

REDBIRD FLIGHT SIMULATIONS

TD / TD2

QUALIFICATION AND APPROVAL GUIDE (QAG)

Version 3, Revision 2



BASIC AVIATION TRAINING DEVICE

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LOG OF REVISIONS

Description of Changes	Version	Edited By
Combined QAGs TD BATD QAG v2.2 and TD2 BATD QAG v2.2	3.0	WJ
Added Navigator Instructor Station in Section 2	3.0	WJ
Added E-Trim, AP, PTT switches to Yoke controller in Section 2 and 3	3.0	WJ
Added TD Platform to Component List in Section 2 and 3	3.0	WJ
Added RealNav to Component List in Section 3	3.0	WJ
Added Windows 10 to Component List in Section 3	3.0	WJ
Added IS PC or Wireless Mobile Device to Component List in Section 3	3.0	WJ
Updated Section 4 with verbatim language from AC 61-136A	3.0	WJ
Added Performance Table in Section 5	3.0	WJ
Added Visual reference images to Section 6	3.0	WJ
Added Section 7: ATD Functions and Maneuvers Checklist	3.0	WJ
Updated GLS capability to "No" in Section 7	3.0A	WJ
Corrected typo on Page 7	3.0B	WJ
Removed reference to AATD in Section 4	3.0B	WJ
Updated Aircraft Configurations in Section 5	3.0B	WJ
Updated MGW in Section 5	3.0B	WJ
Edited language in paragraph a.(2) in Section 4	3.0C	WJ
Updated Performance Table in Section 5	3.0C	WJ
Updated aircraft descriptions with retractable gear enabled in Section 5	3.0C	WJ
AC 61-136B compliance updates	3.1	WJ
Separated Software and Hardware on Component List	3.1	WJ
Labeled Hardware component list Table 2	3.1	WJ
Relabeled Performance table from Table 2 to Table 3	3.1	WJ
Added Corvus, TRACON, and GIFT to Software Component List	3.1	WJ
Updated Compliance Statement according to new FAA template	3.1A	WJ
Provided additional clarity on devices in Section 2 per request from AFS-800	3.1A	WJ
Updated/added additional IOS images per request from AFS-800	3.1A	WJ
Deleted Statements of Compatibility of Software and Hardware per request from AFS-800	3.1A	WJ
Updated Section 4 - BATD Requirements to statements in the Affirmative according to new FAA template	3.1A	WJ
Removed individual aircraft configurations from ToC per request from AFS-800	3.1A	WJ
Removed W&B Information from A/C Configuration per request from AFS-800	3.1A	WJ
Updated Performance Tables with V _G according to new FAA template	3.1A	WJ
Updated Section 7 according to new FAA template	3.1A	WJ
Corrected Typo on Page 7 (Reference to VTO)	3.1A	WJ
Reformatted Footer information to provide better revision information	3.1A	WJ
Updated Cover page according to FAA template	3.1B	WJ
Added aircraft models represented per FAA template	3.1B	WJ
Updated reference to AC61-136B with AC61-136 per FAA request	3.1B	WJ
Corrected typo in B.3.3.2	3.1B	WJ
Updated Section 7 with the correct text from FAA template	3.1B	WJ
Added LOEP	3.2	WJ
Added Redbird RD1 Rudder Pedal Figure 37	3.2	WJ
Added Connect to Section 3 – Training Device Component List	3.2	WJ

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SECTION 1: Compliance Statement

This Qualification and Approval Guide (QAG) provides a detailed description of all the required components, features, functions, and capabilities for the Redbird Flight Simulations, Inc. models TD AND TD2 aviation training device. This includes any optional airplane configurations with quality color pictures and diagrams. This QAG is provided by Redbird Flight Simulations, Inc. 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.

The manufacturer 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. Redbird Flight Simulations, Inc. 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 FAA approval or use of ATDs should be directed to the General Aviation and Commercial Division.

SECTION 2: Aviation Training Device (ATD) Description and Pictures

The Redbird TD and TD2 models are based on the dimensions and layout of a several production Single-Engine Land aircraft. This trainer closely represents the overall functionality, performance, and instrumentation for these airplanes. 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 Redbird Flight Simulations, Inc. All hardware components are designed and installed so the flight deck has the appearance and feel of an actual airplane.

The Redbird TD and TD2 models 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.

Airplane Single Engine Land representing:

- Cessna C172 (including RG)
- Cessna C182 (including RG)

Redbird TD

- Primary visuals provided by 27" LCD monitor. See Figure 1, 2, 25
- Single pilot control with realistic switches, buttons, knobs, circuit breakers and other cockpit controls that are designed to represent the family of aircraft. See Figures 6, 7, 9, 11, 37
- An interchangeable instrument panel to allow a quick-change options between analog and glass panel configurations. See Figures 12, 13
- Optional Horizon monitor configuration to improve visual display capabilities. See Figure 14, 26



Figure 1: Redbird TD (Shown with G1000 panel and optional Horizon monitor configuration and Redbird RD1 Rudder Pedals)

Redbird TD2

- Primary visuals provided by 27" LCD monitor. See Figure 1, 2, 25
- Single pilot control with realistic switches, buttons, knobs, circuit breakers and other cockpit controls that are designed to represent the family of aircraft. See Figures 6, 7, 9, 10, 37
- An interchangeable instrument panel to allow a quick-change options between analog and glass panel configurations. See Figures 12, 13
- User configurable options to enable – Retractable Gears, Variable Pitch Propeller, High Performance Engine. Figure 10
- Optional Horizon monitor configuration to improve visual display capabilities. See Figure 14, 26



Figure 2: Redbird TD2 (Shown with Analog panel and Redbird RD1 Rudder Pedals)

