

Healy Aviation LLC

Model: H-ATD-SEL-1

Qualification and Approval Guide (QAG)



Advanced Aviation Training Device

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Log of Revisions

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List of Effective Pages

This lists all current pages, with effective dates for this Qualification and Approval Guide. It should be used after posting changes to ensure the manual is complete and up-to-date.

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1	Original	04/17/2023		21	Original	04/17/2023
2	Original	04/17/2023		22	Original	04/17/2023
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7	Original	04/17/2023		27	Original	04/17/2023
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Compliance Statement

This Qualification and Approval Guide (QAG) provides a detailed description of all the required components, features, functions, and capabilities for the Healy Aviation model H-ATD-SEL-1 aviation training device. This includes any optional airplane configurations with quality color pictures and diagrams. This QAG is provided by Healy Aviation to clearly describe and verify the required functionality of this aviation training device platform confirming its suitability for airman training and experience. The information as described in advisory circular AC 61-136, *FAA Approval of Aviation Training Devices (ATD) and Their Use for Training and Experience* is provided within this document. This includes listing all of the required qualifying items, functions, and capabilities. A valid FAA Letter of Authorization (LOA) specifying the credit allowances must accompany the training device when utilized for satisfying airman training or experience requirements specified in 14 CFR §61 or 141. Additionally, FAA Order 8900.1 Volume 11 Chapter 10 Section 1 provides guidance to aviation safety inspectors facilitating ATD evaluations, approvals and oversight.

Healy Aviation must provide a detailed operations manual with each aviation training device model produced. This will include how to properly start, operate, and shut down the trainer. This must include how to operate and maintain the trainer as originally designed and tested. Healy Aviation will ensure that the operator of this training device is familiar and proficient with all the features and capabilities of this trainer, and how to correct any malfunctions that may occur.

The operator of this aviation training device is expected to become proficient in its operation before using it to satisfy any pilot experience requirements specified in the code of federal regulations. This includes maintaining its condition and functionality. This ATD must be maintained to its original performance and functionality, as demonstrated during the original FAA functional evaluation. This trainer cannot be used to log pilot time unless all the components of the trainer are in normal working order.

Only the airplane configurations approved for this model can be utilized when satisfying FAA experience or training requirements. Any additions, changes, or modifications to this model, or the associated configurations, must be evaluated and approved in writing by the General Aviation and Commercial Division. This does not prohibit software updates that do not otherwise change the appearance of the systems operation. Operators who use these trainers to satisfy FAA pilot training or experience requirements specified in part 61 or 141 are obligated to allow FAA inspection ensuring acceptable function and compliance. Any questions concerning this FAA approval or use of ATDs should be directed to the General Aviation and Commercial Division.

Section 1 - Trainer Description

Trainer Description. Include a detailed description of what aircraft are represented and the model details. This is where quality pictures of the trainer should be located. This will permit easy identification of the approved trainer configuration(s).

-FAA AC 61-136B (A.2.4.1.1)

The Healy Aviation model H-ATD-SEL-1 is based on the dimensions and layout of a production single engine land airplane. This trainer closely represents the overall functionality, performance, and instrumentation for the airplane. The platform consists of a flight deck, instrument panel, avionics panel, and associated flight and instrument controls. A combination of hardware and software components are assembled and functionally checked by Healy Aviation. All hardware components are designed and installed so the flight deck has the appearance and feel of an actual airplane.

The H-ATD-SEL-1 model provides a realistic flight deck design, avionics interface, and reliable hardware/software performance. This platform provides an effective training environment for students and pilots in training. This includes the ability to accomplish scenario based flight training activities, instrument procedures and experience, pilot proficiency evaluations, simulated equipment failure, emergency procedures, and facilitates increased pilot competency.

The H-ATD-SEL-1 represents a Cessna 172 airplane.

