter systems operation.				
	X	(a) Air conditioning.				
	X	(b) Anti-icing/deicing.				
	X	(c) Auxiliary power plant.				
	X	(d) Communications.				
	X	(e) Electrical.				
	X	(f) Fire detection/supression.				
	X	(g) Flight controls.				
	X	(h) Fuel and oil.				
	X	(i) Hydraulic.				
	X	(j) Landing gear.				
	X	(k) Oxygen.				
	X	(l) Pneumatic.				
	X	(m) Powerplant.				
	X	(n) Flight control computers.				
X		(o) Stability/control augmentation.				
	X	(p) Other.				
		2. Flight management/guidance.				
	X	(a) Airborne radar.				
X		(b) Automatic landing aids.				
	X	(c) Autopilot.				
X		(d) TCAS				
	X	(e) Flight data displays.				
	X	(f) Flight management computer.				
X		(g) Head-up displays.				
	X	(h) Navigation systems.				
	X	(i) Other.				

Initials _____ Date_____   -- Continued Next Page --

NQ	Q	SIMULATOR SYSTEM	NQ	Q	SIMULATOR SYSTEM
		A. Inst. Ops. Station (IOS).			**B. Sound Controls.**
	X	1. Power switch(es).		X	-- On / off / rheostat
		2. Airplane conditions.			**C. Motion/Cont. Load. System.**
	X	(a) GW, CG, Fuel weight, etc.		X	1. On / off / emergency stop.
	X	(b) Airplane systems status.		X	2. Crosstalk
	X	(c) Ground crew functions		X	3. Smoothness
	X	(d) Other.			**D. Observer Stations.**
		3. Airports.		X	1. Position.
	X	(a) Number and selection.			
	X	(b) Runway selection.			
	X	(c) Runway surface condition			
	X	(d) Preset positions			
	X	(e) Lighting controls.			
	X	(f) Other.			
		4. Environmental controls.			
	X	(a) Clouds (base and tops).			
	X	(b) Visibility			
	X	(c) Runway visual range			
	X	(d) Temperature.			
	X	(e) Climate conditions			
	X	(f) Wind speed and direction.			
X		(g) Windshear.			
	X	(h) Other.			
		5. Airplane system malfunctions.			
	X	(a) Insertion / deletion.			
	X	(b) Problem clear.			
	X	(c) Other			
		6. Locks, freezes, repositioning.			
	X	(a) Problem freeze / release.			
	X	(b) Position freeze / release.			
	X	(c) Repositioning			
	X	(d) Ground speed control			
	X	(e) Other			
X		7. Remote IOS.			
	X	8. Other.			

Initials _____ Date _____   -- End --

Attachment 5 to Appendix C to Part 60—
Figure 5 – Sample Recurrent 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)

Attachment 5 to Appendix C to Part 60—
Figure 6 – Sample Request for Initial, Upgrade, or Reinstatement Evaluation Date

INFORMATION

Mr. Edward Cook
Manager, National Simulator Program
Federal Aviation Administration
P.O. Box 20636 (AFS-205)
Atlanta, GA 30320

Dear Mr. Cook:

RE: Request for Initial [Upgrade / Reinstatement] Evaluation Date

This is to advise you of our intent to request an evaluation of our (Aircraft Type/Level) Simulator 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.] This simulator [has / has not] been previously qualified by the FAA [and had been issued FAA identification number XXX]. [The history of this simulator is as follows: _____.]

We agree to provide a Qualification Test Guide (QTG) to your staff not later than 45 days prior to the proposed evaluation date (if tests not run at training site, an additional "1/3 on-site" tests must be provided not later than 14 days prior the proposed evaluation date). If we are unable to meet the above date for the evaluation, this may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation.

[Added comments from Operator/Sponsor, if any]

Please contact (Name and Telephone 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 our Principal Operations Inspector (POI) and/or Training Center Program Manager (TCPM).

Sincerely,

(Signature)

Acknowledgement:

_____   We concur with your proposed dates.

_____   The date requested is not available, however, we propose the following date:

_____   Please provide us with the following information:

_____   _____
Scheduler, National Simulator Program   Date

Attachment 5 to Appendix C to Part 60—
Figure 7 – Sample MQTG Index of Effective FSD Directives

INFORMATION

Index of Effective FSD Directives
Filed in this Section

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

Continue as Necessary....

BILLING CODE 4910–13–C

Attachment 6 to Appendix C to Part 60—Record of FSD Directives

Begin QPS Requirements

When the FAA determines that modification of an FTD is necessary for safety reasons, all affected FTDs must be modified accordingly, regardless of the original qualification standards applicable to any specific FTD.

a. A copy of the notification to the sponsor from the TPAA or NSPM that a modification is necessary will be filed in and maintained as part of this appendix.

b.The effective FSD Directives, including the date of the directive, the direction to make these changes, and the date of completion of any resulting modification must be maintained in a separate section of the MQTG and index accordingly. The MQTG must also be updated to include the information described in § 60.15(b)(4) as may be appropriate as a result of the FSD Directive. See Appendix 5 for a sample Index of Effective FSD Directives.