Configuration Components

Instructor's Station

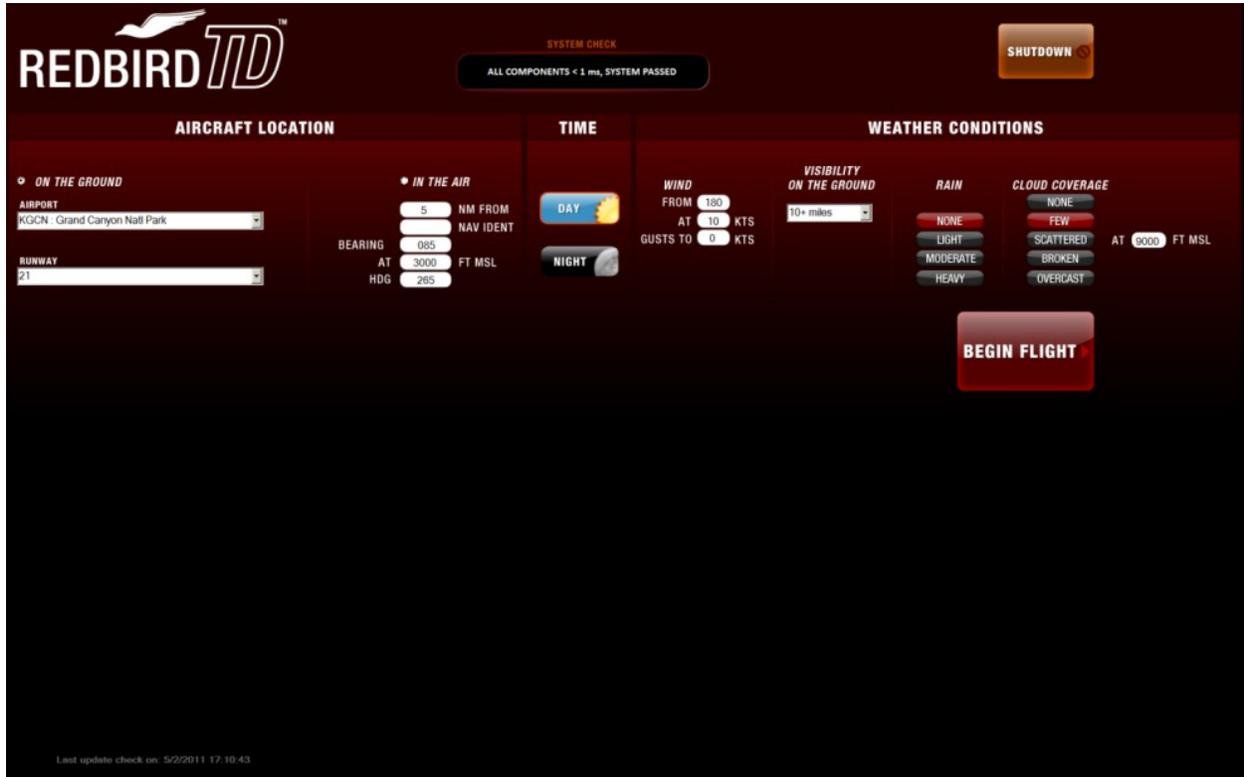


Figure 3: TD/TD2 Session Start Screen

The Redbird TD and TD2 comes standard with an industry standard keyboard to initialize training sessions and provide basic Instructor functions.



Figure 4: Instructor Hotkeys

The Optional Navigator full-featured Instructor Station is also available for the Redbird TD and TD2 and is operated from any PC and/or web browser enabled device.