Image 1. Exterior view of the ATD



Image 2. Overall view of the cockpit



Image 3. Detailed view of the mechanical compass



Image 4. Pilot instrument panel



Image 5. Copilot instrument panel



Image 6. Avionics panel

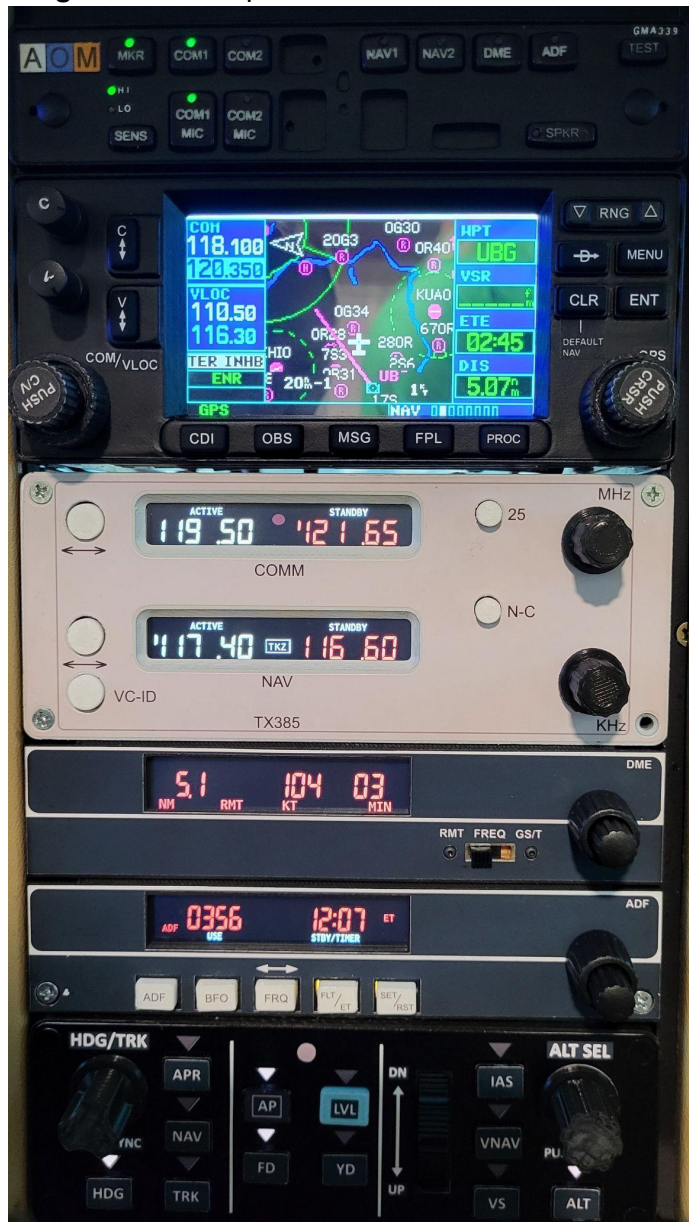


Image 7. Yoke mounted switches (A/P disengage and PTT)



Image 8. Lower switch panel



Image 9. Engine controls and Flap Selector/Indicator



Image 10. Rudder Pedals, Trim Wheel, Trim Indicator and Fuel Selector



Image 11. Overall view of the instructor station

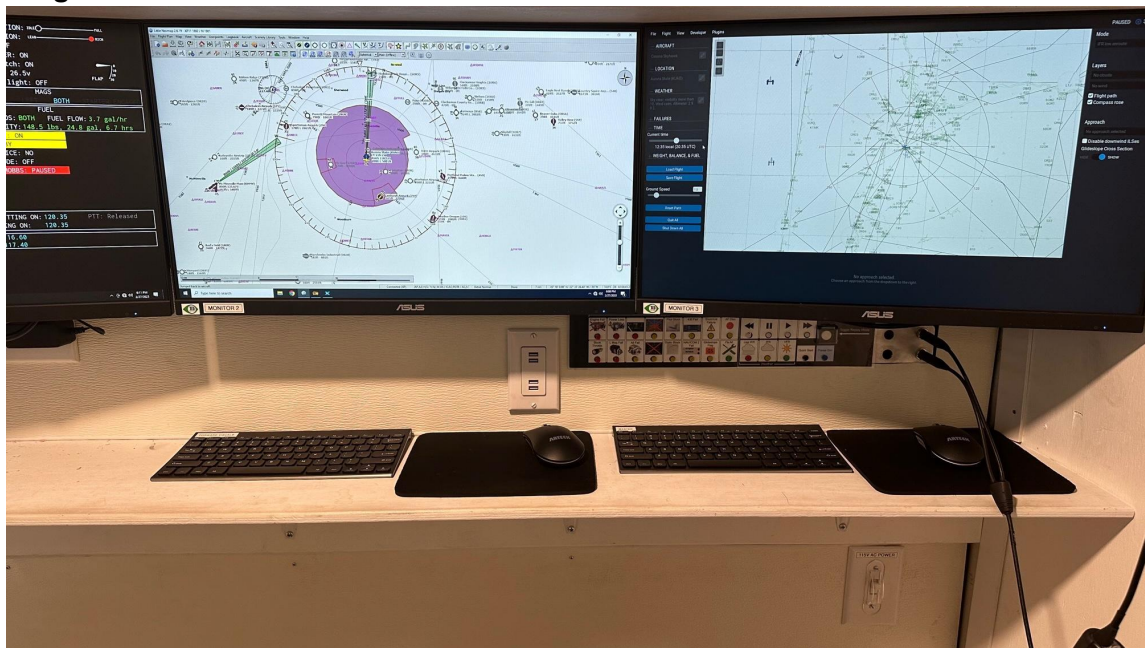


Image 12. Instructor station (Aircraft position and airways)

