

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 an FTD 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 as follows:

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

(2) Completes a functional preflight check in accordance with the appropriate QPS each calendar day prior to the start of the first FTD 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 FTD.

b. Recurrent evaluation.

(1) This evaluation consists of performance demonstrations, objective tests, and subjective tests, including general FTD 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 FTD 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 FTD performance or demonstration results in the MQTG, and access to the FTD 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, an FTD for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet the requirements of this chapter unless the FTD 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 FTD 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 FTD for appropriate hydraulic (if applicable), pneumatic, and electrical connections (*e.g.*, in place, not leaking, appear serviceable);

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

(3) a review of the FTD discrepancy log;

(4) a functional check of the major FTD systems and simulated helicopter, or set of helicopters, systems (*e.g.*, cockpit instrumentation, control loading, and adequate air flow for equipment cooling) by doing the following:

(i) Turn on main power, including motion system (if applicable), 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, if applicable, observe the visual system, for proper operation (including light-point color balance and convergence, edge-matching and blending, etc.).

(vi) If applicable, adjust visibility value to inside of the far end of the runway and release “position freeze or flight freeze.” From either pilot position, advance power to taxi/ hover taxi (as applicable) down the runway (if applicable), observe visual system (if applicable); check sound system and engine instrument response (as applicable) and apply wheel brakes (if applicable); check normal operation and continued deceleration.

(vii) Select position on final approach, at least five (5) miles out (if applicable, observe visual scene). From either pilot position, adjust helicopter configuration appropriately (if applicable, check for normal landing gear operation). If 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, if applicable). Observe simulated helicopter systems operation.

(viii) Extend landing gear,

(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, as applicable.

(xi) Record “functional preflight” in the FTD 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 as may be applicable.

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

(1) a review of the results of the objective tests and all the designated FTD 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 FTD 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 FTD, including, but not necessarily limited to the motion, visual, and sound system as applicable, and the instructor operating station, including the normal and simulated malfunctions of the simulated helicopter systems.

End Information

15. Logging FTD 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 FTD, must write or cause to be written a description of that discrepancy into the discrepancy log at the end of the FTD preflight or FTD use session.

End Rule Language (§ 60.20)

16. [Reserved]

17. Modifications to FTDs

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 FTD cannot be used adequately to train, evaluate, or provide flight experience for flightcrew members, the sponsor must modify the FTD 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 FTD modification is necessary for safety of flight reasons, the sponsor of each affected FTD must ensure that the FTD is modified according to the FSD Directive regardless of the original qualification standards applicable to any specific FTD.

c. Before modifying a qualified FTD, 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 FTD.

(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 FTD programming or replacing or modifying the host computer; or if the sponsor is changing or modifying the control loading system (or motion, visual, or sound system for FTD levels requiring these 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 FTD 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 FTD 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 FTD until one of the following has occurred:

(1) For circumstances described in paragraph (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 paragraph (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 an FTD, the sponsor must notify each certificate holder planning to use that FTD of that modification prior to that certificate holder using that FTD 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 an FTD 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, or set of helicopters, being simulated and designated by the sponsor, that, with the modification proposed—

(1) the FTD systems and sub-systems function equivalently to those in the helicopter, or set of helicopters, being simulated;

(2) the performance and flying qualities of the FTD are equivalent to those of the helicopter, or set of helicopters, being simulated; and

(3) the cockpit configuration conforms to the configuration of the helicopter, or set of helicopters, being simulated.

End QPS Requirements

18. Operations with Missing, Malfunctioning, or Inoperative Components

Begin Rule Language (§60.25)

a. No person may use or allow the use of or offer the use of an FTD 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 FTD qualification.

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

End Rule Language (§ 60.25)

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

Begin Rule Language (§60.27)

a. An FTD is not qualified if any of the following occurs:

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

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

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

(4) The FTD 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 FTD qualification is lost under paragraph (a) of this section, qualification is restored when either of the following provisions are met:

(1) The FTD 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 FTD that was accomplished, and the care that had been taken of the device since the last evaluation.

End Rule Language (§ 60.27)

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

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 FTD no longer meets qualification standards, the following procedure applies:

(1) The NSPM or the TPAA notifies the sponsor in writing that the FTD 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 FTD qualification.

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

(4) If the NSPM or the TPAA notifies the sponsor that some or all of the FTD 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 FTD 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 FTD 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 FTD 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 FTD 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)

21. Recordkeeping and Reporting

Begin Rule Language (§60.31)

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

(1) The MQTG and each amendment thereto.

(2) A copy of the programming used during the evaluation of the FTD 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 FTD hardware configurations made since initial qualification.

b. The FTD sponsor must keep a current record of each certificate holder using the FTD. 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 FTD continues to perform and handle as qualified by the NSPM.

End Rule Language (§ 60.31)

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

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 FTD qualification and approval for use in a training program.

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

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

(2) An incorrect entry, upon which the FAA relied or could have relied, made in any logbook, record, or report that is kept, made, or used to show compliance with any requirement for an FTD qualification or an approval for use.

End Rule Language (§ 60.33)

23. [Reserved]

24. [Reserved]

25. [Reserved]

Attachment 1 to Appendix D to Part 60—General FTD Requirements

1. General

Begin QPS Requirements

a. Requirements

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

End QPS Requirements

b. Discussion

Begin Information

(1) This attachment describes the minimum requirements for qualifying Level 2 through Level 6 flight training devices. To determine the complete requirements for a specific level FTD, the objective tests in attachment 2 of this appendix and the subjective tests listed in attachment 3 of this appendix for this QPS must be consulted.

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

(a) General cockpit configuration.

(b) Simulator programming.
 (c) Equipment operation.
 (d) Equipment and facilities for instructor/evaluator functions.

(e) Sound system.