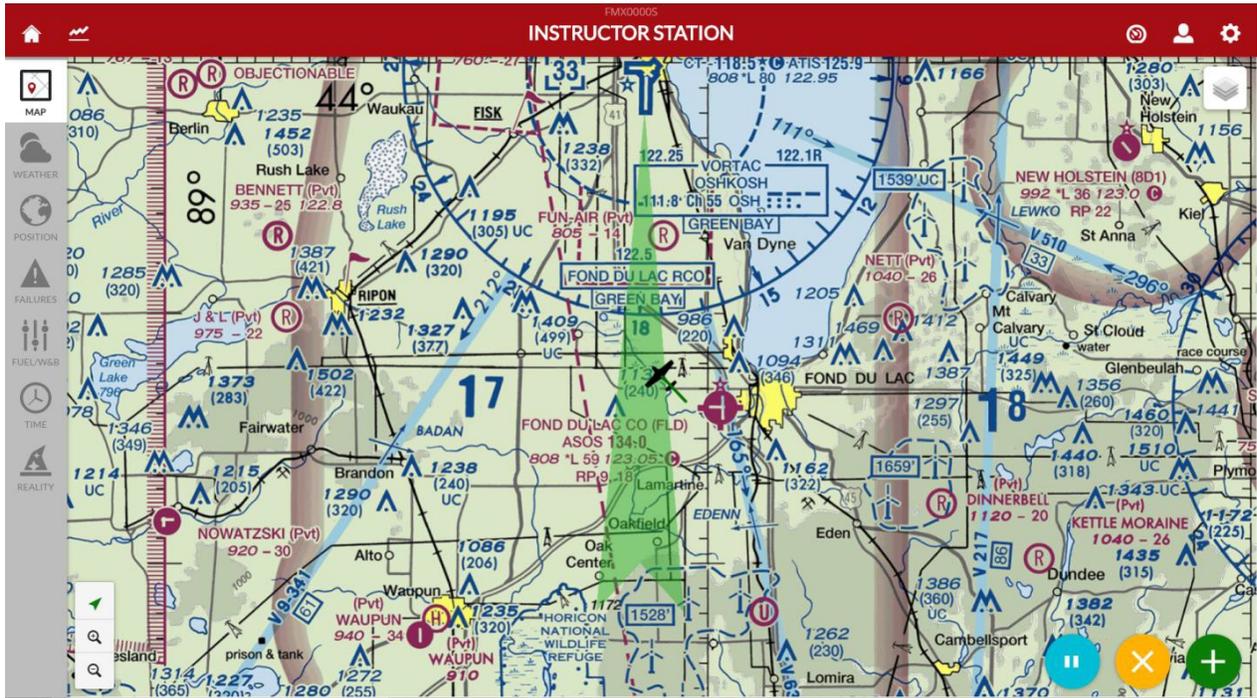


Figure 5: Redbird's Instructor's interface Map Tab

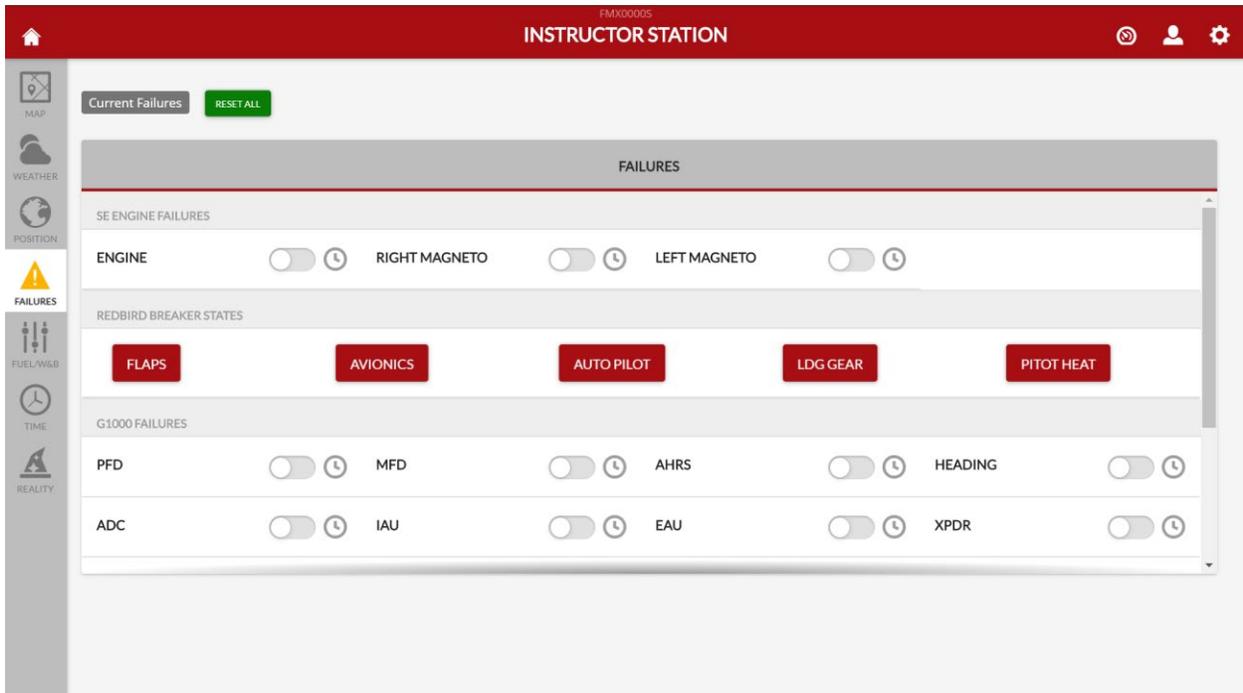


Image 5a: Redbird's Instructor's interface Failure Tab

Redbird GIFT – PPL/IR

Redbird Guided Independent Flight Training is a simulator-based maneuvers training supplement that allows the student to learn, practice, and receive feedback on maneuvers required for Private Pilot or Instrument Rating. GIFT includes:

- A video and written pre-flight briefing
- A simulator mission with an AI-powered instruction that provides real-time coaching and corrections based on the pilot's performance.
- A post-flight debrief with objective scoring based on the FAA Airmen Certification Standards
- In-depth post-flight review and trend tracking by uploading completed lesson history to the Redbird Cloud

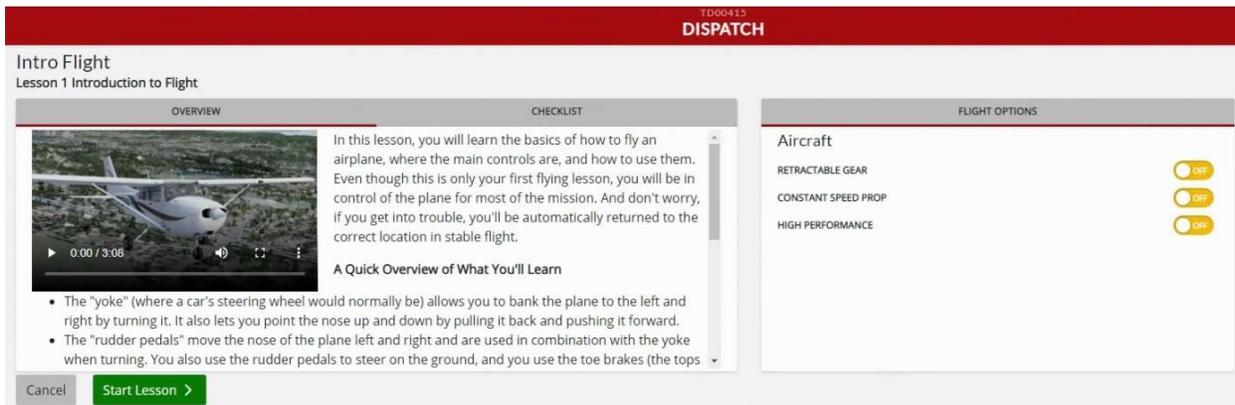


Image 37: GIFT Dispatch Screen – TD/TD2



Image 38: GIFT Instructional Virtual Gate

P3DV4VIDEO SCORE					
Meets ACS					
DESCRIPTION	PERFORMANCE	TARGET	AVERAGE	DEVIATION	
Prior to Entry <i>Meets ACS</i>					
Assigned Heading	90.4%	320	322	307	322
Approach Path <i>Meets ACS</i>					
KIAS	89.9%	90	92	91	94
CDI Deflection	96.5%	Centered	1/8 left	1/8 right	1/8 left
GSI Deflection	94.0%	Centered	1/8 above	1/8 below	2/8 above
Tuned to Approach <i>Meets ACS</i>					
Tuned to ILS <i>Meets ACS</i>					
Tuned to Tower <i>Meets ACS</i>					
Land Runway 36 <i>Meets ACS</i>					
Overall Score	92%				
CLOSE					

Image 39: GIFT Sample Scoring Analysis

CONNECT

Redbird CONNECT is a connection service that provides secured remote connection to the simulator’s Redbird Navigator IOS. CONNECT generates an authentication access code that is used to establish the connection.

