

Redbird Flight Simulations

Qualification and Approval Guide (QAG)

TD2 BASIC- Basic Aviation Training Device
Amended Qualification and Approval Guide

VERSION 2.2
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FAA APPROVED QAG

Date

12/18/2014

Signature

A handwritten signature in black ink, appearing to read 'Jeffrey Smith', is written over a blue line.

Jeffrey Smith

Manager, Airmen Certification and Training Branch AFS-810

2301 East St. Elmo Rd., Suite 100

Austin, Texas 78744

(512) 301-0718 Phone

(512) 301-0770 Fax

info@redbirdflight.com

Section 1: List of Configurations

Currently Approved:

1. **Configuration: TD2 BASIC-Standard** - Single Engine, Land, Optional Fixed or Retractable Gear, Optional Fixed Pitch or Constant Speed Propeller, Optional High Performance, High Wing
2. **Configuration: TD2 BASIC-Glass** - Single Engine, Land, Optional Fixed or Retractable Gear, Optional Fixed Pitch or Constant Speed Propeller, Optional High Performance, High Wing



Statements of Compatibility of Software and Hardware

AC61-136, Appendix 2, 4. b.:

The device and all configurations included in this Qualification and Approval Guide (QAG) meet the requirements for the Compatibility of Software and Hardware.

Microsoft Windows XP or 7 (Operating System)

This is to certify that Microsoft Corporation, the owner and developer of the Windows 7 operating system, has evaluated that their operating system works with industry standard PC's and USB flight control devices. Redbird Flight Simulations, Inc., utilizes industry standard USB flight control devices for all pilot input. All input control devices meet the USB 2.0 industry standard specified interfaces. Redbird Flight Simulations, Inc., the component integrator, has determined that the transport delay time is less than 300 milliseconds, and that all analog and digital input signals meet the performance criteria established for the software.

Microsoft ESP or FSX (Simulation Engine)

This is to certify that Microsoft Corporation, the owner and developer of the ESP and FSX Simulator Engine, has evaluated that their software application works with industry standard PC's and USB flight control devices. Redbird Flight Simulations, Inc., utilizes industry standard USB flight control devices for all pilot input. All input control devices meet the USB 2.0 industry standard specified interfaces. Redbird Flight Simulations, Inc., the component integrator, has determined that the transport delay time is less than 300 milliseconds, and that all analog and digital input signals meet the performance criteria established for the software.

Lockheed Martin Prepar3D (Simulation Engine)

This is to certify that Lockheed Martin, the owner and developer of the Prepar3D Simulator Engine, has evaluated that their software application works with industry standard PC's and USB flight control devices. Redbird Flight Simulations, Inc., utilizes industry standard USB flight control devices for all pilot input. All input control devices meet the USB 2.0 industry standard specified interfaces. Redbird Flight Simulations, Inc., the component integrator, has determined that the transport delay time is less than 300 milliseconds, and that all analog and digital input signals meet the performance criteria established for the software.

Mindstar Aviation Redbird Virtual Instrument Suite

This is to certify that Mindstar Aviation, the owner and developer of the Redbird Virtual Instrument Suite, including the Redbird 1000, Redbird 430/530, Redbird 140 Autopilot, Redbird 55 Autopilot, Redbird Entegra and Redbird Perspective along with Redbird Flight Simulations, the hardware manufacturer and component integrator, have demonstrated that the Redbird Virtual Instrument Suite software package is fully compatible with the Redbird Flight Simulations TD2 and all configurations of that model. Mindstar Aviation and Redbird Flight Simulations can assure that the communications/transport data delay is not greater than 300 milliseconds and all analog and digital input signals meet the performance criteria established for the software performance by Redbird Flight Simulations.



**Statements of Compatibility of Software and Hardware
AC61-136, Appendix 2, 4. b. (continued):**

The device and all configurations included in this Qualification and Approval Guide (QAG) meet the requirements for the Compatibility of Software and Hardware.