End Information

TABLE OF MINIMUM FTD REQUIREMENTS INFORMATION

General FTD Standards	QPS Requirement						Additional details	Notes
	FTD level							
	1	2	3	4	5	6		
2. General Cockpit Configuration:								
a. The FTD must have a cockpit that is a full-scale replica of the helicopter, or set of helicopters, simulated with controls, equipment, observable cockpit indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the helicopter or set of helicopters. The direction of movement of controls and switches must be identical to that in the helicopter or set of helicopters.			X			X	Level 3 must be representative of a single set of helicopters, and must have navigation controls, displays, and instrumentation as set out in Part 91, §91.33 for operation in accordance with instrument flight rules (IFR). Crewmember seats must afford the capability for the occupant to be able to achieve the design "eye position" for specific helicopters, or to approximate such a position for a generic set of helicopters.	For FTD purposes, the cockpit consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots' seats including additional, required crewmember duty stations and those required bulkheads aft of the pilot seats.
b. The FTD must have equipment (i.e., instruments, panels, systems, and controls) simulated sufficiently for the authorized training/checking events to be accomplished. The installed equipment, must be located in a spatially correct configuration, and may be in a cockpit or an open flight deck area. Actuation of this equipment must replicate the appropriate function in the helicopter.		X		X	X		Level 2 must be representative of a single set of helicopters.	
c. Circuit breakers must function accurately when they are involved in operating procedures or malfunctions requiring or involving flight crew response.		X	X		X	X	Level 6 devices must have installed circuit breakers properly located in the FTD cockpit.	
3. Programming:								
a. The FTD must provide the proper effect of aerodynamic changes for the combinations of drag and thrust normally encountered in flight. This must include the effect of change in helicopters attitude, thrust, drag, altitude, temperature, and configuration.		X	X		X	X	Levels 3 and 6 additionally require the effects of change in gross weight and center of gravity. Levels 2, 3, and 5 require only generic aerodynamic programming.	
b. The FTD must have the computer (analog or digital) capability (i.e., capacity, accuracy, resolution, and dynamic response) needed to meet the qualification level sought.		X	X	X	X	X		

TABLE OF MINIMUM FTD REQUIREMENTS INFORMATION—Continued

General FTD Standards	QPS Requirement						Additional details	Notes
	FTD level							
	1	2	3	4	5	6		
c. The FTD hardware and programming must be updated within 6 months of any helicopters modifications or data releases (or any such modification or data releases applicable to the set of helicopters) unless, with prior coordination, the NSPM authorizes otherwise.		X	X	X	X	X		
d. Relative responses of the cockpit instruments (and the visual and motion systems, if installed and training, testing, or checking credits are being sought) must be coupled closely to provide integrated sensory cues. The instruments (and the visual and motion systems, if installed, and training, testing, or checking credits are being sought) must respond to abrupt input at the pilot's position within the allotted time, but not before the time, when the helicopter or set of helicopters would respond under the same conditions. (If a visual system is installed and training, testing, or checking credits are sought, the visual scene changes from steady state disturbance must occur within the appropriate system dynamic response limit but not before the instrument response (and not before the motion system onset if a motion system is installed)).		X	X		X	X	A demonstration is required and must simultaneously record: the analog output from the pilot's control column, wheel, and pedals; and the output signal to the pilot's attitude indicator. These recordings must be compared to helicopter response data in the following configurations: takeoff, cruise, and approach or landing. The results must be recorded in the QTG. Additionally, if a visual system is installed and training, testing, or checking credits are sought, the output signal to the visual system display (including visual system analog delays must be recorded); and if a motion system is installed and training, testing, or checking credits are sought, the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots' seats is also required.	
4. Equipment Operations:								
a. All relevant instrument indications involved in the simulation of the helicopter (or set of helicopters) must automatically respond to control movement or external disturbances to the simulated helicopter or set of helicopters; e.g., turbulence or winds.		X	X		X	X		

TABLE OF MINIMUM FTD REQUIREMENTS INFORMATION—Continued

General FTD Standards	QPS Requirement						Additional details	Notes
	FTD level							
	1	2	3	4	5	6		
b. Navigation equipment must be installed and operate within the tolerances applicable for the helicopter or set of helicopter.		X	X		X	X	Levels 2 and 5 need have only that navigation equipment necessary to fly an instrument approach. Levels 3 and 6 must also include communication equipment (inter-phone and air/ground) like that in the helicopter, or set of helicopters, and, if appropriate to the operation being conducted, an oxygen mask microphone system.	
c. Installed systems must simulate the applicable helicopter (or set of helicopters) system operation, both on the ground and in flight. At least one helicopter system must be represented. Systems must be operative to the extent that applicable normal, abnormal, and emergency operating procedures included in the sponsor's training programs can be accomplished.		X	X	X	X	X	Level 6 must simulate all applicable helicopter flight, navigation, and systems operation. Level 3 must have flight and navigational controls, displays, and instrumentation for powered aircraft as set out in part 91, §91.205 for IFR operation. Levels 2 and 5 must have influenced flight and navigational controls, displays, and instrumentation.	
d. The lighting environmental for panels and instruments must be sufficient for the operation being conducted.		X	X	X	X	X		
e. The FTD must provide control forces and control travel that correspond to the replicated helicopter, or set of helicopters. Control forces must react in the same manner as in the helicopter, or set of helicopters, under the same flight conditions.			X			X		
f. The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach. The control forces must react in the same manner as in the helicopter, or set of helicopters, under the same flight conditions.		X			X			
5. Instructor or Evaluator Facilities:								
a. In addition to the flight crewmember stations, suitable seating arrangements for an instructor/check airman and FAA Inspector must be available. These seats must provide adequate view of crewmember's panel(s).		X	X	X	X	X	.....	These seats need not be a replica of an aircraft seat and may be as simple as an office chair placed in an appropriate position.