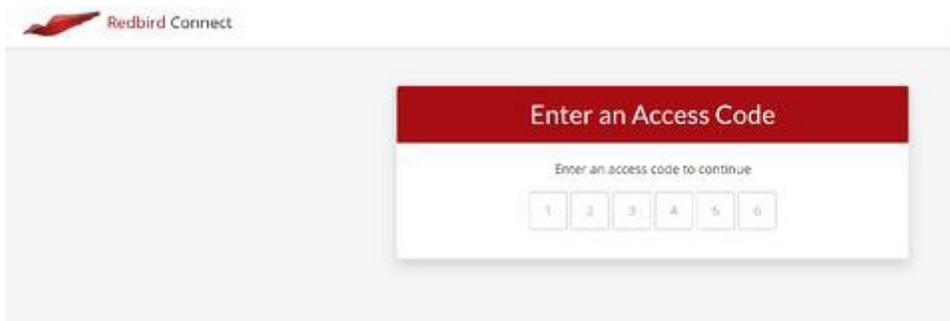


Image 40: CONNECT (SAMPLE access code)

Corvus

Corvus provides Redbird simulator location service to an EFB by providing data similar to an ADS-B receiver. In addition to representing own-ship position of simulated aircraft, Corvus also broadcasts attitude and heading reference systems (AHRS) information as well as Traffic Information Services-Broadcast (TIS-B) data. Select Flight Information Services-Broadcast (FIS-B) functionality, such as weather and airspace information will be added in future updates.

*Corvus runs in the background. No images available.

Cygnus Home/Cygnus Pro

Cygnus connects Apple iOS EFBs with the Redbird simulators. Cygnus Home passes the location of the simulated flight to a specific iOS device through a specialized USB/30pin cable. Cygnus Pro utilizes the Bad Elf device to connect up to 6 iOS device and their aviation app to display the simulated location of the aircraft.



Image 41: Cygnus Pro

Controls

The flight controls for Redbird TD and TD2 are realistic in appearance and function and represents flight controls found in many popular aircrafts used for flight training.



Figure 6: Control Yoke (Legacy)



Figure 7: Control Yoke w/ E-Trim, AP, PTT Switches



Figure 8: E-Trim, AP, PTT



Figure 9: Switch Panel



Figure 10: TD2 Throttle Quadrant (T-P-M), Trim, Gear Handle, Flap Handle



Figure 11: TD Throttle Quadrant (T-P), Trim, Flap Handle



Figure 37: RD1 Rudder Pedals (USB)

Aircraft Instrument Configurations

The modular design of the Redbird TD and TD2 allows for quick configuration changes between different aircraft. Reconfiguring the TD and TD2 for different aircraft configuration is completed by switching the acrylic instrument panel.



Figure 12: Analog Panel



Figure 13: Glass Panel



Figure 14: TD2 - Glass Panel General Overview (Shown with optional Redbird Horizon expanded visuals)



Figure 15: TD2 - Analog Panel General Overview (Shown with optional Redbird Horizon expanded visuals)



Figure 16: TD – Glass Panel General Overview (Shown with optional Redbird Horizon expanded visuals)



Figure 17: TD – Analog Panel General Overview (Shown with optional Redbird Horizon expanded visuals)

Misc. Accessories



Figure 18: TD Platform with optional Horizon Visual Expansion

SECTION 3: Training Device Component List

Software Components					
Qty	Type	Manufacturer	Name	Description/Function	Configuration
1	Software	Microsoft	Windows XP, 7, or 10	Operating system. (depending on serial number)	All
1	Software	Microsoft	ESP or FSX	Simulation engine. (depending on serial number)	All
1	Software	Lockheed Martin	Prepar3D	Simulation engine. (depending on serial number)	All
1	Software	Redbird Flight Simulations	RB Sim	Simulation control and component integration. (depending on serial number)	All
1	Software	Redbird Flight Simulations	Navigator	Simulation control and component integration. Environmental, location and failure controls with map, track and glideslope display. (depending on serial number)	All
1	Software	Redbird Flight Simulations	CONNECT	Optional ATD IOS secured remote connection service	All
1	Software	Redbird Flight Simulations	Cygnus (including Pro)	Optional location services software/equipment	All
1	Software	Redbird Flight Simulations	Corvus	Optional location services software	All
1	Software	Redbird Flight Simulations	GIFT	Optional guided flight training software	All
1	Software	PilotEdge	PilotEdge	Optional simulator ATC service	All
1	Software	RealNav Data	Instrument Procedures Database	Optional software providing updates for FAA published instrument navigation procedures, database per 14 CFR 97 (enroute, approach)	All
1	Software	Mindstar Aviation	Redbird 1000	Virtual replication of the Garmin G1000 flight instruments, GPS, radios, gauges, indicators, alerts, misc. instruments and logic controls for simulated systems.	See Configuration
1	Software	Mindstar Aviation	Redbird 430/530	Virtual replication of the Garmin GNS430 and GNS530	See Configuration
1	Software	Mindstar Aviation	Redbird Autopilot	Virtual replication of the BendixKing KAP140 and Garmin GFC700	See Configuration
1	Software	Mindstar Aviation	Redbird Radios	Virtual Radios replication of the BendixKing and Garmin radios	See Configuration
1	Software	Mindstar Aviation	Miscellaneous Gauges	Virtual Miscellaneous Gauges	See Configuration
1	Software	Flight 1	Compass	Virtual Generic Compass	All
1	Software	Redbird Flight Simulations	Analog Gauges	Virtual Analog Instruments, Hobbs, Flap and Trim Indicators, Gear Position	See Configuration
1	Software	Redbird Flight Simulations	Miscellaneous Gauges	Virtual Miscellaneous Gauges	All

