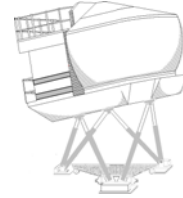




AFS-205 FEDERAL AVIATION ADMINISTRATION NATIONAL SIMULATOR PROGRAM



Flight Simulation Training Device Qualification Guidance

Enhanced Flight Vision System (EFVS) Simulator Qualification

FSTD Guidance Bulletin 03-03

1. APPLICABILITY. This procedure applies to all simulators used to satisfy the training requirements' pertaining to the certificate holder's approved EFVS flight training program and the Flight Standardization Board Report for the aircraft. A copy of Flight Standardization Board Reports may be found at <http://www.opspecs.com>. The methods, procedures, and standards defined in this document provide one means, acceptable to the Administrator, to evaluate and qualify a simulator EFVS system. If an applicant desires to use another means, a proposal must be submitted to the National Simulator Program Manager for review and approval prior to the submittal of a detailed simulator Qualification Test Guide (QTG). If an applicant chooses to utilize the approach described in this document, the applicant must adhere to all of the methods, procedures, and standards herein.

2. STATEMENT OF COMPLIANCE. For those simulators where EFVS hardware is not provided as original equipment with the airplane, and, therefore, subsequently added to the airplane and simulator, a statement of compliance is required. The statement of compliance must state that the simulation of the added simulator hardware/software, including associated cockpit displays and annunciation, functions the same or equivalent to the system(s) installed in the airplane. A block diagram describing the input and output signal flow and comparing it to the airplane configuration shall support this statement.

3. EFVS STANDARDS. This section describes the minimum simulator requirements for qualifying an infrared EFVS system in a simulator.

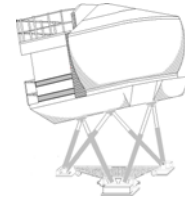
- a. The simulator used for EFVS must be an FAA qualified Level C, with a daylight visual display, or a level D simulator.
- b. The EFVS simulator hardware/software, including associated cockpit displays and annunciation, must function the same or equivalent to the EFVS system installed in the airplane.
- c. The instructor operator station (IOS) must include an EFVS display of the representative EFVS and HUD scene, as seen through the pilot's Head-UP-Display (HUD) combiner glass or the cockpit flight displays.
- d. A minimum of one airport must be modeled for EFVS. That model must have an ILS and a non-precision approach (With VNAV if required by the AFM for that type) available. In addition to EFVS modeling, the airport model must meet the requirements of Advisory Circular, AC-120-40B, for a level D simulator.

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4. OBJECTIVE TESTS. The ground and flight tests required for qualification are listed in this section. Computer generated simulator test results should be provided for each test. The results should be produced on a multichannel recorder, line printer, or other appropriate recording device acceptable to the NSPM. Time histories are required unless otherwise indicated. The following tests are required:

Test	Tolerance	Flight Condition	Comments
1. HUD Attitude vs. Simulator Attitude Indicator (Pitch and Roll of Horizon)	Demonstration Model		
2. EFVS Registration Test	Demonstration Model.	Takeoff Point and 200' AGL	This test validates the visual alignment of the EFVS.
3. EFVS RVR and visibility Calibration	Demonstration Model. The scene indicates 1200 ft and 1 mile EFVS RVR and correct light intensity.	IR scene representative of both 1200 ft., and 1 mile. Visual scene may be removed.	This test validates the RVR and visibility of the EFVS.
4. Visual, EFVS, Motion, and Cockpit Instrument Response. Transport Delay	150 msec or less after control movement, + or - 30 msec from visual system, and not before motion response	Pitch, Roll, Yaw	One test is required in each axis. (Total of 3 tests)
5. EFVS Thermal Crossover	Demonstration Model.	Day & Night.	

Note: Because of the camera position vs. the pilot eye position, this must be checked at both 200' on final similar to a visual ground segment and on the ground at the takeoff point. As you get closer to the ground (e.g. takeoff position) you will be able to observe the registration issues caused by the parallax.

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5. SUBJECTIVE TESTING.