TABLE OF MINIMUM FTD REQUIREMENTS INFORMATION—Continued

General FTD Standards		QPS Requirement						Additional details	Notes
		FTD level							
		1	2	3	4	5	6		
b. The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions, as may be appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls.			X	X	X	X	X		
6. Motion System:									
a. The FTD may have a motion system; if desired, although it is not required.			X	X	X	X	X	If installed, the motion system operation may not be distracting. The motion system standards set out in QPS FAA-S-120-40C for at least Level A simulators is acceptable.	
7. Visual System:									
a. The FTD may have a visual system; if desired, although it is not required. If a visual system is installed, it must meet the following criteria: (1) Single channel, uncollimated display is acceptable. (2) Minimum field of view: 18° vertical / 24° horizontal for the pilot flying. (3) Maximum parallax error: 10° per pilot. (4) Scene content may not be distracting. (5) Minimum distance from the pilot's eye position to the surface of a direct view display may not be less than the distance to any front panel instrument. (6) Minimum resolution of 5 arc-min. for both computed and displayed pixel size. (7) Maximum latency or through-put must not exceed 300 milliseconds.			X	X	X	X	X	A statement of capability is required. A demonstration of latency or through-put is required. Visual system standards set out in QPS FAA-S-120-40C, for at least Level A simulators is acceptable. However, if additional authorizations (training, testing, or checking credits) are sought that require the use of a visual system, the Level A simulator visual system standards apply.	
8. Sound System:									
a. The FTD must simulate significant cockpit sounds resulting from pilot actions that correspond to those heard in the helicopter.				X			X		

**Attachment 2 to Appendix D to Part 60—
Flight Training Device (FTD) 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 FTD 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 climb capability for a single-engine helicopter; *etc.*). Each test result is compared against Flight Test Data described in § 60.13, and Paragraph 9 of this document. (See paragraph 1.b, of this attachment for additional information.) Although use of a driver program designed to automatically accomplish the tests is authorized, 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 FTD 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 FTD 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 FTD 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 FTD validity,

such judgment must not be limited to a single parameter. For example, data that exhibit rapid variations of the measured parameters may require interpolations or a "best fit" data section. All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match FTD to helicopter data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

(5) It is not sufficient, nor is it acceptable, to program the FTD so that the aerodynamic modeling is correct only at the validation test points. Unless noted otherwise, tests must represent helicopter performance and handling qualities at normal operating weights and centers of gravity (CG). If a test is supported by aircraft data at one extreme weight or CG, another test supported by aircraft data at mid-conditions or as close as possible to the other extreme is necessary. Certain tests that are relevant only at one extreme CG or weight condition need not be repeated at the other extreme. The results of the tests for Levels 3 and 6 are expected to be indicative of the device's performance and handling qualities throughout the following:

- (a) The helicopter weight and CG envelope;
- (b) The operational envelope; and
- (c) Varying atmospheric ambient and environmental conditions—including the extremes authorized for the respective helicopter or set of helicopters.

(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. If comparing short period dynamics, normal acceleration may be used to establish a match to the helicopter, but airspeed, altitude, control input, helicopter configuration, and other appropriate data must also be given. If comparing landing gear change dynamics, pitch, airspeed, and altitude may be used to establish a match to the helicopter, but landing gear position must also be provided. All airspeed values must be

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 FTD will be set up and operated for each test. Overall integrated testing of the FTD must be accomplished to assure that the total FTD system meets the prescribed standards; *i.e.*, it is not acceptable to test only each FTD 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 FTDs, 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) Tests of handling qualities must include validation of augmentation devices. FTDs for highly augmented helicopters will be validated both in the unaugmented configuration (or failure state with the maximum permitted degradation in handling qualities) and the augmented configuration. Where various levels of handling qualities result from failure states, validation of the effect of the failure is necessary. Requirements for testing will be mutually agreed to between the sponsor and the NSPM on a case-by-case basis.

End QPS Requirements

Begin Information

b. Discussion

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.

End Information

TABLE OF OBJECTIVE TESTS

		QPS Requirement						Information notes	
Test	Tolerance	Flight conditions	Flight training device level						
			1	2	3	4	5		6
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	
								Record each engine start from the initiation of the start sequence to steady state idle and from steady state idle to operating RPM..	

TABLE OF OBJECTIVE TESTS—Continued

QPS Requirement									Information notes	
Test	Tolerance	Flight conditions	Flight training device level							Test details
			1	2	3	4	5	6		
(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	X	Record both steady state idle and operating RPM conditions. May be a series of snapshot tests..
(2) Power Turbine	±10% of total change of power turbine speed.	Ground			X				X	Record engine response to trim system actuation in both directions..
(3) Engine and Rotor Speed Governing.	Torque—±5%, Rotor Speed—±1.5%.	Climb, Descent			X				X	Record results using a step input to the collective. May be conducted concurrently with climb and descent performance tests..
b. In 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	X	Record results for two gross weight and CG combinations with varying trim speeds throughout the air-speed envelope. May be a series of snapshot tests..
c. 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	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..
d. 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	X	Record results 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	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.

