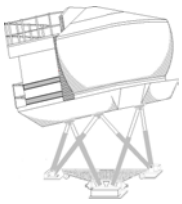

Flight Simulation Training Device Qualification Guidance

Head-UP Display (HUD) Simulator Qualification

FSTD Guidance Bulletin 03-02

1. APPLICABILITY.

This procedure applies to all simulators used to satisfy the training requirements pertaining to the certificate holder's approved Head-Up Display (HUD) flight training program, and the Flight Standardization Board Report for the aircraft. A simulator used to satisfy HUD training and checking requirements of the applicable FSB report must meet the specifications of that report (usually Level C with the addition of a daylight visual display, or Level D). Copies of Flight Standardization Board Reports may be found at http://www.opspecs.com.

For purposes of this document, "HUD" will be used as a generic term for any alternative aircraft instrument system that displays information to a pilot through a combiner in the normal "out-the-window" view.

The methods, procedures, and standards defined in this document provide one means, acceptable to the Administrator, to evaluate and qualify a simulator HUD system. If an applicant desires to use another means, a proposal must be submitted to the National Simulator Program Manager for review and approval. 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.

Qualification Test Guides for new or upgraded simulators incorporating a HUD system shall contain a HUD statement of compliance. This statement must be an attestation that HUD hardware and software, including associated displays, function the same as that installed in the aircraft.

2. SIMULATOR/HUD STANDARDS.

a. Whether the HUD system is an actual aircraft system, or software simulated, the system must be shown to perform its intended function for each operation and phase of flight.

b. An active display (repeater) of all parameters displayed on the pilot's combiner must be located on the instructor operator station (IOS), or other location approved by the NSPM. Display format of the repeater must replicate that of the combiner.

3. OBJECTIVE TESTING.

Static calibration tests must be included for HUD attitude alignment. These tests may be combined with the alignment tests for the simulator visual system.

HUD systems that are software simulated (not an actual aircraft system) must include latency/throughput tests in all three axes. The HUD system display response must be within 150 milliseconds of the control input.

4. SUBJECTIVE TESTING.

An FAA-NSP Simulator Evaluation Specialist, or other pilot designated by the NSP, will evaluate accurate replication of HUD functions. The evaluation will include procedures using the operator's approved manuals and checklists.

The ground and flight tests required for the qualification of HUD systems are listed below. Only those phases of flight for which the particular HUD system is authorized will be tested. Tests not listed may be required to assure the HUD system performs appropriately for use in pilot training and checking as specified in the sponsor's approved training program. The evaluation will be conducted using daylight, dusk, and night conditions.

1) PREFLIGHT:
   Preflight inspection of the HUD system.

2) TAXI:
   a) Evaluation of HUD taxi guidance.
   b) Check that the combiner horizon matches the visual horizon within the manufacturer's tolerance.
   c) Check centerline guidance if available.

3) TAKEOFF:
   a) Normal takeoff in VMC
      i) Observe that pitch commands replicate the PFD (e.g. V2 or fixed pitch).
      ii) Engage IAS and verify that the pitch command tracks the IAS requested
   b) Instrument takeoff using the lowest RVR authorized for the particular HUD under test.
   c) Engine out takeoff. (Note 1.)
   d) Windshear takeoff.

4) IN-FLIGHT:
   a) Set the visual scene to day, VMC. Insure that the combiner horizon matches the visual horizon within the manufacturer's tolerance.
   b) Check various modes (e.g. IFR, VMC, caged, un-caged)
   c) Execute turns to verify the correct correlation with the PFD and with the combiner horizon.
   d) Execute climbs, descents accelerations, and decelerations to confirm proper display of trend indicators and acceleration vectors.
   e) Verify that the HUD responds to the guidance panel selections (e.g. VS, IAS)
   f) Intercept and track a navigation course.
   g) Maneuver the aircraft through sufficient pitch and roll excursions to check format changes and horizon locator indicators or "Attitude Chevrons".
   h) Perform a stall to check for the pitch limit indicator if installed.

5) APPROACHES:
   a) Normal approach in VMC.
      i) Set the Flight Path Reference Angle to 3 degrees
      ii) On final approach, place the Flight Path Reference Angle indicator on the 1000' aiming point on the runway.
      iii) The radar altimeter should show 50' ± 10' crossing over the landing threshold.
   b) ILS approach *with crosswind* (in VMC).
      i) Check to see that the flight path vector represents the inertial path of the aircraft.
      ii) Verify that the course indication matches the track over the ground.
      iii) Freeze the simulator at 200' AGL, set RVR to 2400', and insure that the HUD combiner does excessively degrade the approach lights.
   c) Engine out approach and landing.
   d) Non-precision approach.

6) MALFUNCTIONS:
   a) Malfunctions causing abnormal pre-flight tests.
   b) Malfunctions logically associated with training during takeoff and approach..
   c) Malfunctions associated with any Approved Flight Manual abnormal procedures that are not included above.

Note 1: Some HUDs have been certificated without emergency power backup. Therefore, they will blank out and effectively reboot if any temporary power loss occurs. This should be confirmed by checking the manufacturers data.

5. ADDITION OF HUD TO A PREVIOUSLY QUALIFIED SIMULATOR.

Addition of a HUD system to a previously qualified simulator requires a statement of compliance be added to the QTG. This statement must be an attestation that added hardware and software, including associated displays, function the same as that installed in the aircraft. A block diagram describing the input and output signal flow and comparing it to the airplane configuration shall support this statement.

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.

6. PREVIOUSLY QUALIFIED HUD SYSTEMS.

Sponsors of simulators qualified with a HUD system prior to the effective date of this policy will have 12 months to meet the requirements of this policy.