

2 July 2013

Federal Aviation Administration
ATTN: AFS-800
800 Independence Ave SW
Washington DC 20591

SUBJECT: Request for Evaluation and Approval of a **Helicopter Advanced ATD, Model S623T**
Reference: AC 61-136

Dear Sir or Madam,

ELITE Simulation Solution requests an evaluation of its Helicopter, Model S623T, Serial Number 80000 proposed advanced aviation training device (AATD) for approval by the Federal Aviation Administration (FAA) at Orlando, Florida. The device is fully described in the accompanying Qualification and Approval Guide (QAG) and photographs. This device has been evaluated by the manufacturer and is believed to adequately meet the applicable requirements for approval as an AATD. Appropriate hardware and software configuration control procedures have been established and are listed for your review and approval.

It conforms to the generic class of rotary wing aircraft, twin engine, turbine, modeled after the Eurocopter AS 355 and that the simulated systems and subsystems function equivalently to those found in that aircraft; the performance and handling qualities have been assessed and have been determined to adequately represent the designated category and class of aircraft; and the device contains the following design features significantly beyond those required for a basic aviation training device (BATD). Examples include: fully enclosed hard shell cockpit with pilot seats; life sized instrumentation with correct scan patterns, adjustable anti torque pedals, and helicopter flight controls with correct ergonomics and spatial orientation to knobs, switches levers and controls and WAAS enabled GPS. The external view provides essential cues for ITOs, instrument approaches, landing, hovering, auto-rotations, confined area landing, high and low reconns, pinnacle landings, turns about the nose, mast or tail and decelerations.

Sincerely,



John Dixon
President/CEO

ELITE Advanced Aviation Training Device Model S623T Helicopter



ADVANCED AVIATION TRAINING DEVICE
APPROVAL QUALIFICATION GUIDE
FOR AZURE COMPUTING, INC (d.b.a. **ELITE** Simulation Solutions)
. **ELITE**® ATD SYSTEMS

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A. MODEL: ELITE AATD S623T Helicopter

The purpose of this guide is to provide information to the FAA for evaluation of the **ELITE**® S623T Helicopter ATD system. This trainer is a generic twin engine turbine rotary wing aircraft modeled after the Eurocopter AS 355. It has dual controls and is dual instrumented for MCC as well as instrument and visual flight training. All guidance and standards specified in AC 61-136 have been met.

B. CONTROL REQUIREMENTS: PHYSICAL CONTROLS

All physical and virtual control requirements are met:

1. A cyclic stick that tilts the main rotor disk by changing the pitch angle of the blades in their cycle of rotation.
2. Anti-torque tail rotor pedals that allow continuous adjustment of the tail rotor/heading.
3. Collective pitch control that changes the pitch angle of all main rotor blades simultaneously.
4. Dual mixture and throttle controls that allows engine start / shutdown and allows for continuous movement from idle to full power settings. Also allows for proper corrective action for hot and hung starts.
5. Physical controls applicable to the aircraft for the following:
 - a. Dual engine fuel control levers with start and igniters simulation
 - b. Warning horn and reset for hydraulic failure and low rotor RPM
 - c. Pitot heat
 - d. Fuel pumps
 - e. Standby attitude indicator
 - f. Auto engine crank
 - g. Inverters
 - h. Battery
 - i. Generator
 - j. Radio master and avionics cooling fan noise
 - k. Hydraulic test switch (affects master caution only)
 - l. Taxi, landing, anti-collision and position light switches (procedural only)
 - m. Dual NAV/COM radios
 - n. ADF
 - o. DME
 - p. Transponder
 - q. Flight Director / autopilot
 - r. GPS
 - s. Timer / stopwatch
 - t. Audio panel
 - u. Radar altimeter
 - v. Master caution panel test switch
 - w. OAT gauge
 - x. Altitude/VSI preselect
 - y. Optional Automatic Flight Control System and Stabilization
 - z. Optional dynamic control loading on pitch, roll and yaw axis

6. Control Inputs: ELITE Simulation Solutions AG, a.k.a. Initiative Computing AG, Switzerland, has certified that the transport delay between the control inputs to recognizable system response is less than 150 milliseconds for all controls. Calculated transport delay is approximately 25 milliseconds or less.