- a. **DISCUSSION.** An FAA Simulator Evaluation Specialist will evaluate accurate replication of EFVS systems functions. The evaluation will include procedures using the operator's approved manuals and checklists. Handling qualities, performance, and simulator systems operation, while using the EFVS system, will be subjectively assessed by an FAA Simulator Evaluation Specialist qualified in the respective airplane.
- b. **TEST REQUIREMENTS.** The ground and flight tests and other checks required for qualification of the EFVS system are listed below. This includes maneuvers and procedures to assure that the EFVS system functions and performs appropriately for use in pilot training and checking in the maneuvers and procedures delineated in the sponsors approved training program. The evaluation should be conducted using daylight, dusk, and night conditions. Daylight is the most difficult to simulate.

(1) Preflight Inspection of the EFVS system.

Note: Perform a check of all EFVS warnings and annunciations.

(2) Check to insure that the IOS has preset selections that match the training program (See AC 90-EFVS)

(2) Taxi.

- (a) Observe parallax caused by camera position.
- (b) Observe ground hazards especially other aircraft.
- (c) Signs may appear as a block (unreadable) due to no temperature variation between the letters and the background.

(3) Takeoff:

- (a) Normal takeoff in night VMC conditions. Observe the terrain and surrounding visual scene.
- (b) Instrument takeoff using visual RVR settings of 600. The EFVS RVR should be better than the visual RVR, i.e. 2400+.

(4) In-flight Operations:

- (a) Adjust the scene to VMC and see if the image horizon is conformal with the visual horizon and the combiner horizon.
- (b) Using a VMC night or dusk scene, select a thunderstorm at a distance of at least 20 miles and see if the imager detects the clouds.

(5) Approaches:

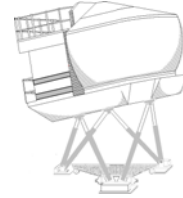
- (a) Normal approach in night VMC conditions.
- (b) ILS approach.

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- i) Select the preset that allows the PF to see the EFVS image at approximately 500'. This should preset the EFVS visibility to approximately 1.4 miles, and the visual RVR to 2400'.
 - ii) Fly or reposition the aircraft to 500' AGL on the ILS. Freeze position. The PF should be able to see the image of the runway approach lights. PNF should not be able to see any lights (Some very slight bleed through of strobes is acceptable, but no steady lights).
 - iii) Continue the approach and freeze position at 200' AGL. The PF should be able to see approximately 1 mile down the runway, and the PNF should be able to visually acquire the approach lights and REILs.
 - iv) Continue the approach and landing. Observe the blooming effect of the airport lights.
- (c) Non-precision approach.
(d) Missed approach.

Note: Emphasis should be placed on the simulator's capability to demonstrate that the EFVS system is able to display the visual for the pilot to identify the required visual references required by CFR 91.175 (c) (3) to descend below the published decision altitude (DA) when conducting instrument approaches with vertical guidance. The EFVS should continue to provide glide path and alignment information between DH and touchdown. During landing roll out, visual alignment information should be available to the pilot.

- (6) Visual Segment and Landing:
- (a) Normal:
 - (i) From nonprecision approach.
 - (ii) From precision approach.
 - (7) Abnormal Procedures:
 - (a) EFVS malfunctions on the ground
 - (b) EFVS malfunctions in the air.

6. QUALIFICATION TEST GUIDE (QTG).

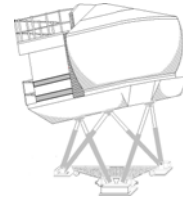
- a. The operator must develop the statement of compliance, accomplish the performance determination and recording, and forward the resulting information to the National Simulator Program Manager (NSPM) at the following address:

Federal Aviation Administration
National Simulator Program Manager, AFS-205
1701 Columbia Avenue, College Park, Georgia 30337

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Telephone (404) 305-6100

When it is received and accepted, the NSPM will return the package to the operator with instructions to include the information in the QTG.

- b. The simulator will be scheduled for an evaluation in accordance with normal procedures. Use of recurrent evaluation schedules will be used to the maximum extent possible.
- c. During the onsite evaluation, the evaluator should ask the operator to run the performance tests and record the results. The results of these onsite tests will be compared to those results previously approved and placed in the QTG.
- d. Qualification Test Guide's for new or upgraded simulators shall contain or reference the information described in paragraphs 2 through 4 of this document as may be appropriate for the simulator.

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