TABLE OF OBJECTIVE TESTS—Continued

Test	Tolerance	Flight conditions	QPS Requirement						Test details	Information notes
			Flight training device level							
			1	2	3	4	5	6		
d. Autorotation										
Entry	Rotor Speed-±3%, Pitch Attitude ±22°, Roll Attitude-3°, Yaw Attitude-±5°, Airspeed-±5 kts., Vertical Velocity-±200 fpm (1.00m/sec) or 10%.	Cruise; or Climb			X				X	Record results of a rapid throttle reduction to idle. If accomplished in cruise, results must be for the maximum range airspeed. If accomplished in climb, results must be for the maximum rate of climb airspeed at or near maximum continuous power.
3. Handling Qualities										
a. Control System Mechanical Characteristics										
For FTDs requiring Static or Dynamic tests at the controls (i.e., cyclic, collective, and pedal), special test fixtures will not be required during initial or upgrade evaluations if the sponsor's QTG/MQTG shows both test fixture results and the results of an alternative approach, such as computer plots produced concurrently, that show satisfactory agreement. Repeat of the alternative method during the initial or upgrade evaluation would then satisfy this test requirement. For initial and upgrade evaluations, the control dynamic characteristics must be measured at and recorded directly from the cockpit controls, and must be accomplished in climb, cruise, and autorotation.									Contact the NSPM for clarification 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	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 and 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	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	X	
(4) Trim System Rate (all applicable systems).	Rate—±10%	Ground Static conditions. Trim On. Friction Off.		X	X			X	X	The tolerance applies to the recorded value of the trim rate.
(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 greater than 5% of initial displacement ±1 overshoot.	Hover/Cruise. Trim On, Friction Off.		.....	.....			.....	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 3 of this appendix for additional information "N" is the sequential period of full cycle of oscillation.
(6) Freepay	±0.10 in	Ground; Static conditions.		X	X			X	X	Record and compare results for all controls.
B. 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	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 un-augmented cases.

TABLE OF OBJECTIVE TESTS—Continued

QPS Requirement										Information notes
Test	Tolerance	Flight conditions	Flight training device level						Test details	
			1	2	3	4	5	6		
(2) Static Stability	Longitudinal Control Position: $\pm 10\%$ of change from trim or ± 0.25 in. (6.3 mm) or Longitudinal Control Force: ± 0.5 lb. (0.223 daN) or $\pm 10\%$.	Cruise or Climb. Auto-rotation. Augmentation on and Off.		X	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.	$\pm 10\%$ of calculated period. $\pm 10\%$ of time to $1/2$ or double amplitude, or ± 0.02 of damping ratio.	Cruise Augmentation On and Off.		X	X			X	X	Record results for three full cycles (6 overshoots after input completed) or that sufficient to determine time to $1/2$ or double amplitude, whichever is less. For non-periodic responses, the time history must be matched.
(b) Short Term Response.	$\pm 1.5\%$ Pitch or $\pm 2\%$ /sec. Pitch Rate. ± 0.1 g Normal Acceleration.	Cruise or Climb. Augmentation On and Off.							X	Record results for at least two airspeeds.
(4) Maneuvering Stability.	Longitudinal Control Position $\pm 10\%$ of change from trim or ± 0.25 in. (6.3 mm) or Longitudinal Control Forces ± 0.5 lb. (0.223 daN) or $\pm 10\%$.	Cruise or Climb. Augmentation On and Off.							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	X	.
d. Lateral and Directional Handling Qualities										
(1) Control Response: (a) Lateral	Roll Rate— $\pm 10\%$ or $\pm 3^\circ$ /sec. Roll Attitude Change— $\pm 10\%$ or $\pm 3^\circ$.	Cruise Augmentation On and Off.		X	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— $\pm 10\%$ or $\pm 2^\circ$ /sec., Yaw Attitude Change— $\pm 10\%$ or $\pm 2^\circ$.	Cruise; Augmentation On and Off.		X	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

Test	Tolerance	Flight conditions	QPS Requirement						Test details	Information notes	
			Flight training device level								
			1	2	3	4	5	6			
(2) Directional Static Stability.	Lateral Control Position—±10% of change from trim or ±0.25 in. (6.3mm) or Lateral Control Force—±0.5 lb. (0.223daN) or 10% Roll Attitude—±1.5, Directional Control Position—±10% of change from trim or ±0.25 in. (6.3mm) or Directional Control Force—±1 lb. (0.448 daN) or 10%.. Longitudinal Control Position—±10% of change from trim or ±0.25 in. (6.3 mm). Vertical Velocity— ±100 fpm (0.50 m/sec) or 10 %.	(1) Cruise; or (2) Climb (may use Descent instead of Climb if desired) Augmentation On and Off.		X	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 or ±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	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, which 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	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	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. Control Dynamics

Begin Information

a. The characteristics of a helicopter flight control system have a major effect on the handling qualities. A significant consideration in pilot acceptability of a helicopter is the “feel” provided through the cockpit controls. Considerable effort is expended on helicopter feel system design in order to deliver a system with which pilots will be comfortable and consider the helicopter desirable to fly. In order for an

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

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

of Objective Tests in this appendix. Where accomplished, the free response is measured after a step or pulse input is used to excite the system.

c. For initial and upgrade evaluations, it is required that control dynamic characteristics be measured at and recorded directly from the cockpit controls. This procedure is usually accomplished by measuring the free response of the controls using a step or pulse input to excite the system. The procedure must be accomplished in hover, climb, cruise, and autorotation. For helicopters with irreversible control systems, measurements may be obtained on the ground. Proper pitot-

static inputs (if appropriate) must be provided to represent airspeeds typical of those encountered in flight.

d. It may be shown that for some helicopters, climb, cruise, and autorotation have like effects. Thus, some tests for one may suffice for some tests for another. If either or both considerations apply, engineering validation or helicopter manufacturer rationale must be submitted as justification for ground tests or for eliminating a configuration. For FTDs requiring static and dynamic tests at the controls, special test fixtures will not be required during initial and upgrade evaluations if the sponsor's QTG shows both test fixture results and the results of an alternative approach, such as computer plots which were produced concurrently and show satisfactory agreement. Repeat of the alternative method during the initial evaluation would then satisfy this test requirement.

e. Control Dynamics Evaluations. The dynamic properties of control systems are often stated in terms of frequency, damping, and a number of other classical measurements which can be found in texts on control systems. In order to establish a consistent means of validating test results for FTD control loading, criteria are needed that will clearly define the interpretation of the measurements and the tolerances to be applied. Criteria are needed for both the underdamped system and the overdamped system, including the critically damped case. In the case of an underdamped system with very light damping, the system may be quantified in terms of frequency and

damping. In critically damped or overdamped systems, the frequency and damping is not readily measured from a response time history. Therefore, some other measurement must be used.

f. Tests to verify that control feel dynamics represent the helicopter must show that the dynamic damping cycles (free response of the control) match that of the helicopter within specified tolerances. The method of evaluating the response and the tolerance to be applied are described below for the underdamped and critically damped cases.