End QPS Requirements

Appendix D to Part 60—Qualification Performance Standards for Helicopter Flight Training Devices

This appendix establishes the standards for Helicopter Flight Training Device (FTD)

evaluation and qualification at one of the established levels. The Flight Standards Service, National Simulator Program (NSP) staff, under the direction of the NSP Manager (NSPM), is responsible for the development, application, and interpretation of the standards contained within this appendix.

The procedures and criteria specified in this document will be used by the NSPM, or a person or persons assigned by the NSPM (*e.g.*, FAA pilots and/or FAA aeronautical engineers, assigned to and trained under the direction of the NSP—referred to as NSP pilots or NSP engineers, other FAA personnel, etc.) when conducting helicopter FTD evaluations.

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1. Introduction

a. This appendix contains background information as well as information that is either directive or guiding in nature. Information considered directive is described in this document in terms such as "will," "shall," and "must," and means that the actions are mandatory. Guidance information is described in terms such as "should," or "may," and indicate actions that are desirable, permissive, or not mandatory and provide for flexibility.

b. To assist the reader in determining what areas are directive or required and what areas are guiding or permissive—

(1) The text in this appendix is contained within sections, separated by horizontal lines; headings associated with these horizontal lines will indicated that a particular section begins or ends. All of the text falls into one of three sections: a direct quote or a paraphrasing of the Part 60 rule language; additional requirements that are also regulatory but are found only in this appendix; and advisory or informative material.

(2) The text presented between horizontal lines beginning with the heading "Begin Rule Language" and ending with the heading "End Rule Language," is a direct quote or is paraphrased from Part 60 of the regulations. For example: the rule uses the terms "flight simulation device (FSD)" and "aircraft;" however, in this appendix the rule is paraphrased and the term "simulator" is used instead of FSD, and "airplane" is used instead of aircraft. Additionally, the rule uses the terms "this part" and "appropriate QPS;" however, in this appendix the rule is paraphrased and the terms "Part 60" and "this appendix," respectively, are used instead. (Definitions are not paraphrased or modified in any way.) For ease of referral, the Part 60 reference is noted at the beginning and the end of the bordered area.

(3) The text presented between horizontal lines beginning with the heading "Begin QPS Requirements" and ending with the heading "End QPS Requirements," is also regulatory but is found only in this appendix.

(4) The text presented between horizontal lines beginning with the heading "Begin Information" and ending with the heading "End Information," is advisory or informative.

5. The tables in this appendix have rows across the top of each table—

(a) The data presented in columns under the heading "QPS REQUIREMENTS" is regulatory but is found only in this appendix.

(b) The data presented in columns under the heading "INFORMATION" is advisory or informative.

Important Note: While this appendix contains quotes and paraphrasing directly from the rule, the reader is cautioned *not* to rely solely on this appendix for regulatory requirements regarding flight simulators. For regulatory references for airplane flight simulators, the reader is referred to paragraphs 3. a through h of this appendix.

c. Questions regarding the contents of this publication should be sent to: U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Service, National Simulator Program Staff, AFS–205, PO Box 20636, Atlanta, Georgia, 30320. Telephone contact numbers are: phone, 404–305–6100; fax, 404–305–6118. The National Simulator Program Internet Web Site address is: *www.faa.gov/nsp*. On this Web Site you will find an NSP personnel list with contact information, a list of qualified flight simulation devices, advisory circulars, a description of the qualification process, NSP policy, and an NSP "In-Works" section. Also linked from this site are additional information sources, handbook bulletins, frequently asked questions, a listing and text of the Federal Aviation Regulations, Flight Standards Inspector's handbooks, and other FAA links.

d. The NSPM encourages the use of electronic media for communication and the gathering, storage, presentation, or transmission of any record, report, request, test, or statement required by this QPS provided the media used has adequate provision for security and is acceptable to the NSPM. The NSPM recommends inquiries on system compatibility prior to any such activity. Minimum System requirements may be found on the NSP Web Site.

End Information

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2. Definitions

See Attachment 4 of this appendix for a list of definitions and abbreviations. Attachment 4 of this appendix contains definitions directly quoted from Part 1 or Part 60, contained within a bordered area with Red-colored left hand columns, indicating they are quoted from 14 CFR Part 1 or Part 60 and are regulatory. Additional definitions and abbreviations used in reading and understanding this document are contained within bordered areas with Blue-colored left hand columns, indicating they are also regulatory but appear only within this document. For purposes of accuracy, the definitions listed are directly quoted, and are not paraphrased.