6a. At each startup **ELITE** software runs a series of test and will display a conformation message if all controls are working properly or appropriate warning messages if any design parameter is out of tolerance.

C. DISPLAY REQUIREMENTS

All aircraft modules listed in this qualification guided meet or exceed the display requirements of AC61-136:

1. Instruments and indicators:
 - a. Flight instruments are in a Standard Configuration, represented as separate traditional round flight instruments or as an EFIS display.
 - b. An adjustable altimeter that operates throughout the normal operating range of the aircraft being replicated which has incremental markings of 20 feet.
 - c. A magnetic compass which displays incremental markings typical of that shown in the family of airplanes represented
 - d. Heading indicator with incremental markings of 5 degrees and display on a 360 circle (for Standard Configuration) and Arc segments (on EFIS equipped trainers)
 - e. An airspeed indicator with incremental markings appropriate to the aircraft being replicated.
 - f. Vertical speed indicator (instantaneous) with incremental markings of 100 feet for the range of ± 1000 feet and incremental markings of 500 feet for the remaining ± 2000 feet or appropriate to the aircraft being replicated.
 - g. The function of a gyroscopic rate-of-turn indicator is provided by a standby altimeter with an independent power source.
 - h. All aircraft modules have a skid and slip indicator with coordination information displayed in the conventional skid ball format with markings for the center position.
 - i. The attitude indicator is appropriate to the aircraft being replicated with incremental markings for each 5 degrees of pitch, from 25 degrees pitch up to 25 degrees pitch down. Left and right bank angles are marked at 10, 20, 30, and 60 of bank.
 - j. Engine instruments and markings for normal ranges and minimum and maximum limits applicable to the helicopter being replicated.
 - k. N1 and N2 displays with appropriate transient and red line limitations.
 - l. Suction gauge not applicable
 - m. Flap indicator not applicable
 - n. Pitch trim indicator not applicable
 - o. Communication radios with digital displays of the radio frequency in use.
 - p. Two navigation radios with digit displays for VOR/ILS frequency in use, and one radio display for the NDB frequency in use. Each navigation radio is equipped with an aural identification feature and all aircraft modules have a marker beacon receiver with appropriate graduated markings.
 - q. Stop watch/ timer that display minutes and seconds.

- r. Magnetic compass with incremental markings of 5 degrees that display proper lead and lag during turns.
 - s. Transponder which displays the current transponder setting.
 - t. Fuel quantity indicator which displays the fuel remaining.
 - 2. All instrument displays listed above are visible during all flight operations. The update rate of all displays provide an image that:
 - a. Does not appear to be out of focus.
 - b. Does not appear to jump or step to a distracting degree during operation.
 - c. Does not appear with distracting jagged lines or edges.
 - 3. The display update varies with the speed of the computer processor, memory, and graphics card. If the computer system being used meets or exceeds the programs minimum system requirements, then the refresh rate will be faster than 10 Hz (approximate refresh rate will be 20 Hz or faster). Minimum IBM-compatible system requirements 2.6Ghz processor, 4 Gb RAM, 500 GB HD, 1 Gb nVidia or comparable open GL compatible video card; USB, DVD drive, LAN connection (10/100) and Windows, XP, Windows 7 or Windows 8 operating system.
- “Display updates” display all changes that meet or exceed the values listed in AC61-136 . The “display updates” display the following changes for each of the instruments listed below.
- a. Airspeed indicator: Displays ½ to 1 knot of change.
 - b. Attitude indicator: Displays 1/3 to ½ degree of pitch change and ½ to 1 degree of bank change.
 - c. Altimeter: Displays 2.78 feet of change.
 - d. Turn and Bank: Displays 1/20 of standard rate turn changes.
 - e. Heading Indicator: Displays ½ degree of change.
 - f. VSI: Displays 10 fpm of change.
 - g. Engine and Rotor Tachometer: Displays 20 RPM of change.
 - h. VOR/ILS: Displays ½ degree of change for VOR or 1/8 degree of change for ILS.
 - i. ADF: Displays 1/2 degree of change.
 - j. Timer: Displays 1 second of change.
- 4. All displays reflect the dynamic behavior of an actual aircraft display.