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

(b) The damping tolerance will be applied to overshoots on an individual basis. Care must be taken when applying the tolerance to small overshoots since the significance of such overshoots becomes questionable. Only those overshoots larger than 5 percent of the total initial displacement will be considered significant. The residual band, labeled $T(A_d)$ on Figure 1 of this attachment is ± 5 percent of the initial displacement amplitude A_d from the steady state value of the oscillation. Oscillations within the residual band are considered insignificant. When comparing simulator data to helicopter data, the process

would begin by overlaying or aligning the simulator and helicopter steady state values and then comparing amplitudes of oscillation peaks, the time of the first zero crossing, and individual periods of oscillation. To be satisfactory, the simulator must show the same number of significant overshoots to within one when compared against the helicopter data. 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 must be the same as the helicopter within ± 10 percent. The simulator response must be critically damped also. Figure 2 of this attachment illustrates the procedure.

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

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

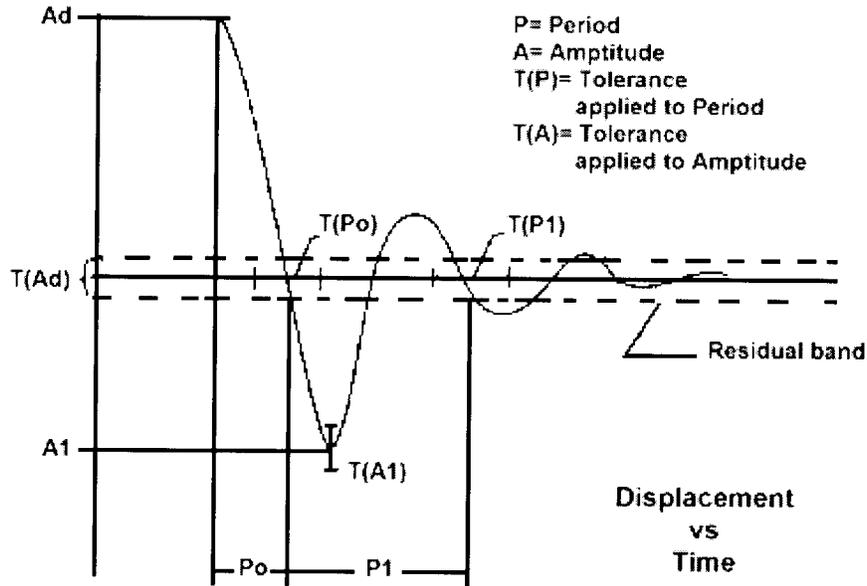
(b) In the event the number of cycles completed outside of the residual band, and thereby significant, exceeds the number depicted in figure 1 of this attachment, the following tolerances (T) will apply:

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

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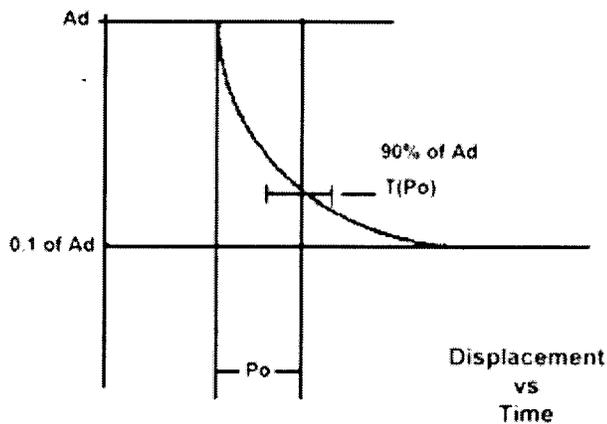
Attachment 2 to Appendix D to Part 60—

FIGURE 1. UNDER-DAMPED STEP RESPONSE



Attachment 2 to Appendix D to Part 60—

FIGURE 2. CRITICALLY-DAMPED STEP RESPONSE



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Attachment 3 to Appendix D to Part 60—
FTD 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

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

c. 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

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

1. Definitions

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

Begin QPS Requirement

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/m²—candela/meter², 3.4263 candela/m² = 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.
 DPR—Engine Pressure Ratio.
 FAA—Federal Aviation Administration (U.S.).
 fpm—feet per minute.
 ft—foot/feet, 1 foot = 0.304801 meters.
 ft-Lambert—foot-Lambert, 1 ft-Lambert = 3.4263 candela/m².

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

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.

PLA—Power Lever Angle.

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

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.

T/O—Takeoff.

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.

End QPS Requirements 7

**Attachment 5 to Appendix D to Part 60—
Sample Documents**

Begin Information

Title of Sample

Table of Contents

- Figure 1. Sample Letter of Request
- Figure 2. Sample Qualification Test Guide
Cover Page
- Figure 3. Sample FTD Information Page
- Figure 4. Sample Statement of Qualification
 - 4A Sample Statement of Qualification;
Configuration List
 - 4B Sample Statement of Qualification;
Qualified/Non-Qualified Tasks

- Figure 5. Sample Recurrent Evaluation
Requirements Page
- Figure 6. Sample Request for Initial, Upgrade,
or Reinstatement Evaluation Date
- Figure 7. Sample MQTG Index of Effective
FSD Directives

End Information

BILLING CODE 4910-13-P

Attachment 5 to Appendix D 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 FTD for Level _____ qualification. The (name) _____ FTD with (name) _____ visual system is fully defined on page _____ of the accompanying

qualification test guide (QTG). We have completed tests of the FTD 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 FTD 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 FTD 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 FTD 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 FTD and state that it represents the helicopter.

