

JAA Administrative & Guidance Material
Section Six: Synthetic Training Devices (STD/FSTD), Part Three: Temporary Guidance Leaflet

LEAFLET NO. 12: **GUIDANCE FOR ENHANCED VISION SYSTEM (EVS) SIMULATOR
QUALIFICATION**

NOTE: The material contained in this Leaflet has been issued in accordance with Chapter 9 of the Administrative & Guidance Material Section Six: Synthetic Training Devices (STD), Part Two: Procedures (JAR-STD). The purpose of this leaflet is to provide guidance for enhanced vision system simulator qualification.

1. APPLICABILITY

1.1 This process applies to all simulators used to comply with EVS training and checking requirements as detailed in the relevant JOEB report for the particular aircraft type. These reports are available on the JAA website www.jaa.nl. This document represents one means of qualifying a simulator. Use of any other means requires prior approval by the relevant NAA.

2. COMPLIANCE CERTIFICATE

2.1 A statement of compliance is required for those simulators in which EVS hardware is not fitted as original equipment in the aircraft and has therefore been retrofitted to the aircraft and simulator. The statement of compliance must confirm that the added hardware and software has the same functionality as the aircraft equipment. A block diagram showing input and output signal flow as compared to the aircraft will be required.

3. SIMULATOR STANDARDS

3.1 This section details the minimum simulator requirements for qualifying an EVS system in a simulator.

- a) The simulator must be JAA qualified to Level C with a daylight visual display or Level D.
- b) The EVS simulator hardware and software, including cockpit displays, must function the same or equivalent to that installed in the aircraft.
- c) The instructor Operator Station (IOS) must include an EVS display of the representative EVS 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 modelled for EVS. 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 EVS modelling, the airport model must meet the requirements of JAR-STD 1A Amendment 3.

4. OBJECTIVE TESTS

4.1 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:

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Test		Tolerance	Flight Condition	Comments
1.	HUD Attitude vs. Simulator Attitude Indicator (Pitch and Roll of Horizon)	Demonstration Model		
2.	EVS Registration Test	Demonstration Model	Takeoff Point and 200 AGL	This test validates the visual alignment of the EVS
3.	EVS RVR and visibility calibration	Demonstration Model. The scene indicates 350m EVS RVR and correct light intensity	IR scene representative of both 1600m, and 5km. Visual scene may be removed	This test validates the RVR and visibility of the EVS
4.	Visual, EVS, 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.	EVS 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 height above ground reduces (e.g. at takeoff position) it is possible to observe the registration issues caused by the parallax.

5. SUBJECTIVE TESTING.

5.1 DISCUSSION. A JAA Simulator Evaluation Specialist will evaluate accurate replication of EVS systems functions. The evaluation will include procedures using the operator's approved manuals and checklists. A JAA Simulator Evaluation Specialist qualified in the respective aircraft will subjectively assess handling qualities, performance, and simulator systems operation, while using the EVS system.

5.2 TEST REQUIREMENTS. The ground and flight tests and other checks required for qualification of the EVS system are listed below. They include manoeuvres and procedures to assure that the EVS system functions and performs appropriately for use in pilot training and checking in the manoeuvres and procedures delineated in the relevant JOEB report. The evaluation should be conducted using daylight, dusk, and night conditions. Daylight is the most difficult to simulate.

5.2.1 IOS:

Check to ensure that the IOS has preset selections that match the training program.

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5.2.2 Pre-flight:

Carry out normal pre-flight procedures and checks, including warnings and annunciations.

5.2.3 Taxi:

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

5.2.4 Takeoff:

- (a) Normal takeoff in night VMC conditions. Observe the terrain and surrounding visual scene.
- (b) Instrument takeoff using visual RVR settings of 200m. The EVS RVR should be better than the visual RVR, i.e. 750m+.

5.2.5 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.

5.2.6 Approaches:

- (a) Normal approach in night VMC conditions.
- (b) ILS approach.
 - (i) Select the preset that allows the pilot to see the EVS image at approximately 500'. This should preset the EVS visibility to approximately 2300m, and the visual RVR to 750m'.
 - (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 EVS system is able to display the visual for the pilot to identify the required visual references required by JAR-OPS NPA-OPS 41 to descend below the published decision altitude (DA) when conducting instrument approaches with vertical guidance. The EVS 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.

5.2.7 Visual Segment and Landing:

- (a) Normal:

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- (i) From non-precision approach.
- (ii) From precision approach.

5.2.8 Abnormal Procedures:

- (a) EVS malfunctions on the ground.
- (b) EVS malfunctions in the air.

6. QUALIFICATION TEST GUIDE (QTG).

6.1

- (a) The operator must develop the statement of compliance, accomplish the performance determination and recording, and forward the resulting information to the relevant NAA. The NAA 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 Guides for new or upgraded simulators shall contain or reference the information described in paragraphs 2 through 4 of this document as applicable for the simulator.

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