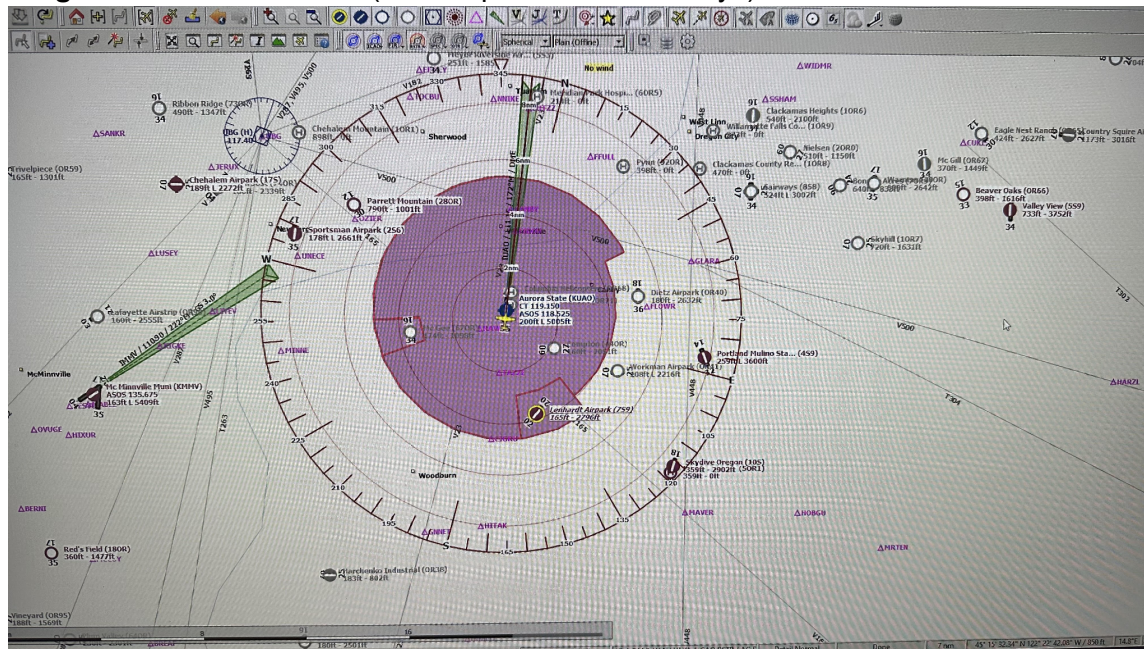


Image 13. Instructor station (Weather controls)

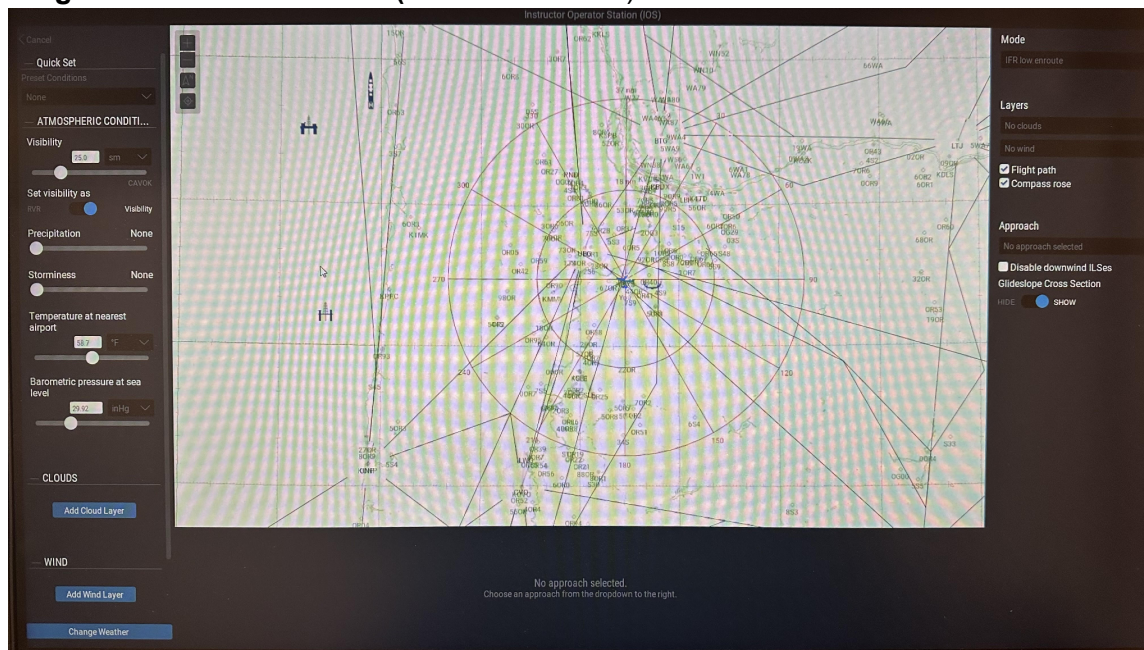
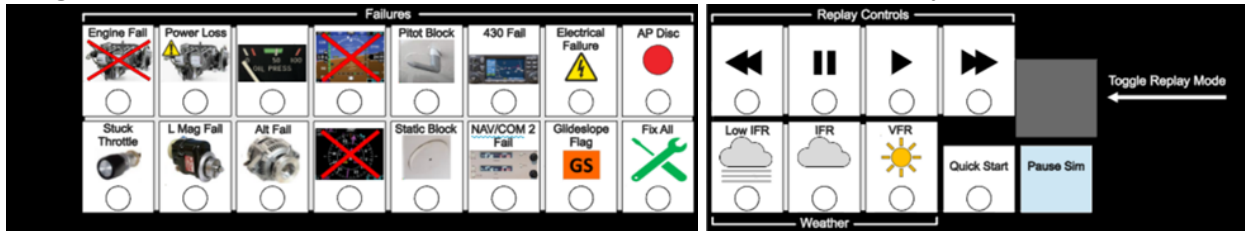


Image 14. Instructor Shortcut Panel (Weather, failures, pause and replay controls)



Section 2 - Components List

Components List. List any hardware or software components that make the device function (flight deck panels, avionics components, computer processors, projectors, screens, LCD screens, operating systems software, etc.).

-FAA AC 61-136B (A.2.4.1.2)

Note: Only one aircraft configuration exists for this trainer.