He/She(They) has(have) not subjectively tested the FTD 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 D 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)

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

(FTD Level)

(Qualification Performance Standard Used)

(FTD Location)

FAA Initial Evaluation

Date: _____

(Sponsor) Date: _____

Manager, National
Simulator Program, FAA Date: _____

Attachment 5 to Appendix D to Part 60—

Figure 3 – Sample FTD Information Page

INFORMATION

SPONSOR NAME	
SPONSOR FTD 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
FTD MODEL AND MANUFACTURER:	VTF-320, Tinker Simulators, Inc.
DATE OF FTD MANUFACTURE:	1988
FTD COMPUTER:	CIA
VISUAL SYSTEM MODEL, MANUFACTURER, and DISPLAY TYPE:	ClearView, Inc. "Real World H1;" CRT Visual System
VISUAL SYSTEM COMPUTER:	LMB-H1
MOTION SYSTEM:	N/A

Information on this page 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 D 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 Training Device
FAA Identification Number 889

And found it to meet the standards set forth
In the Qualification Performance Standards
For a flight training device at
Level 6

(date)

for the NSPM

Subject to the attached
Configuration List and Restrictions

Attachment 5 to Appendix D 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 6 -- FAA ID# 889

Configuration		Date Qualified
Helicopter Model:.....	AB-320.....	July 12, 1988
Engine Model(s) and Revision:...	<input type="checkbox"/> CPX-8D, RPT-6.....	July 12, 1988
	<input type="checkbox"/> DRQ-4002, RPT-3.....	April 1, 1991
Flight Management System:.....	Berry XP.....	July 12, 1988
Visual System / Manufacturer: <input type="checkbox"/> CRT Installation:..... <input type="checkbox"/> Projected System:.....	Real World H1, Clear View, Inc. 1 Channel, 2 Window CRT.....	July 12, 1988
Flight Instruments: <input type="checkbox"/> Electro-Mechanical:..... <input type="checkbox"/> Display (CRT, LCD, etc.)..... <input type="checkbox"/> Combination <input type="checkbox"/> Heads-Up Display.....	.....	July 12, 1988
Flight Director: <input type="checkbox"/> Single Cue..... <input type="checkbox"/> Dual Cue..... <input type="checkbox"/> None.....	Sperry.....	July 12, 1988
Engine Instruments: <input type="checkbox"/> Electro-Mechanical..... <input type="checkbox"/> Display (CRT, LCD, etc.)..... <input type="checkbox"/> Combination.....	.....	July 12, 1988
Navigation Type(s): <input type="checkbox"/> ADF..... <input type="checkbox"/> VOR/ILS..... <input type="checkbox"/> GPS..... <input type="checkbox"/> INS..... <input type="checkbox"/> IRS.....	.....	July 12, 1988 July 12, 1988 July 12, 1988
Weather Radar:		
TCAS		
ACARS		

Attachment 5 to Appendix D 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 6 -- FAA ID# 889

The following are those items listed in the Helicopter Flight Training Device Qualification Performance Standards (QPS), FAA-S-120-63FTD, 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	(a) Timed.
	X	1. Preflight.		X	(b) Normal.
		2. APU/Engine start and run-up.		X	(c) Steep.
	X	(a) Normal start procedures.			4. Accelerations and decelerations.
	X	(b) Alternate start procedures.	X		5. High speed vibrations.
	X	(c) Abnorm. starts / shutdowns.			6. Abnormal/emergency procedures
	X	(d) Rotor engagement.		X	(a) Engine fire.
	X	(e) System checks		X	(b) Engine failure.
	X	(f) Other.		X	(c) Inflight eng. shutdown and restart.
		B. Takeoff.		X	(d) Fuel governing system failures.
		1. Normal.		X	(e) Directional control malfunction
	X	(a) From ground.		X	(f) Hydraulic failure.
		(b) From hover.	X		(g) Stability system failure.
X		(1) Cat A.	X		(h) Rotor vibrations.
X		(2) Cat B.		X	(i) Other.
	X	(c) Running.			E. Descent.
	X	(d) Crosswind/tailwind.		X	1. Normal.
	X	(e) Maximum performance.		X	2. Maximum rate.
	X	(f) Instrument.		X	3. Other.
		2. Abnorm./emer. procedures:			F. Approach.
		(a) Takeoff, eng. fail after CDP.			1. Non-precision.
	X	(1) Cat A.		X	(a) All engines operating.
	X	(2) Cat B.		X	(b) Engines inoperative.
	X	(b) Other			(c) Approach procedures:
		C. Climb.		X	(1) NDB
	X	1. Normal.		X	(2) VOR
	X	2. One engine inoperative.	X		(3) RNAV
	X	3. Other.	X		(4) TACAN
		D. Cruise.	X		(5) ASR
	X	1. Performance.		X	(6) Helicopter only.
	X	2. Flying qualities.		X	(7) Other.
		3. Turns.			(d) Missed approach.