End Information

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3. Related Reading References.

Begin Information

a. 14 CFR part 60
b. 14 CFR part 61.
c. 14 CFR part 63.
d. 14 CFR part 121.
e. 14 CFR part 125
f. 14 CFR part 135.
g. 14 CFR part 141
h. 14 CFR part 142
i. Advisory Circular (AC) 120–28C, Criteria for Approval of Category III Landing Weather Minima.
j. AC 120–29, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
k. AC 120–35B, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.
l. AC 120–41, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.
m. AC 120–57A, Surface Movement Guidance and Control System (SMGS).
n. AC 150/5300–13, Airport Design.
o. AC 150/5340–1G, Standards for Airport Markings.
p. AC 150/5340–4C, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.
q. AC 150/5340–19, Taxiway Centerline Lighting System.
r. AC 150/5340–24, Runway and Taxiway Edge Lighting System.
s. AC 150/5345–28D, Precision Approach Path Indicator (PAPI) Systems
t. International Air Transport Association document, "Flight Simulator Design and Performance Data Requirements," Fifth Edition (1996).
u. AC 29–2B, Flight Test Guide for Certification of Transport Category Rotorcraft.
v. AC 27–1A, Flight Test Guide for Certification of Normal Category Rotorcraft.
x. International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, First Edition, 1994 Doc 9625–AN/938.
y. Airplane Flight Simulator Evaluation Handbook, Volume I (February, 1995) and Volume II (July, 1996), The Royal Aeronautical Society, London, UK.
z. FAA Publication FAA-S–8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).

End Information

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4. Background [Reserved]

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5. Quality Assurance Program

Begin Rule Language (§ 60.5)

a. After [date 6 months after the effective date of the final rule], no sponsor may use or allow the use of or offer the use of an FTD for flightcrew member training or for obtaining flight experience to meet any requirement of this chapter unless the sponsor has established and follows a quality assurance (QA) program, acceptable to the NSPM, for the continuing surveillance and analysis of the sponsor's performance and effectiveness in providing a satisfactory FTD for use on a regular basis as described in the appropriate QPS.

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

c. Whenever the NSPM finds that the QA program does not adequately address the procedures necessary to meet the requirements of this part, the sponsor must, after notification by the NSPM, change the program so the procedures meet the requirements of this part.

d. Each sponsor of an FTD must identify to the NSPM and to the TPAA, by name, one individual, who is an employee of the

sponsor, to be the management representative (MR) and the primary contact point for all matters between the sponsor and the FAA regarding the qualification of that FTD as provided for in this part.

End Rule Language (§ 60.5)

Begin QPS Requirements

e. The Director of Operations for a Part 119 certificate holder, the Chief Instructor for a Part 141 certificate holder, or the equivalent for a Part 142 or Flight Engineer School sponsor, must designate a management representative who has the responsibility and authority to establish and modify the sponsor's policies, practices, and procedures regarding the QA program for the recurring qualification of, and the day-to-day use of, each FTD.

f. An acceptable Quality Assurance (QA) Program must contain a complete, accurate, and clearly defined written description of and/or procedures for—

(1) The method used by management to communicate the importance of meeting the regulatory standards contained in Part 60 and this QPS and the importance of establishing and meeting the requirements of a QA Program as defined in this paragraph f.

(2) The method(s) used by management to determine that the regulatory standards and the QA program requirements are being met, and if or when not met, what actions are taken to correct the deficiency and prevent its recurrence.

(3) The method used by management to determine that the sponsor is, on a timely and regular basis, presenting a qualified FTD.

(4) The criteria for and a definition or description of the workmanship expected for normal upkeep, repair, parts replacement, modification, etc., on the FTD and how, when, and by whom such workmanship is determined to be satisfactorily accomplished.

(5) The method used to maintain and control appropriate technical and reference documents, appropriate training records, and other documents for—
   (a) continuing FTD qualification; and
   (b) the QA program.

(6) The criteria the sponsor uses (*e.g.*, training, experience, etc.) to determine who may be assigned to duties of inspection, testing, and maintenance (preventive and corrective) on FTD's.

(7) The method used to track inspection, testing, and maintenance (preventive and corrective) on each FTD.

(8) The method used by the sponsor to inform the TPAA in advance of each scheduled NSPM-conducted evaluation and after the completion, the results of each such evaluation.

(9) The method used to ensure that instructors, check airmen, and those who conduct the daily preflight, are capable of determining what circumstance(s) constitute(s) a discrepancy regarding the FTD and its operation.

(10) The method used to ensure that instructors, check airmen, and those who conduct the daily preflight, record in the FTD discrepancy log each FTD discrepancy and each missing, malfunctioning, or inoperative FTD component.