Hardware:

ITEM	COMPONENT NAME	MANUFACTURER	Model #	Version #	QTY	DESCRIPTION/FUNCTIONS
1	Frame	Healy Aviation	H-ATD-SEL-1-FRAME	1	1	Frame/enclosure
2	Frame Integrated Control System	Healy Aviation	NA	1	1	Frame-integrated controls, sensors and USB interface system for: Yoke, rudder, brakes, elevator trim (wheel and indicator), carburetor heat, throttle, mixture, alternate static, ignition and switches.
3	Computer	Healy Aviation	NA	NA	4	-CPU: Intel Core i3, i5, i7, i9 with 2 or more cores, or equivalent. -Memory: minimum 8 GB RAM -Video Card: a DirectX 11-capable video card from NVIDIA, AMD or Intel with at least 1 GB VRAM
4	I/O Interface	NA	Mega2560	R3	3	I/O interface for instruments, switches, buttons, knobs and relays
5	Instructor shortcut panel	Healy Aviation	H-ATD-SEL-1-I SP	NA	1	Button panel for quick settings (WX, failures, etc.)
6	Airspeed Indicator	Healy Aviation	H-ATD-SEL-1-ASI	1	1	A stepper motor based airspeed indicator.
7	PF/D/HSI	RealSimGear	G5	NA	2	Replica Garmin G5
8	Altimeter	Healy Aviation	H-ATD-SEL-1-ALT	1	1	A stepper motor based Altimeter
9	Flight Instrument	Healy Aviation	4in MFD	V3	3	Turn Coordinator, Vertical Speed Indicator and NAV2 indicator.
10	Flight Instrument	Healy Aviation	4in MFD	V1	1	Optional Equipment. Engine monitor.
11	Clock	NA	NA	NA	1	Any real aircraft clock.
12	Engine cluster	Healy Aviation	H-ATD-SEL-1-ENG	1	1	Servo based fuel quantity, oil temperature and oil pressure gauges.
13	Ammeter	Healy Aviation	H-ATD-SEL-1-AMPS	1	1	Servo based ammeter

14	Avionics Panel 1	Healy Aviation	H-ATD-SEL-1-AUD/GPS430	1	1	An avionics panel representing a general aviation audio panel with selections for com1, com2, nav1, nav2, DME, ADF and marker beacon plus a GPS/NAVCOM with moving map.
15	Avionics Panel 2	Healy Aviation	MVP	1	1	An avionics panel representing a NAV/COM radio, a DME and an ADF receiver.
16	Tachometer	Healy Aviation	H-ATD-SEL-1-TACH	1	1	A stepper motor based tachometer.
17	Low Voltage Light	NA	NA	NA	1	Any 5mm LED
18	ELT	Healy Aviation	H-ATD-SEL-1-ELT	1	1	ELT remote with LED
19	Network Device	NA	NA	NA	1	A wireless router supporting 802.11AC standard or a wired network switch supporting IEEE 802.3ab
20	Autopilot	Healy Aviation	H-500	1	1	GMC507 style autopilot.
21	Transponder	Healy Aviation	H-ATD-SEL-1-XPNDR	1	1	King style transponder.
22	Intercom	FlightCom	403	NA	1	Any FlightCom 403 intercom.
23	Flap Selector and Indicator	Healy Aviation	H-ATD-SEL-1-FLAP	1	1	Flap selector and indicator.
24	Pilot's Seat	Healy Aviation	H-ATD-SEL-1-SEAT-L	1	1	Pilot's seat with vertical and forward/back adjustment
25	Projector	Optoma	1080HDR	NA	1	Main Display
26	Industry Standard 55" Television	NA	NA	NA	2	Side Displays supporting 1080p
27	Industry Standard 24" Monitor	NA	NA	NA	3	Instructor Station Monitors supporting 1080p
28	Industry standard PC speakers	NA	NA	NA	3	Speakers for external audio (engine etc.), flight deck speaker audio and Air Manager audio (stall horn, tire noise etc.)

Software:

Healy Aviation LLC asserts that all software listed below is compatible.

-(FAA AC 61-136B, A.6.2)

ITEM	COMPONENT NAME	MANUFACTURER	Model #	Version #	QTY	DESCRIPTION/FUNCTIONS
1	Operating System	Microsoft	Windows	10/10 pro	4	Operating System
2	Flight sim software	Laminar Research	XPLANE	11	3	Flight simulation software
3	Air Manager	Sim Innovations	Air Manager	4	1	Simulation management software
4	Air Player	Sim Innovations	Air Player	4	1	Simulation management software
5	Graphics	Orbx	TruEarth	NA	1	Graphics improvements
6	GPS	Reality-XP	GNS 530W/430W	V2	1	GPS simulation software
7	Moving map	Alexander Barthel	Little Navmap	V2	1	Moving map for Instructor Station
8	Projection Warping	Fly Elise	Immersive Display Pro	V4	1	Projection warping software
9	PDF viewer	Microsoft or Google	Edge or Chrome	NA	1	PDF Chart viewing

Section 3 - Design Criteria

Design Criteria. Word-for-word listing identifying the applicable qualifying items (BATD criteria as described in Appendix B, plus the additional AATD criteria as described in Appendix C, if applicable.)

-FAA AC 61-136B (A.2.4.1.3)

The following section provides a detailed “word for word” listing and design criteria of each of the required items, functions, and capabilities listed in AC 61-136, (See Appendix B for BATD and Appendix C for AATD items “if applicable”) and the operational performance (as applicable) for each of the functions described for the H-ATD-SEL-1 airplane ATD.

Basic ATD Requirements

All configurations for this model meet all AC 61-136, Appendix B requirements.

The H-ATD-SEL-1 model meets the following Control Input requirements.