D. FLIGHT DYNAMICS

- 1. The flight dynamics are comparable to the aircraft being replicated.
- 2. The aircraft performance parameters are comparable to the aircraft being replicated (including hovering/sideward/forward/rearward flight, IGE and OGE).
- 3. The vertical lift component changes as a function of bank comparable to the aircraft being replicated.
- 4. Changes of gear settings changes (as applicable) cause changes in flight dynamics comparable to the aircraft being replicated.
- 5. The presence and intensity of wind and turbulence are reflected in the handling and performance qualities comparable to the aircraft being replicated.

E. INSTRUCTIONAL MANAGEMENT

- 1. The instructor has the ability to freeze the simulation at any point using the following controls listed: keyboard, mouse, and avionics panel.
- 2. The instructor can manipulate the following system parameters via virtual controls independent of the simulation with the following methods or devices.
 - a. Aircraft geographic location: mouse
 - b. Aircraft heading: mouse

- c. Aircraft airspeed: mouse
 - d. Aircraft altitude: mouse
 - e. Wind direction and speed: mouse
 - f. Turbulence: mouse
3. The system is capable of recording both horizontal and vertical tracks of the aircraft movement and can be stored and played back for review using: mouse and primary monitor or secondary monitor.
 4. The instructor can disable any of the instruments prior to the beginning of a training session and can simulate failure during a training session without stopping or freezing the simulation to effect the failure using: mouse and secondary monitor, or keyboard.
 5. The software has navigational databases, obtained and compiled from the FAA National Flight Data Center and/or Jeppesen, for the entire United States. All navigational data is based on procedures as published in 14 CFR Part 97 and is updated and maintained by ELITE Simulation Solutions AG.

F. TASK REQUIREMENT LIST

Using the **ELITE®** ATD configuration in this guide a flight school could incorporate all of the items listed in AC61-136 under the Task Requirement List into an integrated ground and flight instrument training curriculum. Course syllabuses developed companies such as AOPA's Air Safety Foundation, ASA, Jeppesen, or by the school its self, should be acceptable, as long as it incorporates the items listed under the Task Requirement List in AC61-136.

G. ADVANCED ATD DESIGN CRITERIA

The **ELITE® Model AATD S623T Helicopter** exceeds the requirements for Basic ATD approval criteria appropriate for Advanced ATD simulation technology:

1. A realistic cockpit design and instrument panel arrangement representing a generic model rotary wing aircraft cockpit;
2. Cockpit knobs/system controls/switches/switch panels in realistic sizes and design appropriate to each intended function, in the proper position and distance from the pilot's seated position, and representative of the class of airplane being represented;
3. Primary flight and navigation instruments approximately life sized that exhibit neither stepping nor excessive transport delay and arranged so as to observe trends and provide a realistic scan pattern.
4. Digital avionics panel (Optional OEM PFD and MFD which may provide functions of the digital avionics panel).
5. Three axis auto pilot and flight director and automatic flight control system patterned after SFIM 85T31.
6. Pitch trim release.
7. A visual system that provides acceptable cues in both day and night VFR/IFR conditions to enhance a pilot's visual orientation in the vicinity of an airport;
8. A separate instructor station to permit effective interaction without interrupting the flight in overseeing the pilot's horizontal and vertical flight profiles in real time and space, change weather conditions (ceilings, visibilities, wind speed, direction, turbulence and icing conditions) and invoke failures in navigation, instruments, radio receivers, landing gear and flaps, engine power (partial and total) and other airplane systems.
9. Cockpit seating accommodates proper ergonomics and spatial orientation for the pilot in relation to the cockpit, instruments and glare shield.
10. Anti torque pedals are secured to the cockpit floor structure in proper relation to cockpit orientation