(11) The method used to ensure that instructors and check airmen are completely and accurately logging the number of disruptions and time not available for training or for obtaining flight experience during a scheduled FTD use-period, including the cause(s) of the disruption.

(12) The method used by the sponsor to notify users of the FTD of missing, malfunctioning, or inoperative components that restrict the use of the FTD.

(13) The method of recording NSPM-conducted evaluations and other inspections (*e.g.*, daily preflight inspections, NASIP inspections, sponsor conducted quarterly inspections, etc.), including the evaluation or inspection date, test results, discrepancies and recommendations, and all corrective actions taken.

(14) The method for ensuring that the FTD is configured the way the helicopter it represents is configured and that if the configuration is authorized to be changed that the newly configured system(s) function(s) correctly.

(15) The method(s) for:
   (a) determining whether or not proposed modifications of the helicopter will affect the performance, handling, or other functions or characteristics of the helicopter; and
   (b) determining whether or not proposed modifications of the FTD will affect the performance, handling, or other functions or characteristics of the FTD;
   (c) coordinating and communicating items 5.f.(15)(a) and (b) of this appendix, as appropriate, with the sponsor's training organization, other users (*e.g.*, lease or service contract users), the TPAA, and the NSPM.

(16) How information found in the discrepancy log is used to correct discrepancies and how this information is used to review and, if necessary, modify existing procedures for FTD maintenance.

(17) The method for how and when software or hardware modifications are accomplished and tracked, documenting all changes made from the initial submission.

(18) The method used for determining that the FTD meets appropriate standards each day that it is used.

(19) The method for acquiring independent feedback regarding FTD operation (from persons recently completing training or obtaining flight experience; instructors and check airmen using the FTD for training or flight experience sessions; and FTD technicians and maintenance personnel) including a description of the process for addressing these comments.

(20) How devices used to test, measure, and monitor correct FTD operation are calibrated and adjusted for accuracy, including traceability of that accuracy to a recognized standard, and how these devices are maintained in good operating condition.

(21) How, by whom, and how frequently internal audits of the QA program are conducted and where and how the results of such audits are maintained and reported to Responsible Management, the NSPM, and the TPAA.

End QPS Requirements

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g. Additional Information.

Begin Information

(1) In addition to specifically designated QA evaluations, the NSPM will evaluate the sponsor's QA program as part of regularly scheduled recurrent FTD evaluations and no-notice FTD evaluations, focusing in large part on the effectiveness and viability of the QA program and its contribution to the overall capability of the FTD to meeting the requirements of this part.

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

(3) Should a sponsor include a ''foreign FTD'' (*i.e.*, one maintained by a non-US certificate holder) under their sponsorship, the sponsor remains responsible for the QA program for that FTD. However, if that foreign FTD is maintained under a QA program accepted by that foreign regulatory authority and that authority and the NSPM have agreed to accept each other's QA programs (*e.g.*, the Joint Aviation Authorities, JAA, of Europe), the sponsor will be required only to perform an ''external audit'' of the non-US certificate holder's compliance with the accepted foreign QA program, with the results of that audit submitted to and accepted by the NSPM.

End Information

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6. Sponsor Qualification Requirements

Begin Rule Language (§ 60.7)

a. A person is eligible to apply to be a sponsor of an FTD if the following conditions are met:

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

(2) The FTD will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for the helicopter being simulated as evidenced in a request for evaluation submitted to the NSPM through the TPAA.

b. A person is a sponsor of the FTD if the following conditions are met:

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

(2) The person has operations specifications authorizing the use of the helicopter type being simulated by the FTD or has training specifications or a course of training authorizing the use of an FTD for that helicopter type.

(3) The person has an approved quality assurance program in accordance with § 60.5.

(4) The NSPM has approved the person as the sponsor of the FTD and that approval has not been withdrawn by the FAA.

c. A person continues to be a sponsor of an FTD, if the following conditions are met:

(1) Beginning 12 calendar months after the initial qualification and every 12 calendar months thereafter, the FTD must have been used within the sponsor's FAA-approved flight training program for the helicopter type for a minimum of 600 hours.

(2) The use of the FTD described in paragraph (c)(1) of this section must be dedicated to meeting the requirements of parts 61, 63, 91, 121, or 135 of this chapter.

(3) If the use requirements of paragraphs (c)(1) and (2) of this section are not met, the person will continue to sponsor the FTD on a provisional basis for a period not longer than 12 calendar months; and—

(i) If the FTD is used as described in paragraphs (c)(1) and (2) of this section within this additional 12 calendar month period, the provisional status will be removed and regular sponsorship resumed; or

(ii) If the FTD is not used as described in paragraphs (c)(1) and (2) of this section within the additional 12 calendar month period, the FTD is not qualified and the sponsor will not be eligible to apply to sponsor that FSD for at least 12 calendar months.