(1) The airplane physical flight and associated control systems are recognizable as to their function and how they are manipulated solely from their appearance. These physical flight control systems do not use interfaces such as a keyboard, mouse, or gaming joystick to control the airplane in simulated flight.

(2) Virtual controls are those controls used to set up certain aspects of the simulation (such as selecting the airplane configuration, location, weather conditions, etc.) and otherwise program, effect, or pause the training device. These controls are part of the instructor station or independent computer interface.

(3) Except for the initial setup, a keyboard or mouse is not used to set or position any feature of the ATD flight controls for the maneuvers or training tasks to be accomplished. See the control requirements listed below as applicable to the airplane model represented. The pilot is able to operate the controls in the same manner as it would be in the actual airplane. This includes the landing gear, wing flaps, cowl flaps, carburetor heat, mixture, propeller, and throttle controls appropriate to the airplane model represented.

(4) The physical arrangement, appearance, and operation of controls, instruments, and switches closely models the airplane represented. This trainer recreates the appearance, arrangement, operation, and function of realistically placed physical switches and other required controls representative of an airplane instrument panel that includes the following:

- Master/battery;
- Magnetos for each engine (as applicable);
- Alternators or generators for each engine;
- Auxiliary power unit (APU) (if applicable);
- Fuel boost pumps/prime boost pumps for each engine;
- Avionics master;
- Pitot heat; and

- Rotating beacon/strobe, navigation, taxi, and landing lights.

(5) Only the software evaluated by the FAA is available for use on this computer system. Note: This does not prohibit software updates that do not otherwise change the appearance of the systems operation.

The H-ATD-SEL-1 model meets the following additional airplane physical flight and airplane systems controls:

(1) A self-centering displacement yoke or control stick that allows continuous adjustment of pitch and bank.

(2) Self-centering rudder pedals that allow continuous adjustment of yaw and corresponding reaction in heading and roll.

(3) Throttle or power control(s) that allows continuous movement from idle to full-power settings and corresponding changes in pitch and yaw, as applicable.

(4) Mixture/condition, propeller, and throttle/power control(s) as applicable to the make and model of airplane represented.

(5) Controls for the following items, as applicable to the category and class of airplane represented:

- Wing flaps,
- Pitch trim,
- Communication and navigation radios,
- Clock or timer,
- Gear handle (if applicable),
- Transponder,
- Altimeter,
- Carburetor heat (if applicable), and
- Cowl flaps (if applicable).

The H-ATD-SEL-1 model meets the following Control Input Functionality and Response Criteria:

(1) Time from control input to recognizable system response is without delay and does not appear to lag in any way. Healy Aviation verifies that the H-ATD-SEL-1 meets this performance requirement.

(2) The control inputs are tested by the computer software at each session startup, and displayed as a confirmation message of normal operation, or a warning message if the transport delay time or any design parameter is out of tolerance. It is not possible to continue the training session unless the problem is resolved and all components are functioning properly. This test considers all the items listed in the display and control requirements.

The H-ATD-SEL-1 model meets the following Display Requirements:

(1) The following instruments and indicators are replicated and properly located in the instrument panel, as appropriate to the airplane represented:

- Flight instruments are in a standard configuration, represented as traditional “round dial” flight instruments, or as an electronic primary flight instrument display (PFD) and multi-function display (MFD) with reversionary and back-up flight instruments.
- A sensitive altimeter with incremental markings each 20 feet or less, operable throughout the normal operating range for the make and model of airplane represented.
- A magnetic direction indicator
- A heading indicator with incremental markings each 5 degrees or less, displayed on a 360 degree circle. Arc segments of less than 360 degrees are selectively displayed as applicable to the M/M of airplane represented.
- An airspeed indicator with incremental markings as shown for the M/M airplane represented; airspeed markings of less than 20 knots need not be displayed.
- A vertical speed indicator (VSI) with incremental markings each 100 feet per minute (fpm) for both climb and descent, for the first 1,000 fpm of climb and descent, and at each 500 fpm climb and descent for the remainder of a minimum $\pm 2,000$ fpm total display, or as applicable to the M/M of airplane represented.
- A gyroscopic rate-of-turn indicator or equivalent with appropriate markings for a rate of 3 degrees per second turn for left and right turns. If a turn and bank indicator is used, the 3 degrees per second rate index must be inside of the maximum deflection of the indicator.
- A slip and skid indicator with coordination information displayed in the conventional inclinometer format where a coordinated flight condition is indicated with the ball in the center position. A split image triangle indication or as appropriate for a PFD configuration is used.
- An attitude indicator with incremental markings each 5 degrees of pitch or less, from 20 degree pitch up to 40 degree pitch down or as applicable to M/M of airplane represented. Bank angles are identified at “wings level” and at 10, 20, 30, and 60 degrees of bank (with an optional additional identification at 45 degrees) in left and right banks.
- Engine instruments as applicable to the M/M of airplane represented, providing markings for the normal ranges including the minimum and maximum limits.
- A suction gauge or instrument pressure gauge, if applicable, with a display appropriate to the airplane represented.
- A flap setting indicator that displays the current flap setting. Setting indications should be typical of that found in an actual airplane.
- A pitch trim indicator with a display that shows zero trim and appropriate indices of airplane nose down and nose up trim, as would be found in the actual airplane.