Table 1: Software Component List

Hardware Components					
Qty	Type	Manufacturer	Name	Description/Function	Configurations
1	Hardware	Redbird Flight Simulations	Redbird TD/TD2 CPU	Host computer for flight simulation engine, simulation control software, airplane systems and instruments. (depending on serial number)	All
1	Hardware	27" Industry Standard	LCD	Flat Panel displays for exterior views and virtual instruments (depending on serial number)	All
1	Hardware	28" Industry Standard	LCD (Legacy)	Flat Panel displays for exterior views and virtual instruments (depending on serial number)	All
1	Hardware	Redbird Flight Simulations	Redbird TD/TD2 Yoke (Legacy)	Yoke Control (depending on serial number)	All
1	Hardware	Redbird Flight Simulations	Redbird TD/TD2 Yoke	Yoke Control w/ AP, PTT, E-Trim switches (depending on serial number)	All
1	Hardware	Redbird Flight Simulations	Redbird Throttle Quadrant – TD	Throttle Quadrant	TD
1	Hardware	Redbird Flight Simulations	Redbird Throttle Quadrant – TD2	Throttle Quadrant	TD2
1	Hardware	Redbird Flight Simulations	RD1 Rudder Pedals	Rudder Pedals with Toe Brakes	All
1	Hardware	Industry Standard	Rudder Pedals	Optional Industry standard USB Rudder Pedals (Example: Saitek, Logitech, Thrustmaster, CH Products, etc) – <i>Replaces Redbird RD1</i>	See configuration
1	Hardware	Industry Standard	Keyboard and trackpad	USB keyboard and trackpad	All
1	Hardware	Industry Standard	Instructors Station Computer or Wireless Mobile Device	Optional Host computer for Instructors Station.	All
1	Hardware	Redbird Flight Simulations	Redbird Instrument Controls Overlay	Virtual Instrument Controls Overlay	See Configuration
1	Hardware	Redbird Flight Simulations	Redbird TD/TD2 Switch Panel Block	Lower Panel Switch Block	All
1	Hardware	Redbird Flight Simulations	Redbird Horizon	Optional Expanded Exterior Visuals	All
1	Hardware	Redbird Flight Simulations	TD Platform	Optional Platform for TD/TD2 (Table, FMX Rudder Pedals, Pilot Seat, Floor)	All

Table 2: Hardware Component List

SECTION 4: AVIATION TRAINING DEVICE (ATD) DESIGN CRITERIA LIST

The following section provides the detailed “word for word” listing and design criteria of each of the required items, functions, and capabilities (listed in AC 61-136, for BATD requirements Appendix B and the additional AATD items of Appendix C) and operational performance value/scale (as applicable) for each of the functions described for the Redbird TD and TD2.

Basic ATD Requirements List [Appendix B items]

All configurations for this model, as noted, meet AC 61-136, Appendix B requirements

The Redbird TD and TD2 models meet the following Control Input Requirements:

- B.3.1.1. The aircraft physical flight and associated control systems ARE recognizable as to their function and how they are to be 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 aircraft in simulated flight.
- B.3.1.2. Virtual controls are those controls used to set up certain aspects of the simulation (such as selecting the aircraft 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.
- B.3.1.3. Except for the initial setup, a keyboard or mouse IS not be 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 aircraft model represented. The pilot IS able to operate the controls in the same manner as it would be in the actual aircraft. This includes the landing gear, wing flaps, cowl flaps, carburetor heat, mixture, propeller, and throttle controls appropriate to the aircraft model represented.
- B.3.1.4. The physical arrangement, appearance, and operation of controls, instruments, and switches closely MODELS the aircraft represented. THE REDBIRD TD AND TD2 recreates the appearance, arrangement, operation, and function of realistically placed physical switches and other required controls representative of an aircraft 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.
- B.3.1.5. ONLY the software evaluated by the FAA may be loaded for use on that computer system. This does not PROHIBIT software updates that do not otherwise change the appearance of the systems operation.

The Redbird TD and TD2 models meet the following additional airplane physical flight and airplane systems controls:

- B.3.2.1.1 A **self-centering displacement yoke or control stick** that allows continuous adjustment of pitch and bank.
- B.3.2.1.2 **Self-centering rudder pedals** that allow continuous adjustment of yaw and corresponding reaction in heading and roll.
- B.3.2.1.3 **Throttle or power control(s)** that allows continuous movement from idle to full-power settings and corresponding changes in pitch and yaw, as applicable.
- B.3.2.1.4 **Mixture/condition, propeller, and throttle/power control(s)** as applicable to the M/M of aircraft represented.
- B.3.2.1.5 Controls for the following items, as applicable to the category and class of aircraft 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 Redbird TD and TD2 models meet the following Control Input Functionality and Response Criteria:

- B.3.3.1 Time from control input to recognizable system response IS without delay AND DOES NOT not appear to lag in any way. Redbird Flight Simulations, Inc. verifies that the Redbird TD and TD2 meets this requirement.
- B.3.3.2 The control inputs ARE tested by the computer and software program at each 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 Redbird TD and TD2 models meet the following Display Requirements:

- B.3.4.1 The following instruments and indicators ARE replicated and properly located as appropriate to the aircraft represented:
- B.3.4.1.1 Flight instruments ARE in a standard configuration representing the 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.
- B.3.4.1.2 A sensitive **altimeter** with incremental markings each 20 feet or less, operable throughout the normal operating range of the M/M of aircraft represented.
- B.3.4.1.3 A **magnetic direction indicator**.
- B.3.4.1.4 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 aircraft represented.
- B.3.4.1.5 An **airspeed indicator** with incremental markings as shown for the M/M aircraft represented; airspeed markings of less than 20 knots need not be displayed.
- B.3.4.1.6 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 aircraft being represented.
- B.3.4.1.7 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 IS inside of the maximum deflection of the indicator.
- B.3.4.1.8 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 as appropriate for PFD configurations may be used.
- B.3.4.1.9 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 aircraft 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.
- B.3.4.1.10 **Engine instruments** as applicable to the M/M of aircraft being represented, providing markings for the normal ranges including the minimum and maximum limits.
- B.3.4.1.11 A **suction gauge** or instrument pressure gauge with a display applicable to the aircraft represented.
- B.3.4.1.12 A **flap setting indicator** that displays the current flap setting. Setting indications should be typical of that found in an actual aircraft.
- B.3.4.1.13 A **pitch trim indicator** with a display that shows zero trim and appropriate indices of airplane nose down and airplane nose up trim, as would be found in an aircraft.
- B.3.4.1.14 **Communication radio(s)** with a full range of selectable frequencies displaying the radio frequency in use.