End Rule Language (§ 60.7)

7. Additional Responsibilities of the Sponsor

Begin Rule Language (§ 60.9)

a. The sponsor must not allow the FTD to be used for flightcrew member training or evaluation or for attaining flight experience for the flightcrew member to meet any of the requirements under this chapter unless the sponsor, upon request, allows the NSPM to inspect immediately the FTD, including all records and documents relating to the FTD, to determine its compliance with this part.

b. The sponsor must, for each FTD ''

(1) Establish a mechanism for the following persons to provide comments regarding the FTD and its operation and provide for receipt of those comments:

(i) Flightcrew members recently completing training or evaluation or recently obtaining flight experience in the FTD;

(ii) Instructors and check airmen using the FTD for training, evaluation, or flight experience sessions; and

(iii) FTD technicians and maintenance personnel performing work on the FTD.

(2) Examine each comment received under paragraph (b)(1) of this section for content and importance and take appropriate action.

(3) Maintain a liaison with the manufacturer of the helicopter being simulated by the FTD to facilitate compliance with § 60.13(f) when necessary.

(4) Post in or adjacent to the FTD the Statement of Qualification issued by the NSPM.

End Rule Language (§ 60.9)

8. FTD Use

Begin Rule Language (§ 60.11)

No person may use or allow the use of or offer the use of an FTD for meeting training, evaluation, or flight experience requirements of this chapter for flightcrew member certification or qualification unless, in accordance with the QPS for the specific device—

a. It has a single sponsor who is qualified under § 60.9. The sponsor may arrange with another person for services of document preparation and presentation, as well as FTD inspection, maintenance, repair, and servicing; however, the sponsor remains responsible for ensuring that these functions are conducted in a manner and with a result of continually meeting the requirements of this part.

b. It is qualified as described in the Statement of Qualification that is required to be posted pursuant to § 60.9(b)(4)—

(1) For the make, model, and series of helicopter; and

(2) For all tasks and configurations.

c. It remains qualified, through satisfactory inspection, recurrent evaluations, appropriate maintenance, and use requirements in accordance with this part and the appropriate QPS.

d. Its software and active programming used during the training, evaluation, or flight experience is the same as the software and active programming that was evaluated by the NSPM.

End Rule Language (§ 60.11)

Begin QPS Requirements

e. Only those FTDs that are used by a certificate holder (as defined for use in Part 60 and this QPS) will be evaluated by the NSPM. However, other FTD evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

End QPS Requirements

Begin Information

f. Each FTD must be evaluated as completely as possible. To ensure a thorough and uniform evaluation, each FTD is subjected to the objective tests listed in attachment 2 and the subjective tests listed in attachment 3 of this appendix. The evaluation(s) described in this paragraph f herein will include, but not necessarily be limited to the following, as appropriate, for the qualification level of the FTD.

(1) Aerodynamic responses, including control responses in the longitudinal, lateral-directional, and vertical directions; as well as low airspeed responses (see attachment 2 of this appendix);

(2) Performance in authorized portions of the simulated helicopter's operating envelope, to include tasks suitable to the NSPM in the areas of ground operations, takeoff, climb, cruise, descent, approach, landing, and vertical climb, as well as abnormal and emergency operations (see

paragraph 23 and 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 and instructor station functions checks (see attachment 1 and attachment 3 of this appendix);

(6) Helicopter, or set of helicopters, systems and sub-systems (as attachment) as compared to the helicopter or set of helicopters simulated (see attachment 1 and attachment 3 of this appendix);

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

(8) Certain additional requirements, depending upon the complexity of the FTD 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.

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

(1) Objective tests are used to compare FTD and helicopter data objectively to ensure that the FTD performance and handling qualities are within specified tolerances.

(2) Subjective tests provide a basis for:

(a) evaluating the capability of the FTD to perform over a typical utilization period;

(b) determining that the FTD satisfactorily meets the appropriate training/testing/checking objectives and competently simulates each required maneuver, procedure, or task; and

(c) verifying correct operation of the FTD controls, instruments, and systems.

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

i. In addition to the scheduled recurrent evaluation (see paragraph 13 of this appendix), each FTD is subject to evaluations conducted by the NSPM at any time with no prior notification to the sponsor. Such evaluations would be accomplished in a normal manner (*i.e.*, requiring exclusive use of the FTD for the conduct of objective and subjective tests and an examination of functions) if the FTD is not being used for flightcrew member training, testing, or checking. However, if the FTD were being

used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the FTD evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the FTD along with the student(s) and observing the operation of the FTD during the training, testing, or checking activities. While the intent is to observe the operation and interaction of the device and not the check airman, instructor, APD, FAA inspector, or student(s), the FTD evaluator is a qualified FAA operations inspector and must, without question, report any obvious lack of proficiency to the appropriate POI or TCPM.