- Communication radio(s) with a full range of selectable frequencies displaying the radio frequency in use.
- Navigation radio(s) with a full range of selectable frequencies displaying the frequency in use and capable of replicating both precision and nonprecision instruments, including approach procedures (each with an aural identification feature), and a marker beacon receiver. Examples include, an instrument landing system (ILS), non-directional radio beacon (NDB), Global Positioning System (GPS), Localizer (LOC) or very high frequency omni-directional range (VOR). Graduated markings as indicated below are present on each course deviation indicator (CDI) as applicable. The markings include:
 - One-half dot or less for course/glideslope (GS) deviation (i.e., VOR, LOC, or ILS), and
 - Five degrees or less for bearing deviation for automatic direction finder (ADF) and radio magnetic indicator (RMI), if installed.
 - If equipped with a Primary Flight Display (PFD) and/or Multifunction Flight Display (MFD), the flight and navigation information and guidance replicates the avionics manufactures same scales and navigation information presentation.
- A clock with incremental markings for each minute and second, or a timer with a display of minutes and seconds.
- A transponder that displays the current transponder code.
- Fuel quantity indicator(s) that displays the fuel remaining, either in analog or digital format, as appropriate for the make and model of airplane represented.

(2) All instrument displays listed above are visible during all flight operations. All of the displays provide an image of the instrument that is clear and:

- (a) Does not appear to be out of focus or illegible
- (b) Does not appear to “jump” or “step” during operation.
- (c) Does not appear with distracting jagged lines or edges.
- (d) Does not appear to lag relative to the action and use of the flight controls.

(3) Control inputs are properly reflected by the flight instruments in real time and without a perceived delay in action. Display updates or actions show all changes (within the total range of the replicated instrument) that are equal to or greater than the following values:

- (a) Airspeed indicator: change of 5 knots.
- (b) Attitude indicator: change of 2 degrees in pitch and bank.
- (c) Altimeter: change of 10 feet.
- (d) Turn and bank: change of ¼ standard rate turn.
- (e) Heading indicator: change of 2 degrees.
- (f) Vertical speed indicator (VSI): change of 100 fpm.

- (g) Tachometer: change of 25 rpm or 2 percent of turbine speed.
- (h) VOR/ILS: change of 1 degree for VOR or ¼ of 1 degree for ILS.
- (i) ADF: change of 2 degrees.
- (j) GPS: change as appropriate for the model of GPS based navigator represented.
- (k) Clock or timer: change of 1 second.

Note: Airplane configurations with PFD and/or MFD displays are representative of those avionics systems and the associated instrument display information.

(4) Flight Displays reflect proper dynamic behavior of the airplane represented. Examples: a VSI reading of 500 fpm reflects a corresponding movement in altitude, and an increase in power reflects an increase in the rpm indication or power indicator.

The H-ATD-SEL-1 model meets the following Flight Dynamics requirements:

- (1) Flight dynamics are comparable to the way the airplane represented performs and handles.
- (2) Airplane performance parameters (such as maximum speed, cruise speed, stall speed, and maximum climb rate) are comparable to the airplane represented. A performance table is provided for each airplane configuration for sea level and 5,000 feet, to verify the appropriate performance. (or 6,000 feet can be used. 25,000 feet should will be used for turboprop or turbojet altitude performance)
- (3) Airplane vertical lift component changes as a function of bank comparable to the way the airplane represented performs and handles.
- (4) Changes in flap setting, slat setting, or gear position is accompanied by the appropriate changes in flight dynamics comparable to the way the make and model of airplane represented performs and handles.
- (5) The presence and intensity of wind and turbulence is reflected in the handling and performance qualities of the simulated airplane and is comparable to the way the airplane represented performs and handles.

The H-ATD-SEL-1 model meets the following Instructional Management Requirements:

- (1) The instructor is able to pause the system at any time during the training simulation for the purpose of administering instruction or procedural recommendations.
- (2) If a training session begins with the “airplane in the air” and ready for the performance of a particular procedural task, the instructor can manipulate the following system parameters independently of the simulation:
 - Airplane geographic location,
 - Airplane heading,
 - Airplane airspeed,
 - Airplane altitude, and

- Wind direction, speed, and turbulence.

(3) The system is capable of recording both a horizontal and vertical track of airplane movement for the entire training session for later playback and review.

(4) The instructor can disable any of the instruments prior to or during a training session and is able to simulate failure of any of the instruments without stopping or freezing the simulation to affect the failure. This includes simulated engine failures and the following airplane systems failures: alternator or generator, vacuum or pressure pump, pitot static, electronic flight displays, or landing gear or flaps, as appropriate.

(5) This ATD has an available navigational database that is local (within 25NM) to the training facility location. All navigational data is based on procedures as published per 14 CFR part 97. This device uses Coded Instrument Flight Procedures to support the instrument approach and navigation capabilities.

Advanced ATD Requirements

All configurations, as noted in AC 61-136, Appendix C meet the following *additional* AATD design criteria.

The H-ATD-SEL-1 model has the following additional AATD features and components.

- (1) A realistic shrouded (enclosed) or unshrouded (open) flight deck design with a singular and uniform instrument panel design representing a specific model airplane flight deck.
- (2) Cockpit knobs, system controls, switches, and/or 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 category and class of airplane being represented.
- (3) Primary flight and navigation instruments are appropriately sized and properly arranged that exhibit neither stepping nor excessive transport delay.
- (4) A digital avionics panel.
- (5) A Global Positioning System (GPS) navigator with moving map display.
- (6) A Two-axis autopilot is installed, and, as appropriate, a flight director (FD). (If standard equipment)
- (7) Pitch trim (manual or electric pitch trim) is available permitting indicator movement either electrically or analog in an acceptable trim ratio.
- (8) Has An independent visual system, panel, or screen that provides realistic cues in both day and night VFR and IFR meteorological conditions to enhance a pilot's visual orientation in the vicinity of an airport including:
 - Adjustable visibility parameters; and
 - Adjustable ceiling parameters.
- (9) A fixed pilot seat appropriate to the airplane configuration, including an adjustable height and an adjustable forward and aft seat position. The pilot should be oriented so that the pilots line of sight is at approximately at the same height of the top edge of the instrument panel.