Initials _____ Date _____

-- Continued Next Page --

NQ	Q	TASK (Con't.)	NQ	Q	TASK (Con't.)
	X	(1) All engines operating.	X		(c) Autopilot.
	X	(2) Engine(s) inoperative.	X		(d) TCAS
		2. Precision.		X	(e) Flight data displays.
	X	(a) All engines operating.		X	(f) Flight management computers.
	X	(b) Engine(s) inoperative.	X		(g) Head-up displays.
		(c) Approach procedures		X	(h) Navigation systems.
X		(1) PAR		X	(i) Other.
X		(2) MLS			3. Airborne procedures.
	X	(3) ILS		X	(a) Holding.
	X	(4) Manual	X		(b) Air hazard avoidance.
	X	(5) With Flight director.		X	(c) Retreating blade stall recovery.
		(6) Autopilot coupled	X		(d) Mast bumping.
X		(i) Cat I		X	(e) Other.
X		(ii) Cat II			H. Engine Shutdown and Parking.
	X	(7) Other.		X	1. Engine and systems operation.
		(d) Missed approach.		X	2. Parking brake operation.
	X	(1) All engines operating.		X	3. Rotor brake operation.
	X	(2) Engine(s) inoperative.		X	4. Abnorm./emer. procedures.
	X	(3) Stability system failure.			
	X	(e) Other			
		G. Any Flight Phase.			
		1. 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 detect. and suppression.			
X		(g) Stabilizer.			
	X	(h) Flight controls.			
	X	(i) Fuel and oil.			
	X	(j) Hydraulic.			
	X	(k) Landing gear.			
	X	(l) Oxygen.			
	X	(m) Pneumatic.			
	X	(n) Powerplant.			
	x	(o) Flight control computers.			
X		(p) Stability augmentation.			
	X	(q) Other.			
		2. Flight mgmt. and guide. system.			
X		(a) Airborne radar.			
X		(b) Automatic landing aids.			

Initials _____ Date _____

-- Continued Next Page --

NQ	Q	FTD SYSTEM	NQ	Q	FTD SYSTEM
		A. Inst. Ops. Station (IOS).			B. Sound Controls.
	X	1. Power switch(es).		X	-- On / off / rheostat
		2. Helicopter conditions.			C. Observer Stations.
	X	(a) GW, CG, Fuel weight, etc.		X	1. Position.
	X	(b) Airplane systems status.		X	2. Adjustments.
	X	(c) Ground crew functions			
	X	(d) Other.			
		3. Airports and Landing Areas.			
	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) Other.			
		5. Helicopter 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 D to Part 60—

Figure 5 – Sample Recurrent Evaluation Requirements Page

INFORMATION

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

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

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

(Repeat as Necessary)

Attachment 5 to Appendix D 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) FTD 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 FTD [has / has not] been previously qualified by the FAA [and had been issued FAA identification number XXX]. [The history of this FTD 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

Notification No.	Individual FTDs affected	Sponsors affected	Date of notification

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

7. The authority citation for part 61 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701–44703, 44707, 44709–44711, 45102–45103, 45301–45302.

8. Section 61.1 is amended by revising paragraphs (b)(1) and (b)(15)(iii), and by removing and reserving paragraphs (b)(5) and (b)(7), to read as follows:

§ 61.1 Applicability and definitions.

* * * * *

(b) * * *

(1) Aeronautical experience means pilot time obtained in an aircraft, a flight simulator, a flight training device, or other device approved under § 61.4(b) for meeting the appropriate training and flight time requirements for an airman certificate, rating, flight review or recency of flight experience requirements of this part.

* * * * *

(15) * * *

(iii) In a flight simulator, a flight training device, or other device approved under § 61.4(b) from an authorized instructor.

9. Section 61.4 is revised to read as follows:

§ 61.4 Flight simulators, flight training devices, or other devices.

(a) Each flight simulator and flight training device used for training, and for which an airman is to receive credit to satisfy any training, testing, or checking requirement under this chapter, must be evaluated and qualified under part 60 of this chapter and must be approved by the Administrator for both of the following:

(1) The training, testing, and checking for which it is used.

(2) Each particular maneuver, procedure, or flightcrew member function performed.

(b) The Administrator may approve a device other than a flight simulator or flight training device for the purpose indicated in those sections of this part where the phrase “other device” is used.

10. Section 61.23 is amended by revising paragraphs (b)(7) and (b)(8) to read as follows:

§ 61.23 Medical certificates: Requirement and duration.

* * * * *

(b) * * *

(7) When serving as an examiner or check airman during the administration of a test or check for a certificate, rating, or authorization conducted in a flight simulator, a flight training device, or other device approved under § 61.4(b); or

(8) When taking a test or check for a certificate, rating, or authorization conducted in a flight simulator, a flight training device, or other device approved under § 61.4(b).

* * * * *

11. Section 61.31 is amended by revising the introductory text of paragraph (g)(3) to read as follows:

§ 61.31 Type rating requirements, additional training, and authorization requirements.

* * * * *

(g) * * *

(3) The training and endorsement required by paragraphs (g)(1) and (g)(2) of this section are not required if that person can document satisfactory accomplishment of any of the following in a pressurized aircraft, a flight simulator, a flight training device, or other device approved under § 61.4(b) that is representative of a pressurized aircraft:

* * * * *

12. Section 61.51 is amended by revising paragraphs (b)(1)(iii), (b)(2)(v), (b)(3)(iii), (g)(4), and (h)(1) to read as follows:

§ 61.51 Pilot logbooks.

* * * * *

(b) * * *

(1) * * *

(iii) Location where the aircraft departed and arrived, or for lessons in a flight simulator, a flight training device, or other device approved under § 61.4(b), the location where the lesson occurred.

* * * * *

(2) * * *

(v) Training received in a flight simulator, a flight training device, or other device approved under § 61.4(b) from an authorized instructor.

(3) * * *

(iii) Simulated instrument conditions in flight, a flight simulator, a flight

training device, or other device approved under § 61.4(b).

* * * * *

(g) * * *

(4) A flight simulator, a flight training device, or other device approved under § 61.4(b), may be used by a person to log instrument flight time, provided an authorized instructor is present during the simulated flight.