End Information

9. FTD Objective Data Requirements

Begin Rule Language (§ 60.13)

a. Except as provided in paragraph (b) and (c) of this section, for the purposes of validating FTD performance and handling qualities during evaluation for qualification, the sponsor must submit the helicopter manufacturer's flight test data to the NSPM.

b. The sponsor may submit flight test data from a source in addition to or independent of the helicopter manufacturer's data to the NSPM in support of an FTD qualification, but only if this data is gathered and developed by that source in accordance with flight test methods, including a flight test plan, as described in the appropriate QPS.

c. The sponsor may submit alternative data acceptable to the NSPM for consideration, approval and possible use in particular applications for FTD qualification.

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

e. The NSPM may require additional flight testing to support certain FTD qualification requirements.

f. When an FTD sponsor learns, or is advised by a helicopter manufacturer or supplemental type certificate (STC) holder, that an addition to, an amendment to, or a revision of the data used to program and operate an FTD used in the sponsor's training program is available, the sponsor must immediately notify the NSPM.

End Rule Language (§ 60.13)

Begin QPS Requirements

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

(1) A flight test plan, that contains:
(a) The required maneuvers and procedures.
(b) For each maneuver or procedure—
(i) The procedures and control input the flight test pilot and/or engineer are to use.
(ii)B The atmospheric and environmental conditions.
(iii)C The initial flight conditions.
(iv)D The helicopter configuration, including weight and center of gravity.
(v)E The data that is to be gathered.

(vi)F Any other appropriate factors.
(2) Appropriately qualified flight test personnel.
(3) An understanding of the accuracy of the data to be gathered.
(4) Appropriate and sufficient data acquisition equipment or system(s), including appropriate data reduction and analysis methods and techniques, as would be acceptable to the FAA's Aircraft Certification Service.
(5) Calibration of data acquisition equipment and helicopter performance instrumentation must be current and traceable to a recognized standard.

h. The data presented, regardless of source, must be presented:
(1) in a format that supports the FTD validation process;
(2) in a manner that is clearly readable and annotated correctly and completely;
(3) with resolution sufficient to determine compliance with the tolerances set forth in attacment 2 of this appendix.
(4) with any necessary guidance information provided; and
(5) without alteration, adjustments, or bias; however the data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation.

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

End QPS Requirements

Begin Information

j. Any necessary data and the flight test plan should be reviewed with the NSP staff well in advance of commencing the flight test.

End Information

10. Special Equipment and Personnel Requirements for Qualification of the FTD

Begin Rule Language (§ 60.14)

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

End Rule Language (§ 60.14)

Begin Information

b. Examples of a special evaluation would be an evaluation conducted at the request of the TPAA or as a result of comments received from users of the FTD that, upon analysis and confirmation, might cause a question as to the continued qualification or use of the FTD.

c. The NSPM will notify the sponsor at least 24 hours in advance of the evaluation if special equipment or personnel will be required to conduct the evaluation. Examples of special equipment include spot photometers, flight control measurement

devices, sound analyzer, etc. Examples of special personnel would be those specifically qualified to install or use any special equipment when its use is required.

End Information

11. Initial (and Upgrade) Qualification Requirements

Begin Rule Language (§ 60.15)

a. For each FTD, the sponsor must submit a request through the TPAA to have the NSPM evaluate the FTD for initial qualification at a specific level. The request must be submitted in the form and manner described in the appropriate QPS.

b. The request must include all of the following:
(1) A statement that the FTD meets all of the applicable provisions of this part.
(2) A statement that the sponsor has established a procedure to verify that the configuration of hardware and software present during the evaluation for initial qualification will be maintained, except where modified as authorized in § 60.23. The statement must include a description of the procedure.
(3) A statement signed by at least one pilot who meets the requirements of paragraph (c) of this section asserting that each pilot so approved has determined that the following requirements have been met:
(i) The FTD systems and sub-systems function equivalently to those in the helicopter or set of helicopters.
(ii) The performance and flying qualities of the FTD are equivalent to those of the helicopter or set of helicopters.
(iii) For cockpit specific FTDs, the cockpit configuration conforms to the configuration of the helicopter make, model, and series being simulated.
(4) A list of all of the operations tasks or FTD systems in the subjective test appendix of the appropriate QPS for which the FTD has not been subjectively tested (e.g., circling approaches, windshear training, etc.) and for which qualification is not sought.
(5) A qualification test guide (QTG) that includes all of the following:
(i) Objective data obtained from helicopter testing or another approved source.
(ii) Correlating objective test results obtained from the performance of the FTD as prescribed in the appropriate QPS.
(iii) The general FTD performance or demonstration results prescribed in the appropriate QPS.
(iv) A description of the equipment necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification.

c. The pilot or pilots who make the statement required by paragraph (b)(3) of this section must—
(1) Be designated by the sponsor;
(2) Be approved by the TPAA; and
(3) Be qualified in—
(i) The helicopter or set of helicopters being simulated; or
(ii) For helicopter types not yet issued a type certificate, a helicopter type similar in size and configuration.

d. The subjective tests that form the basis for the statements described in paragraph (b)(3) of this section and the objective tests referenced in paragraph (b)(5) of this section must be accomplished at the sponsor's training facility except as provided for in the appropriate QPS.