- B.3.4.1.15 **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. For example, 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 marking 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), as applicable.
- B.3.4.1.16 A clock with incremental markings for each minute and second, or a timer with a display of minutes and seconds.
- B.3.4.1.17 A transponder that displays the current transponder code.
- B.3.4.1.18 A fuel quantity indicator(s) that displays the fuel remaining, either in analog or digital format, appropriate for M/M of aircraft represented.
- B.3.4.2 All instrument displays listed above ARE visible during all flight operations. Allowances can be made for multifunction electronic displays that may not display all instruments simultaneously. All of the displays must provide an image of the instrument that is clear and:
 - B.3.4.2.1 Does not appear to be out of focus or illegible.
 - B.3.4.2.2 Does not appear to “jump” or “step” during operation.
 - B.3.4.2.3 Does not appear with distracting jagged lines or edges.
 - B.3.4.2.4 Does not appear to lag relative to the action and use of the flight controls.
- B.3.4.3 Control inputs ARE PROPERLY reflected by the flight instruments in real time and without a perceived delay in action. Display updates must show all changes (within the total range of the replicated instrument) that are equal to or greater than the values stated below:
 - B.3.4.3.1 Airspeed indicator: change of 5 knots.
 - B.3.4.3.2 Attitude indicator: change of 2 degrees in pitch and bank.
 - B.3.4.3.3 Altimeter: change of 10 feet.
 - B.3.4.3.4 Turn and bank: change of ¼ standard rate turn.
 - B.3.4.3.5 Heading indicator: change of 2 degrees.
 - B.3.4.3.6 VSI: change of 100 fpm.
 - B.3.4.3.7 Tachometer: change of 25 rpm or 2 percent of turbine speed.
 - B.3.4.3.8 VOR/ILS: change of 1 degree for VOR or ¼ of 1 degree for ILS.
 - B.3.4.3.9 ADF: change of 2 degrees.
 - B.3.4.3.10 GPS: change as appropriate for the model of GPS-based navigator represented.
 - B.3.4.3.11 Clock or timer: change of 1 second.
- B.3.4.4 Displays must reflect the dynamic behavior of an actual aircraft (e.g., a VSI reading of 500 fpm must reflect a corresponding movement in altitude, and an increase in power must reflect an increase in the rpm indication or power indicator.)

The Redbird TD and TD2 models meet the following (Flight Dynamics Requirements):

- B.3.5.1 Flight dynamics of the ATD ARE comparable to the way the represented training aircraft performs and handles. However, there is no requirement for an ATD to have control loading to exactly replicate any particular aircraft.
- B.3.5.2 Aircraft performance parameters (such as maximum speed, cruise speed, stall speed, maximum climb rate, and hovering/sideward/forward/rearward flight) ARE comparable to the aircraft being represented. A performance table IS included in the QAG for each aircraft configuration for sea level and 5,000 feet using standard atmosphere and gross weight conditions, to verify the appropriate performance. An alternate performance altitude for 6,000 feet can be used if the manufacturer of that aircraft has a performance chart reflecting that altitude. Performance at altitude for turboprop or turbojet configurations should reflect 18,000 ft.
- B.3.5.3 Aircraft vertical lift component CHANGES as a function of bank comparable to the way the aircraft being represented performs and handles.
- B.3.5.4 Changes in flap setting, slat setting, gear position, collective control, or cyclic control ARE accompanied by changes in flight dynamics comparable to the way the M/M of aircraft represented performs and handles.

B.3.5.5 The presence and intensity of wind and turbulence ARE reflected in the handling and performance qualities of the simulated aircraft and IS comparable to the way the aircraft represented performs and handles.

The Redbird TD and TD2 models meet the following Instructional Management Requirements:

B.3.6.1 The instructor IS able to pause the system at any time during the training simulation for the purpose of administering instruction or procedural recommendations.

B.3.6.2 If a training session begins with the “aircraft in the air” and ready for the performance of a particular procedural task, the instructor IS able to manipulate the following system parameters independently of the simulation:

- Aircraft geographic location,
- Aircraft heading,
- Aircraft airspeed,
- Aircraft altitude, and
- Wind direction, speed, and turbulence.

B.3.6.3 The system IS capable of recording both a horizontal and vertical track of aircraft movement during the entire training session for later playback and review.

B.3.6.4 The instructor IS able to 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 aircraft systems failures: alternator or generator, vacuum or pressure pump, pitot static, electronic flight displays, or landing gear or flaps, as appropriate.

B.3.6.5 The ATD HAS a navigational area database that is local (25 nautical miles (NM)) to the training facility to allow reinforcement of procedures learned during actual flight in that area. All navigational data ARE based on procedures as published per 14 CFR part 97. This device uses Navigraph or RealNav Data to support the instrument approach and navigation capabilities.

SECTION 5: Aircraft Configurations

Available airplane configuration “instrument panel” pictures and any optional instrument or avionics panels for each airplane are shown here. The components list identifies any optional displays, controls, or avionics equipment.