(10) Rudder pedals secured to the cockpit floor structure or to the floor beneath the device in proper relation to cockpit orientation.

(11) A push-to-talk switch on the control yoke.

(12) A separate instructor station permitting effective interaction without interrupting the flight in overseeing the pilot's horizontal and vertical flight profiles in real time and space. This includes the ability to:

(a) Oversee tracks along published airways, holding entries and patterns, and Localizer (LOC) and glideslope (GS) alignment/deviation (or other approaches with a horizontal and vertical track).

(b) Function as air traffic control in providing vectors, etc., change the weather conditions, ceilings, visibilities, wind speed and direction, create light/moderate/ or severe turbulence, and icing conditions.

(c) Invoke failures in navigation and instruments, radio receivers, landing gear and flaps, engine power (partial and total), and other airplane systems (pitot static, electric, vacuum pump, etc

Section 4 - Aircraft Configuration

Aircraft Configurations. Provide a picture of the instrument panel for each configuration. The performance table for all aircraft available should be provided in this section. -FAA AC 61-136B (A.2.4.1.3)

Note: Only one aircraft configuration exists for this trainer.

Instrument Panel



Cessna 172N performance

Aircraft Model	V _{so}	V _{s1}	V _x	V _y	Best Glide Speed	V _a	V _{ne}	V _{mc}	KTAS at Cruise at 75% power setting	Rate of climb (fpm) at best rate (V _y), at full power or as recommended
C172N	41	47	59	73	65	97	160	N/A	SL 114	SL 770
6,000 feet →									120	453

NOTE: Standard atmosphere and gross weight is used for performance.

Section 5 – Visual Systems

Visual System(s). Provide pictures and descriptions of the visual systems available for the trainer.

-FAA AC 61-136B (A.2.4.1.5)

Cockpit View



Left Monitor



Right Monitor

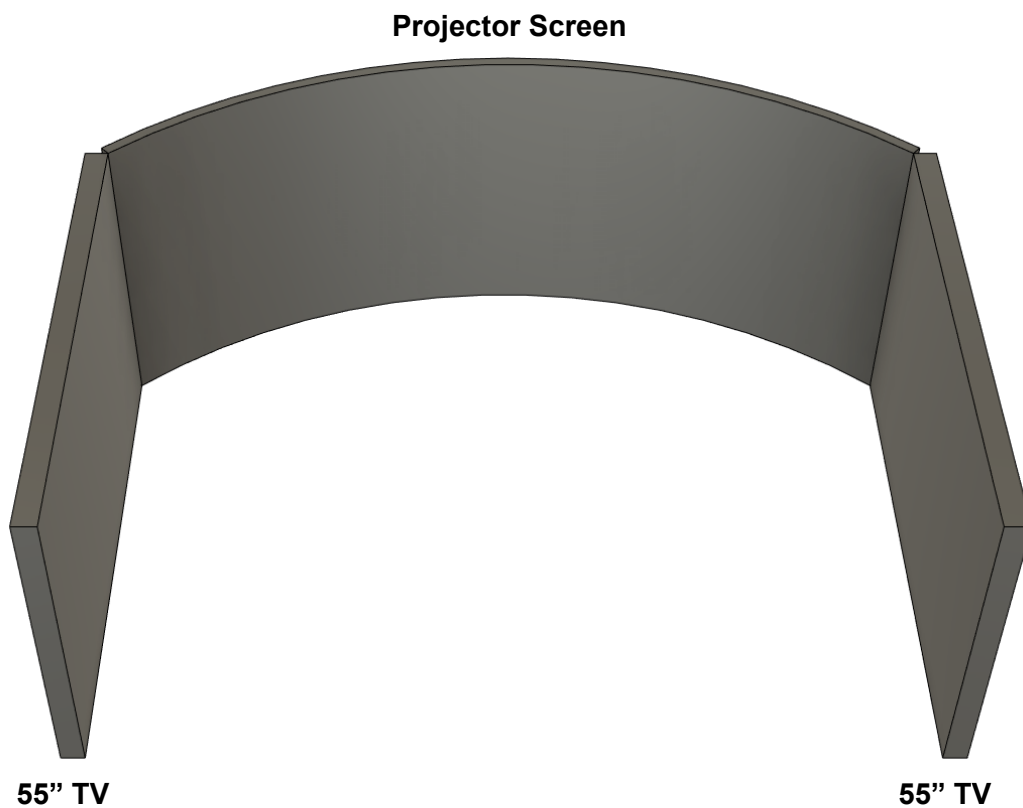


Visuals Description

The visual system provides realistic cues in both day and night VFR and IFR meteorological conditions to enhance a pilot's visual orientation in the vicinity of an airport. This includes the ability to adjust the visibility and ceiling conditions permitting the simulation of various meteorological weather conditions.

The trainer visuals consist of a single projector for the forward view and two side display TVs.