(h) *Logging training time.* (1) A person may log training time when that person receives training from an authorized instructor in an aircraft, flight simulator, a flight training device, or other device approved under § 61.4(b).

* * * * *

13. Section 61.65 is amended by revising paragraphs (a)(5), (a)(8)(ii), the introductory text of paragraph (c), the heading and introductory text of paragraph (e), and (e)(2) to read as follows:

§ 61.65 Instrument rating requirements.

(a) * * *

(5) Receive and log training on the areas of operation of paragraph (c) of this section from an authorized instructor in an aircraft, a flight simulator, a flight training device, or other device approved under § 61.4(b) that represents an airplane, helicopter, or powered-lift appropriate to the instrument rating sought;

* * * * *

(8) * * *

(ii) A flight simulator, a flight training device, or other device approved under § 61.4(b) appropriate to the rating sought and approved for the specific maneuver or procedure performed. If a flight training device or other device approved under § 61.4(b) is used for the practical test, the instrument approach procedures conducted in that device are limited to one precision and one nonprecision approach, provided the flight training device or other device approved under § 61.4(b) is approved for the procedure performed.

* * * * *

(c) *Flight proficiency.* A person who applies for an instrument rating must receive and log training from an authorized instructor in an aircraft, a flight simulator, a flight training device, or other device approved under § 61.4(b) in accordance with paragraph (e) of this

section, that includes the following areas of operation:

* * * * *

(e) *Use of flight simulators, flight training devices, or other devices approved under § 61.4(b).* If the instrument training was provided by an authorized instructor in a flight simulator, a flight training device or other device approved under § 61.4(b)—

* * * * *

(2) A maximum of 20 hours may be performed in that flight simulator, flight training device, or other device approved under § 61.4(b) if the training was not accomplished in accordance with part 142 of this chapter.

14. Section 61.109 is amended by revising paragraphs (i) heading and (i)(1) to read as follows:

§ 61.109 Aeronautical experience.

* * * * *

(i) *Permitted credit for use of a flight simulator, a flight training device, or other device approved under § 61.4(b).* (1) Except as provided in paragraph (i)(2) of this section, a maximum of 2.5 hours of training in a flight simulator, a flight training device, or other device approved under § 61.4(b), representing the category, class, and type, if applicable, of aircraft appropriate to the rating sought, may be credited toward the flight training time required by this section, if received from an authorized instructor.

* * * * *

PART 63—CERTIFICATION: FLIGHT CREWMEMBERS OTHER THAN PILOTS

15. The authority citation for part 63 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701–44703, 44707, 44709–44711, 45102–45103, 45301–45302.

16. Section 63.39 is amended by revising paragraph (b)(3) to read as follows:

§ 63.39 Skill requirements.

* * * * *

(b) * * *

(3) In flight, in an airplane simulator, or in an appropriately equipped cockpit specific flight training device qualified in accordance with part 60 of this chapter, show that he can satisfactorily perform emergency duties and

procedures and recognize and take appropriate action for malfunctions of the airplane, engines, propellers (if appropriate), systems and appliances.

17. Appendix C to part 63 is amended by revising the introductory text of paragraph (a)(3)(iv) to read as follows:

Appendix C to Part 63—Flight Engineer Training Course Requirements

(a) * * *

(3) * * *

(iv) If the Administrator finds a simulator or appropriately equipped cockpit specific flight training device qualified in accordance with part 60 of this chapter to accurately reproduce the design, function, and control characteristics, as pertaining to the duties and responsibilities of a flight engineer on the type of airplane to be flown, the flight training time may be reduced by a ratio of 1 hour of flight time to 2 hours of airplane simulator time, or 3 hours of time in an appropriately equipped cockpit specific flight training device qualified in accordance with part 60 of this chapter, as the case may be, subject to the following limitations:

* * * * *

PART 141—PILOT SCHOOLS

18. The authority citation for part 141 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701–44703, 44707, 44709, 44711, 45102–45103, 45301–45302.

19. Section 141.41 is amended by revising paragraphs (a) and (b) to read as follows:

§ 141.41 Flight simulators, flight training devices, and training aids.

* * * * *

(a) *Flight simulators.* Each flight simulator used to obtain flight training credit allowed for flight simulators in an approved pilot training course curriculum must be evaluated and qualified under part 60 of this chapter and must be approved by the Administrator for use under an approved training program.

(b) *Flight training devices.* Each flight training device used to obtain flight training credit allowed for flight training devices in an approved pilot training course curriculum must be evaluated and qualified under part 60 of this

chapter and must be approved by the Administrator for use under an approved training program.

* * * * *

PART 142—TRAINING CENTERS

20. The authority citation for part 142 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701–44703, 44705, 44707, 44709–44711, 45102–45103, 45301–45302.

21. Section 142.3 is amended by removing the definition for “Advanced Flight Training Device” and by revising the definition for “Flight training equipment” to read as follows:

§ 142.3 Definitions.

* * * * *

Flight training equipment means flight simulators, flight training devices, and aircraft.

* * * * *

22. Section 142.15 is amended by revising paragraph (d) to read as follows:

§ 142.15 Facilities.

* * * * *

(d) An applicant for, or holder of, a training center certificate must have available exclusively, for adequate periods of time and at a location approved by the Administrator, adequate flight training equipment and courseware, including at least one flight simulator or flight training device.

23. Section 142.59 is amended by revising paragraph (c), by removing and reserving paragraph (d), and by removing paragraph (f) to read as follows:

§ 142.59 Flight simulators and flight training devices.

* * * * *

(c) Each flight simulator or flight training device used by a training center must be evaluated and qualified under part 60 of this chapter and must be approved by the Administrator for use under an approved training program.

* * * * *

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Louis C. Cusimano,

Acting Director, Flight Standards Service.

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