List of Previously Approved Configurations (QAG v3.0C):

C172 ANALOG



Figure 19: C172 - Analog

- Available on the Redbird TD & TD2
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 11)
- Analog gauges & 530 GPS with KAP140 Autopilot

C172 GLASS



Figure 20: C172 – Glass

- Available on the Redbird TD & TD2
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 11)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot

C172RG ANALOG



Figure 22: C172 – Analog & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot
- Retractable gears

C172 CSP ANALOG



Figure 21: C172 – Analog & CS Prop

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot
- Constant Speed Propeller Control

C172 CSP RG ANALOG



Figure 21: C172 – Analog, CS Prop & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot
- Constant Speed Propeller Control
- Retractable gears

C172 RG GLASS



Figure 24: C172 – Glass & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot
- Retractable gears

C172 CSP GLASS



Figure 23: C172 – Glass & CS Prop

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot
- Constant Speed Propeller Control

C172 CSP RG GLASS



Figure 24: C172 – Glass, CS Prop & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot
- Constant Speed Propeller Control
- Retractable gears

C182 ANALOG



Figure 25: C182 – Analog

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot

C182 RG ANALOG



Figure 25: C182 – Analog & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot
- Retractable gears

C182 CSP ANALOG



Figure 25: C182 – Analog & CS Prop

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot
- Constant Speed Propeller Control

C182 CSP RG ANALOG



Figure 26: C182 – Analog, CS Prop & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Analog gauges & 530 GPS with KAP140 Autopilot
- Constant Speed Propeller Control
- Retractable gears

C182 GLASS



Figure 27: C182 – Glass

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot

C182 RG GLASS



Figure 27: C182 – Glass & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot
- Retractable gears

C182 CSP GLASS



Figure 27: C182 – Glass & CS Prop

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot
- Constant Speed Propeller Control

C182 CSP RG GLASS



Figure 28: C182 – Glass, CS Prop & Retractable Gears

- Available on the Redbird TD2 Only
- Yoke – Center (See Figures 6,7,8)
- Throttle – Single Engine Vernier (T-P-M) (See Figure 10)
- Glass Cockpit G1000 PFD/MFD & GFC700 Autopilot
- Constant Speed Propeller Control
- Retractable gears

Additional configurations included in this version (QAG v3.1A)

None

Performance Table

Aircraft Model	V _{SO}	V _{S1}	V _X	V _Y	V _A	V _G	V _{NE}	KTAS @ Cruise / 75% power setting	Rate of Climb (fpm) @ (V _Y) / Full Power
C172	40 KIAS	44 KIAS	62 KIAS	74 KIAS	105 KIAS	68 KIAS	163 KIAS	114 KTAS**	1125 fpm**
							5000' -->	120 KTAS	890 fpm
C172CSP	40 KIAS	44 KIAS	62 KIAS	74 KIAS	105 KIAS	68 KIAS	163 KIAS	120 KTAS**	1190 fpm**
							5000' -->	125 KTAS	900 fpm
C172RG	42 KIAS*	47 KIAS*	62 KIAS	84 KIAS	106 KIAS	73 KIAS	164 KIAS	120 KTAS**	1200 fpm**
							5000' -->	126 KTAS	920 fpm
C172CSPRG	42 KIAS*	47 KIAS*	62 KIAS	84 KIAS	106 KIAS	73 KIAS	164 KIAS	124 KTAS**	1230 fpm**
							5000' -->	132 KTAS	945 fpm
C182	50 KIAS	56 KIAS	63 KIAS	80 KIAS	110 KIAS	75 KIAS	175 KIAS	117 KTAS**	810 fpm**
							5000' -->	123 KTAS	620 fpm
C182CSP	50 KIAS	56 KIAS	63 KIAS	80 KIAS	110 KIAS	75 KIAS	175 KIAS	120 KTAS**	825 fpm**
							5000' -->	127 KTAS	625 fpm
C182RG	50 KIAS*	56 KIAS*	65 KIAS	88 KIAS	112 KIAS	80 KIAS	181 KIAS	119 KTAS**	900 fpm**
							5000' -->	129 KTAS	740 fpm
C182CSPRG	50 KIAS*	56 KIAS*	65 KIAS	88 KIAS	112 KIAS	80 KIAS	181 KIAS	128 KTAS**	900 fpm**
							5000' -->	136 KTAS	750 fpm

*MOST FORWARD CENTER OF GRAVITY
**2000 FEET

Table 3: Aircraft Performance

SECTION 6: Visual System with VFR, IFR, DAY, and NIGHT Capabilities

Redbird TD/TD2 Visual System

The TD/TD2 visual system is capable of providing the following flight conditions:

Visual Flight Rules

- Day – See Figure 31
- Night – See Figure 32

Instrument Flight Rules

- Day – See Figure 33
- Night – See Figure 34

The flight condition is set by the user or instructor from the Session Start Screen (Figure 3, 29) and can be adjusted during the training session by the user/instructor from the Keyboard shortcut (Figure 4) as well as the Navigator Instructor Station (Figure 5, 30).