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

f. When the FTD passes an evaluation for initial qualification, the NSPM issues a Statement of Qualification that includes all of the following:

(1) Identification of the sponsor.

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

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

(4) A statement that the FTD is qualified.

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

(6) A list of all of the operations tasks or FTD systems in the subjective test appendix of the appropriate QPS for which the FTD has not been subjectively tested and for which the FTD is not qualified (*e.g.*, circling approaches, windshear training, etc.).

g. After the NSPM completes the evaluation for initial qualification, the sponsor must update the QTG, with the results of the FAA-witnessed tests and demonstrations together with the results of all the objective tests and demonstrations described in the appropriate QPS.

h. Upon issuance of the Statement of Qualification the updated QTG becomes the MQTG and must then be made available to the FAA upon request.

End Rule Language (§ 60.15)

Begin QPS Requirements

i. The QTG described in paragraph 11.b(4)of this appendix must provide the documented proof of compliance with the FTD objective tests in attachment 2 of this appendix.

j. The QTG is prepared and submitted by the sponsor, or the sponsor's agent on behalf of the sponsor, through the TPAA 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 automatically and manually conducted tests;

(3) a means of comparing the FTD's test results to the objective data;

(4) statements of how a particular test was accomplished or that certain requirements have been met (see appendices to this document for additional information);

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

k. The QTG described in paragraph 11.b.(4) of this appendix must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see attachment 5, Figure 2, of this appendix for a sample QTG cover page).

(2) A recurrent evaluation schedule requirements page—to be used by the NSPM to establish and record the frequency with which recurrent evaluations must be conducted and any subsequent changes that may be determined by the NSPM. See attachment 5, Figure 4, of this appendix for a sample Recurrent Evaluation Schedule Requirements page.

(3) An FTD information page that provides the information listed below (see attachment 5, Figure 3, of this appendix for a sample FTD information page). For convertible FTDs, a separate page is submitted for each configuration of the FTD.

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

(b) The helicopter model and series, or set of helicopters, being simulated.

(c) The aerodynamic data revision number or reference.

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

(e The flight control data revision number or reference.

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

(g) The FTD model and manufacturer.

(h) The date of FTD manufacture.

(i) The FTD computer identification.

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

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

(4) A Table of Contents.

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

(6) The source data.

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

(8) Statements of compliance and capability (SOC's) with certain requirements. SOC's must provide references to the sources of information for showing the capability of the FTD to comply with the requirement, a rationale explaining how the referenced material is used, mathematical equations and parameter values used, and the conclusions reached; *i.e.* that the FTD complies with the requirement. Refer to the ''Additional Details'' column in attachment 1 of this appendix, ''FTD Standards,'' or in the ''Test Details'' column in attachment 2 of this appendix, ''FTD Objective Tests,'' to see when SOC's 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 of this appendix, as applicable to the qualification level sought.

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating FTD objective test results.

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

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

(i) Tolerances for relevant parameters.

(j) Source of Helicopter Test Data (document and page number).

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

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

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

(1) The sponsor's FTD test results must be recorded in a manner, acceptable to the NSPM, that will allow easy comparison of the FTD test results to helicopter test data (*e.g.*, use of a multi-channel recorder, line printer, cross plotting, overlays, transpariencies, etc.).

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

(3) Helicopter 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 of this appendix.

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

m. The sponsor may elect to complete the QTG objective tests at the manufacturer's facility. Tests performed at this location must be conducted after assembly of the FTD has been essentially completed, the systems and sub-systems are functional and operate in an interactive manner, and prior to the initiation of disassembly for shipment. The sponsor must substantiate FTD performance at the sponsor's training facility by repeating a representative sampling of all the objective tests in the QTG and submitting these repeated test results to the NSPM. This sample must consist of at least one-third of the QTG objective tests. The QTG must be clearly annotated to indicate when and where each test was accomplished.