H. FUNCTION AND SUBJECTIVE TEST CRITERIA

The ELITE Model S623T helicopter meets the criteria established for Basic and Advanced ATD status and complies with the checklist performance regulatory tasks/maneuvers and /or procedures as outlined in AC 61-136 as applicable under 14 CFR parts 61 and 141.

I. ATD CHECKLIST

FIGURE 1. ADVANCED ATD CHECKLIST

Functions and Maneuvers	Satisfactory? Yes/No
a. Preparation for Flight	
(1) Preflight	Yes
b. Pre-Takeoff	
(1) Engine start	Yes
(2) Brake operation	n/a
c. Takeoff	
(1) AIRPLANE Takeoff	
(i) Power plant checks	n/a
(ii) Acceleration characteristics	n/a
(iii) Nose wheel and rudder steering	n/a
(iv) Effect of crosswind	n/a
(v) Instrument	n/a
(vi) Landing gear, wing flap operation	n/a
(2) HELICOPTER Takeoff	
(i) Power plant checks	Yes
(ii) From Hover	Yes
(iii) From Ground	Yes
(iv) Vertical	Yes
(v) Running	Yes
d. In-flight Operation	
(1) AIRPLANE In-flight Operation	
(i) Climb	n/a
(a) Normal	n/a
(b) One engine inoperative procedures	n/a
(ii) Cruise	n/a

(a) Performance characteristics (speed vs. power)	n/a
(b) Normal and steep turns	n/a
(c) Performance turns	n/a
(d) Approach to stalls, i.e., stall warning (cruise, takeoff/approach, and landing configuration)	n/a
(e) High angle of attack maneuvers (cruise, takeoff/approach, and landing)	n/a
(f) In-flight engine shutdown	n/a
(g) In-flight engine restart	n/a
(iii) Descent	
(a) Normal	n/a
(b) Maximum rate	n/a
(2) HELICOPTER In-flight Operation	
(i) Hovering	
(a) Forward	Yes
(b) Rearward	Yes
(c) Sideward	Yes
(d) Turns	Yes
(ii) Climb	Yes
(iii) Cruise	
(a) Performance characteristics	Yes
(b) Turns	Yes
i. Recovery	Yes
ii. Skidding	Yes
iii. Slipping	Yes
(c) In-flight engine shutdown	Yes
(d) In-flight engine restart	Yes
(iv) Descent	Yes
e. Approaches	
(1) Non-precision	
(i) GPS-WAAS	Yes
(ii) GPS-LAAS	Yes
(iii) All engines operating	Yes
(iv) One or more engines inoperative	n/a
(v) Approach procedures (NDB, VOR, DME Arc, LOC/BC, LOC, LDA, SDF, ASR, LNAV/VNAV, GPS, & LPV, and additional types when developed and certified)	Yes
(vi) Missed approach (all engines operational, one or more engines inoperative)	Yes
(2) Precision	
(i) PAR – normal	Yes
(ii) ILS	Yes
(iii) GLS	Yes
(iv) Effects of crosswind	Yes
(v) With engine(s) inoperative	n/a