The forward view is a non-collimated direct projection onto a curved screen. A toggle switch above the copilot's seat is used to select a left, center or right viewpoint.



Section 6 - ATD Checklist

Procedures and Tasks Test Checklist. Identify the functions and tasks that can be accomplished in this trainer.
 -FAA AC 61-136B (A.2.4.1.6)

Maneuvers and Tasks	Yes/No/NA
a) Pre takeoff	
1) Engine Start	yes
2) Taxi and brake operation	yes
b) Takeoff	
1) AIRPLANE Takeoff	
i) Run-up and powerplant checks	yes
ii) Acceleration Characteristics	yes
iii) Nosewheel and rudder steering	yes
iv) Effect of crosswind	yes
v) Instrument	yes
vi) Landing gear, wing flap operation	yes 1.) wing flap only, fixed landing gear
c) In-Flight Operation	
1) AIRPLANE In-Flight Operations	
i) Climb	
1. Normal and max. performance	yes
2. One-engine-inoperative procedures (multiengine)	NA
ii) Cruise	
(a) Performance characteristics (speed vs. power)	yes
(b) Normal and steep turns	yes
(c) Approach to stalls (i.e., stall warning), stalls, and recovery. Execute from takeoff, cruise, and approach and landing configurations.	yes

(d) In-flight engine shutdown (multiengine)	NA
(e) Fuel selector function	yes
(f) In-flight engine start	yes
iii) Approach	
(a) Normal (with and without flaps) (check gear warning, if applicable)	yes
(b) best glide no power	yes
iv) Landings	yes
d) Instrument Approaches	
1) Non Precision	
i) GPS and LPV	yes
ii) GPS-WAAS (optional)	yes
iii) All engines operating	NA
iv) One or more engines inoperative	NA
v) Approach procedures (VOR/DME, LOC procedures on an ILS, LDA, RNAV (RDP) or RNAV (GPS) to LNAV, LNAV/VNAV or LPV	yes 1.) VOR/DME 2.) LOC/ILS 3.) RNAV(GPS) a.) LNAV b.) LNAV/VNAV c.) LPV
2) Precision	
i) ILS	yes
ii) GLS (optional)	no
iii) Effects of crosswind	yes
iv) With engine inoperative (multiengine)	NA
v) Missed approach (a) Normal (b) With engine(s) inoperative (multiengine)	(a) yes (b) NA
e) Surface Operations	

1) AIRPLANE Surface Operations (Post Landing)	
i) Approach and landing roll	yes
ii) Braking Operation	yes
iii) Reverse thrust operation, if applicable	NA
f) Any Flight Phase	
1) Aircraft and Powerplant Systems	
i) Electrical, mechanical, or hydraulic	yes
ii) Flaps (airplane)	yes
iii) Fuel Selector and oil temp/pressure	yes
iv) Landing gear (if applicable)	NA
2) Flight Management and Guidance Systems	
i) Autopilot (if standard equipment)	yes
ii) Flight director (AATD only)/system display (if installed)	yes
iii) Navigation systems	yes
iv) Stall warning systems avoidance (airplane)	yes 1.) aural stall horn
v) Multi-function displays (if applicable)	NA
3) Airborne Procedures	
i) Holding	yes
ii) Uncoordinated turns, slipping and skidding demo	yes
iii) Configuration and power changes and resulting pitch changes	yes
iv) Compass turns and appropriate errors (if installed)	yes
4) Simulated Turbulence in Flight (light, moderate, severe)	yes
5) Engine Shutdown and Parking	

i) Systems operation	yes
ii) Parking brake operation (if installed) (airplane)	yes
g) Can simulate engine failure, including failures due to simulated loss of oil pressure or fuel starvation.	yes
h) Can simulate the following equipment or systems failures:	
1) Alternator or generator failure.	yes
2) Vacuum pump/pressure failure and the associated flight instrument failure.	no 1.) not installed (AHRS)
3) Gyroscopic flight instrument failures.	yes 1.) AHRS
4) Pitot/static system malfunction and the associated flight instrument failures.	yes
5) Electronic flight deck display malfunctions.	yes
6) Landing gear (if retractable) or flap malfunctions.	yes
i) Independent Instructor Station Requirements (AATD Only)	
1) Displays published airways and holding patterns.	yes
2) Displays aircraft position and track.	yes
3) Displays aircraft altitude and speed.	yes
4) Displays NAVAIDs and airports.	yes
5) Can record and replay aircraft ground track history for the entire training session.	yes
6) Can invoke instrument or equipment failure.	yes

During the initial start of the trainer, the computer component “self-check” program verifies that all the features of the trainer are in working order. It is not possible to continue the training session unless the problem is resolved, and all the components are functioning properly. During the initial start-up the ATD has the following **Screen Statement** is displayed on the instructor station or visual display before the trainer is used for training.

“All the flight instruments required for visual and instrument flight rules listed in part 91.205 must be functional at the start of the simulated flight session. Temporary instrument or equipment failures are permitted when practicing emergency procedures. If this simulated flight session will be used for instrument experience or currency requirements, the visual component must be configured to Instrument Meteorological Conditions [IMC] during the simulated flight session, including execution of instrument approaches from the final approach fix until reaching Decision Height [DH], Decision Altitude [DA], or Minimum Descent Altitude [MDA] as appropriate.”

Notice: Any changes or modifications to this training device that have not been reviewed, evaluated, and approved in writing by General Aviation and Commercial Division will terminate FAA approval.