n. The sponsor may elect to complete the subjective tests at the manufacturer's facility. Tests performed at this location will be conducted after assembly of the FTD has been essentially completed, the systems and sub-systems are functional and operate in an interactive manner, and prior to the initiation of disassembly for shipment. The sponsor must substantiate FTD performance at the

sponsor's training facility by having the pilot(s) who performed these tests originally (or similarly qualified pilot(s)), repeat a representative sampling of these subjective tests and submit a statement to the NSPM that the FTD has not changed from the original determination. The report must clearly indicate when and where these repeated tests were completed, but need not take more than one normal FTD period (e.g., 4 to 8 hours) to complete.

o. The sponsor must maintain a copy of the MQTG at the FTD location. After [date 6 years from the effective date of this rule] all MQTG's, regardless of initial qualification date of the FTD, must be available in an electronic format, acceptable to the NSPM. The electronic MQTG must include all objective data obtained from helicopter testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the FTD (reformatted or digitized) as prescribed in this document, the general FTD performance or demonstration results (reformatted or digitized) prescribed in this document, and a description of the equipment necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification. This electronic MQTG must include the original helicopter flight test data used to validate FTD performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original flight test time-history plots that were provided by the data supplier. An electronic copy of MQTG must be provided to the NSPM.

End QPS Requirements

Begin Information

p. Problems with objective test results are handled according to the following:

(1) If a problem with an objective test result is detected by the NSP evaluation team during an evaluation, the test may be repeated and/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 FTD at that lower level. For example, if a Level 6 evaluation is requested and the FTD fails to meet the Level 6 Spiral Stability test tolerances but does meet the Level 5 tolerances, it could be qualified at Level 5.

q. After the NSPM issues a statement of qualification to the sponsor when an FTD is successfully evaluated, the FTD is recommended to the TPAA, who will exercise authority on behalf of the Administrator in approving the FTD in the appropriate helicopter flight training program.

r. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within 10 working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made; however, once a schedule is agreed to, any slippage of

the evaluation date at the sponsor's request may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation. A sponsor may commit to an initial evaluation date under this early process, in coordination with and the agreement of the NSPM, but the request must be in writing and must include an acknowledgment of the potential schedule impact if the sponsor slips the evaluation from this early-committed date. See Attachment 5, figure 5, of this appendix Sample Request for Initial Evaluation Date.

s. A convertible FTD is addressed as a separate FTD for each model and series helicopter or set of helicopters to which it will be converted and for the FAA qualification level sought. An NSP evaluation is required for each configuration. For example, if a sponsor seeks qualification for two models of a helicopter type using a convertible FTD, two QTG's, or a supplemented QTG, and two evaluations are required.

t. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in attachment 2 of this appendix, FTD Objective Tests.

End Information

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12. Additional Qualifications for a Currently Qualified FTD

Begin Rule Language (§ 60.16)

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

(1) The sponsor:

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

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

(iii) Must submit a statement to the NSPM that a pilot, designated by the sponsor in accordance with § 60.15(c) and approved by the TPAA for the user, has subjectively evaluated the FTD in those areas not previously evaluated.

(2) The FTD must successfully pass an evaluation ''

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

(ii) For those elements of an evaluation for initial qualification (e.g., objective tests, performance demonstrations, or subjective tests) designated as necessary by the NSPM.

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

c. The FTD is qualified for the additional uses when the NSPM issues an amended

Statement of Qualification in accordance with § 60.15(f).

d. The sponsor may not modify the FTD except as described in § 60.23.

End Rule Language (§ 60.16)

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13. Previously Qualified FTDs

Begin Rule Language (§60.17)

a. Unless otherwise specified by an FSD Directive, further referenced in the appropriate QPS, or as specified in paragraph (e) of this section, an FTD qualified before [the effective date of the final rule] will retain its qualification as long as it continues to meet the standards, including the performance demonstrations and the objective test results recorded in the MQTG, under which it was originally evaluated, regardless of sponsor, and as long as the sponsor complies with the applicable provisions of this part.

b. If the FTD qualification is lost under § 60.27 and not restored under § 60.27 for two (2) years or more, the qualification basis for the re-qualification will be those standards in effect and current at the time of re-qualification application.

c. Except as provided in paragraph (d) of this section, any change in FTD qualification level initiated on or after [the effective date of this rule] requires an evaluation for initial qualification in accordance with this part.

d. The NSPM may downgrade a qualified FTD without requiring and without conducting an initial evaluation for the new qualification level. Subsequent recurrent evaluations will use the existing MQTG, modified as necessary to reflect the new qualification level.

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

End Rule Language (§ 60.17)

Begin Information

f. Other certificate holders or persons desiring to use an FTD may contract with FTD sponsors to use those FTDs already qualified at a particular level for a helicopter type, or set of helicopters, and approved for use within an FAA-approved flight training program. Such FTDs are not required to undergo an additional qualification process, except as described in paragraph 12, above.

Note: The reader is reminded of the requirement that each FTD user obtain approval for use of each FTD in an FAA-approved flight training program from the appropriate TPAA.

End Information