(vi) Missed approach	
(A) Normal	Yes
(B) With engine(s) inoperative	n/a
(C) From steep glide slope	Yes
f. Surface Operations (AIRPLANE-Post Landing)	
(1) Landing roll	n/a
(2) Braking operation	n/a
(3) Reverse thrust operation, if applicable	n/a
g. Any Flight Phase	
(1) Aircraft and power plant systems	
(i) Electrical	Yes
(ii) Flaps (AIRPLANE)	n/a
(iii) Fuel and oil	Yes
(iv) Landing gear (AIRPLANE)	n/a
(2) Flight management and guidance systems	
(i) Automatic pilot	Yes
(ii) Flight director/system displays	Yes
(iii) Navigation systems	Yes
(iv) Stall warning/avoidance (AIRPLANE)	n/a
(v) Multi function displays	n/a
(vi) Primary flight displays	n/a
(3) Airborne procedures	
(i) Holding	Yes
(4) Engine shutdown and parking	
(i) Systems operation	Yes
(ii) Parking brake operation (AIRPLANE)	n/a

J. TRAINER COMPONENTS CONSIST OF:

- 1) ELITE helicopter cockpit, seats, flight controls, center console and instrument panel
- 2) ELITE avionics panel (audio panel, GPS, Nav / Com, ADF, DME, transponder, flight director)
- 3) Overhead console with power levers, rotor brake, mixtures, AFCS & system switches
- 4) Five OTS (off the shelf) 64 bit computer systems (one main computer and four image generators with preloaded software) with Windows 7 or Windows 8 operating systems
- 5) Four each OTS 55 inch or larger LED TVs. (Option may include single or multiple projector & display systems or additional multiple TVs for increased scenery fields of view.
- 6) Instructor desk with OTS monitor, keyboard and mouse

APPENDIX A – Components, Model ELITE AATD S623T Helicopter



S623T Instrument Panel with GNS 430W GPS and Dual EFS-40 (EFIS)



S623T Overhead Console with Throttle Assembly

1	Stick top fourway beep-trim switch ("coolie hat") Activation of this switch commands a change in reference attitude at a rate of approx. 2 deg per second and 4/s in roll (automatic trim function) or, when the AP is disengaged, a shift in the stick anchoring by causing the trim motor to rotate (manual trim).
2	Trim (or stick) release button. Activation of this button declutches the artificial feel and simultaneously synchronized the pitch and roll attitude references. When the button is released, the autopilot maintains the new instantaneous attitude.
3	AP disengage button
4	Coupler disengage button (DCPL)