Figure 29: Session Start Screen Weather Settings

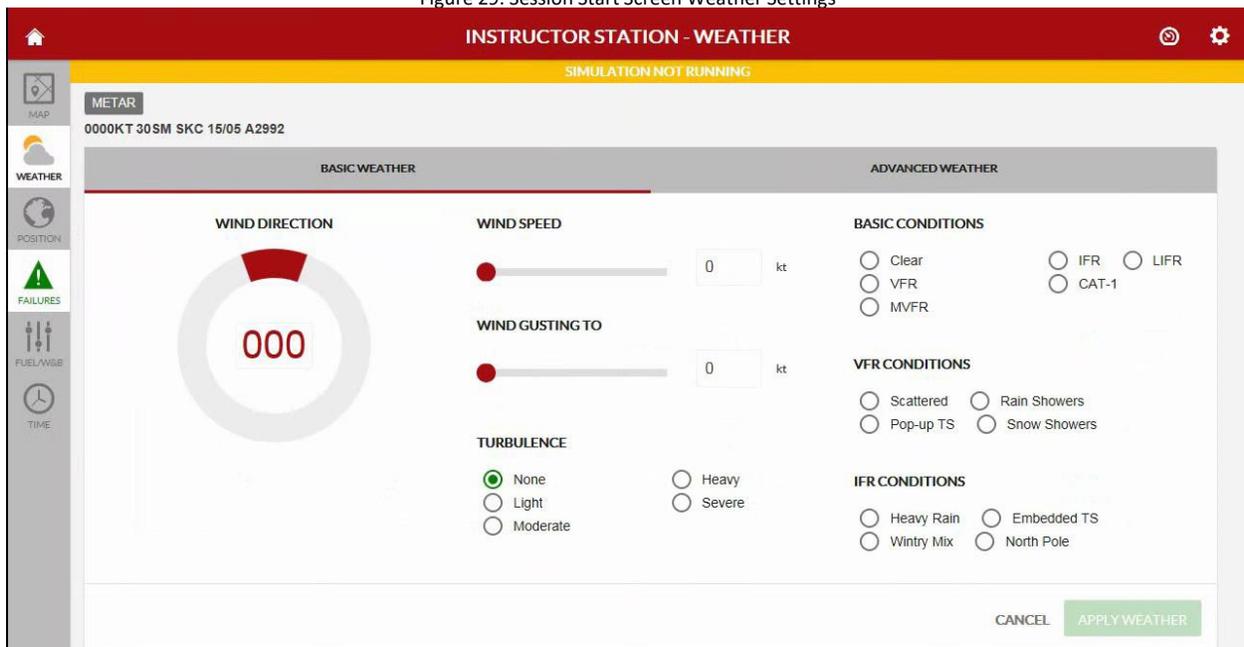


Figure 30: Navigator Instructor Station Weather Settings



Figure 31: VFR Day



Figure 32: VFR Night



Figure 33: IFR Day



Figure 34: IFR Night

The Redbird Horizon (optional expanded visuals) extends the TD/TD2 visual system with two additional monitors to provide extended visual referencing.



Figure 35: Standard TD/TD Visual System



Figure 36: TD/TD2 with optional Redbird Horizon Visual System

SECTION 7: ATD Functions and Maneuvers Checklist

AIRPLANE ATD FUNCTION VERIFICATION CHECKLIST

Functions and Maneuvers	Yes, No, or N/A
a. Pre-Takeoff	
(1) Engine start	Yes
(2) Taxi and brake operation	Yes
b. Takeoff	
(1) Run-up and powerplant checks	Yes
(2) Acceleration characteristics	Yes
(3) Nose wheel and rudder steering	Yes
(4) Effect of crosswind	Yes
(5) Instrument	Yes
(6) Flap operation	Yes
(7) Landing gear operation (if retractable)	Yes
c. In-Flight Operations	
(1) Climb	
(i) Normal and max. performance	Yes
(ii) One engine inoperative procedures (Multiengine only)	Yes
(2) Cruise	
(i) Correct performance characteristics (speed vs. power)	Yes
(ii) Normal and steep turns	Yes
(iii) Approach to stalls, (i.e. stall warning), stalls. Execute from takeoff, cruise, and approach and landing configurations.	Yes
(vi) In flight engine shutdown (multi-engine only)	Yes
(v) In flight engine start (multi-engine only)	Yes
(vi) Fuel selector function	NA
(3) Approach	
(i) Normal (with & without flaps) Check gear horn warning if applicable	Yes
(ii) Single engine approach and landing (multi-engine)	NA
(iii) Best glide no power	Yes
(iv) Landings	Yes
d. Instrument Approaches	
(1) Nonprecision	
(i) GPS and LPV	Yes
(ii) GPS - WAAS (optional)	Varies by configuration
(iii) All engines operating	Yes
(iv) One engine inoperative (Multi-engine only)	NA
(v) Approach procedures (VOR, VOR/DME, LOC procedures on an ILS, LDA, RNAV (RNP) or RNAV (GPS) to LNAV, LNAV/VNAV or LPV)	Yes
(2) Precision	
(i) ILS	Yes
(ii) GLS (optional)	No
(iii) Effects of Crosswind	Yes
(iv) One Engine Inoperative (Multi-engine only)	NA

(v) Missed Approach	Yes
(A) Normal	Yes
(B) With One Engine inoperative (Multi-engine only)	NA
e. Surface Operations (Post Landing)	
(1) Approach and landing roll	Yes
(2) Braking operation	Yes
(3) Reverse thrust operation, if applicable	NA
f. Any Flight Phase	
(1) Airplane and Power Plant Systems	
(i) Electrical, mechanical, or hydraulic	Yes
(ii) Flaps	Yes
(iii) Fuel selector and oil temp/pressure	Yes (Fuel Selector NA)
(vi) Landing gear (if applicable)	Yes
(2) Flight Management and Guidance Systems	
(i) Two axis auto pilot (if standard equipment)	Yes
(ii) Flight director (AATD only) and system displays (if installed)	NA
(iii) Navigation systems and optional display configurations	Yes
(iv) Stall warning systems avoidance	Yes
(v) Multi-function displays (PFD/MFD) if applicable	Yes
(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
(4) Parking and Engine Shutdown	
(i) Systems operation	Yes
(ii) Parking brake operation (if installed)	NA
g. Can simulate engine failure, including failures due to simulated loss of oil pressure or fuel starvation.	Yes (Except oil pressure loss)
h. Can simulate the following equipment or system failures:	
(1) Alternator or generator failure.	Yes
(2) Vacuum pump/pressure failure and associated flight instrument failures.	Yes
(3) Gyroscopic flight instrument failures.	Yes
(4) Pitot/static system malfunction and 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.	Optional
(2) Displays airplane position and track.	Optional
(3) Displays airplane altitude and speed.	Optional
(4) Displays NAVAIDs and airports.	Optional
(5) Can record and replay airplane ground track history for entire training session.	Optional
(6) Can invoke instrument or equipment failures.	Optional

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 Decent 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.