Cyclic Stick Grip Controls



Pilot Instrument Panel with optional EFIS and Landing Gear



Co-Pilot Instrument Panel with optional EFIS

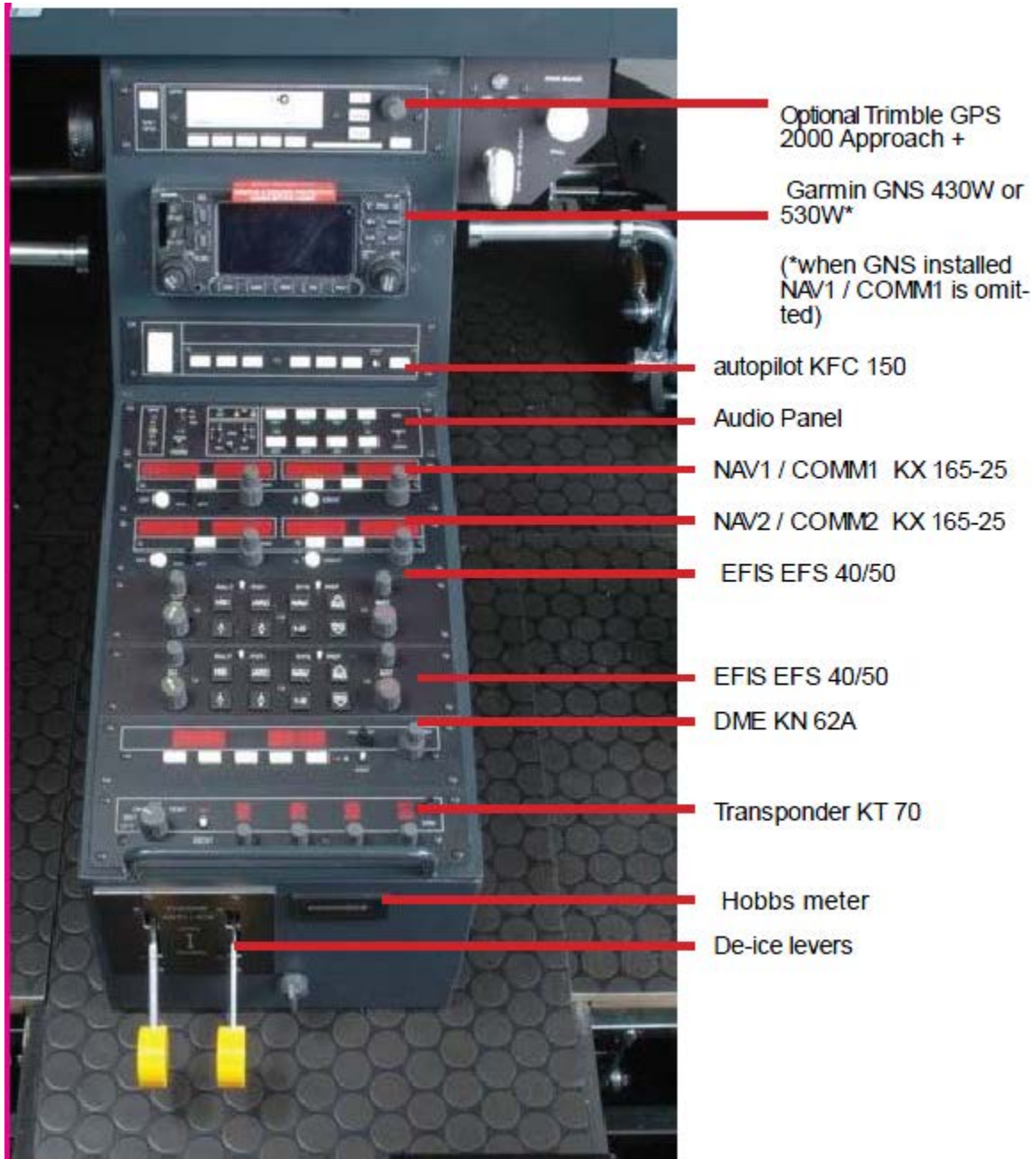


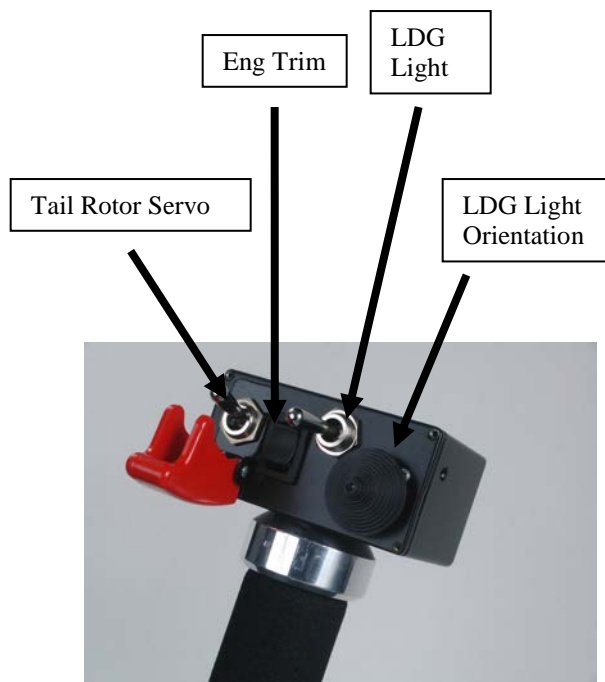
S623T Twin Engine Instrument Cluster with Master Caution Panel



S623T Landing Gear and Park Brake (Optional)

S623T Center Console Layout





S623T Collective and Cyclic Controllers



S623T Cabin and External Visual Screens



S623T Instructor / Operator Station (left side)