Flight 1 Compass

This is to certify that Flight 1, the owner and developer of the Compass and Redbird Flight Simulations, the hardware manufacturer and component integrator, have demonstrated that the Compass software is fully compatible with the Redbird Flight Simulations TD2 and all configurations of that model. Redbird Flight Simulations can assure that the communications/transport data delay is not greater than 300 milliseconds and all analog and digital input signals meet the performance criteria established for the software performance by Redbird Flight Simulations.



Section 2: Description of Hardware and Software Components

All Configurations Include:

Qty	Type	Manufacturer	Name	Description/Function	Applicable Configurations
1	Software	Redbird Flight Simulations	RBSim	Central Processor– Sim Platform Software	All
1	Software	Redbird Flight Simulations	Navigator	Simulator and flight management platform	All
1	Software	Microsoft	Windows 7	Operating System	All
1	Software	Microsoft	ESP or FSX	Simulation Engine (includes Map, Track, and Glideslope tracking)	Varies based on S/N
1	Software	Lockheed Martin	Prepar3d	Simulation Engine (includes Map, Track, and Glideslope tracking)	Varies based on S/N
1	Software	Redbird Flight Simulations	Redbird Analog Gauges	Analog Instruments, Hobbs, Flap and Trim Indicators	All
1	Software	Mindstar Aviation	Redbird 430/ 530	Virtual GPS and Radios	See Configuration
1	Software	Mindstar Aviation	Redbird Autopilot	Virtual Autopilot (Redbird 140, 55, or 700)	See Configuration
1	Software	Mindstar Aviation	Redbird 1000	Virtual flight instruments, GPS, radios, gauges, indicators, alerts, misc. instruments and logic controls for simulated systems.	See Configuration
1	Software	Flight 1	Compass and Analog Gauges	Compass, Miscellaneous Gauges	All
1	Hardware	27" Industry Standard	LCD	Flat Panel displays for exterior views and virtual instruments	All
1	Hardware	Redbird Flight Simulations	Pro and RD1 Rudder Pedals	USB Rudder Pedals	All
1	Hardware	CH Products Corporation	Pro Pedals	USB Rudder Pedals	All
1	Hardware	Mad Catz Inc./Saitek	Pro Flight Rudder Pedals	USB Rudder Pedals	All
1	Hardware	Mad Catz Inc./Saitek	Pro Flight Cessna Rudder Pedals	USB Rudder Pedals	All
1	Hardware	Industry Standard	Keyboard and trackpad	USB keyboard and trackpad	All
1	Hardware	Redbird Flight Simulations	Redbird TD2 Sim CPU	Host computer for flight simulation engine, simulation control software, airplane systems and instruments.	All
1	Hardware	Redbird Flight Simulations	Redbird TD/TD2 Yoke	Yoke Control	All
1	Hardware	Redbird Flight Simulations	Redbird Throttle Quadrant	Throttle Quadrant	All
1	Hardware	Redbird Flight Simulations	Redbird TD2 Instrument Controls Overlay	Virtual Instrument Controls Overlay	All—See Configuration
1	Hardware	Redbird Flight Simulations	Redbird TD2 Switch Panel Block	Lower Panel Switch Block	All
1	Hardware	Redbird Flight Simulations	Redbird Horizon	Expanded Exterior Visuals	All



Approved Individual Configurations Include:

TD BASIC-Standard: Approved Configuration

Yoke: Standard yoke. See Figure— 1

Throttle Quadrant: Complex Single Engine Vernier. See Figure— 2

Virtual Instrument Controls Overlay: Traditional Round Gauges, Redbird 530, Redbird 140
Autopilot. See Figure— 8, 10

TD BASIC-Glass: Approved Configuration

Yoke: Standard yoke. See Figure— 1

Throttle Quadrant: Complex Single Vernier. See Figure— 2

Virtual Instrument Controls Overlay: Glass Cockpit Redbird 1000 PFD & MFD with Integrated
Redbird 700 Autopilot. See Figure— 9, 10



Section 3: Statements of Compliance

All Configurations, as noted, meet AC 61-136, Appendix 2, Paragraph 8 BATD Design Criteria:

a. Controls:

- (1) Meets Requirements: Physical flight and aircraft system controls are recognizable as to their function and how they are manipulated solely from their appearance. The keyboard and track pad device supplied with the Redbird TD2 is used for setting flight location and flight conditions before a flight simulation session begins. During the simulation session the keyboard is used to display the pilot's performance, show backup instruments, introduce aircraft system failures and weather events, pause and end the flight. See Figures— 1, 2, 3, 4, 10
- (2) Meets Requirements: Virtual controls are limited to the initialization of the device and to control aircraft configuration, location and weather. Avionics are virtually displayed but are operated with physical buttons and knobs that closely represent the configuration of the aircraft. See Figures— 7
- (3) Meets Requirements: The keyboard and track pad is not used to set or position any feature of the represented aircraft for the maneuvers or flight training to be accomplished.
- (4) Meets Requirements: The arrangement, appearance, and operation of controls, instruments, and switches closely represent the aircraft, including: master/battery, magnetos, alternators, fuel boost pump, avionics master, pitot heat, and required lights. See Figures— 3, 4
- (5) Meets Requirements: During start-up of the device the PC configuration and file inventory is examined to ensure only tested software is installed. In the event additional files are found, an initialization error will be displayed and starting of a flight simulation session is not permitted.

b. Control Requirements:

- (1)(a): Meets Requirements: A self-centering displacement yoke that allows continuous adjustment of pitch and bank is provided. See Figure— 1
- (1)(b): Meets Requirements: Self-centering rudder pedals that allow continuous adjustment of yaw is provided.
- (1)(c): Meets Requirements: Throttle control that allows continuous movement from idle to full power is provided. See Figure— 2
- (1)(d): Meets Requirements: Mixture and throttle and optional propeller controls as applicable to the family of aircraft represented. See Figure— 2
- (1)(e): Meets Requirements: See individual configuration.

c. Control Inputs:

- (1) Meets Requirements: The transport delay for all control inputs is 300 milliseconds or less. The required transport delay is tested at system start-up by internal start/stop timers. Redbird Flight Simulations is the manufacturer of all control inputs and uses USB 2.0 which exceeds this requirement.



- (2) Meets Requirements: Each control input is tested at training session start-up. If any device fails to meet the requirements of Appendix 2, Paragraph 8, Section c, item (1) a warning message is displayed and the device will not start a training session.

d. Display Requirements:

- (1) Meets Requirements: See individual configuration.
- (2) Meets Requirements: The display is updated at rate that insures that the image of the instrument does not appear to: be out of focus, illegible, jump, step, jagged, nor is it distracting.
- (3) Meets Requirements: Display updates exceed 60Hz. All replicated instruments display changes equal or greater than the values required by this item.
- (4) Meets Requirements: Displays reflect the dynamic behavior of an actual aircraft in flight.

e. Flight Dynamics Requirements:

- (1) Meets Requirements: All simulated aircraft flight dynamics are comparable to the way an actual aircraft performs and handles.
- (2) Meets Requirements: All simulated aircraft performance parameters are comparable to the aircraft being represented.
- (3) Meets Requirements: Vertical lift component changes as a function of bank, comparable to the aircraft being represented.
- (4) Meets Requirements: Changes in aircraft configuration are accompanied by changes in flight dynamics, comparable to the aircraft being represented.
- (5) Meets Requirements: The handling and performance qualities of the simulated aircraft are affected by the presence and intensity of wind and turbulence in manner comparable to the aircraft being represented.

f. Instructional Management Requirements:

- (1) Meets Requirements: The instructor has the ability to pause the system at any time using the supplied keyboard. See Figure— 5, 6
- (2) Meets Requirements: The instructor as the ability to manipulate the parameters listed in this item independently of the simulation.
- (3) Meets Requirements: The system records both the horizontal and vertical track of the aircraft movement and this can be view in real-time or at a later time via the Analyze Flight key on the supplied keyboard.
- (4) Meets Requirements: The instructor is able to disable instruments prior to or during a training session and simulate failure of the instruments without stopping or freezing the simulation to affect the failure.
- (5) Meets Requirements: The device includes a navigational data base that covers all of North America and is based on procedures as published per 14 CFR part 97.



Approved Configuration: TD BASIC- Standard

This configuration represents a single engine land, fixed gear, fixed pitch propeller, high wing, airplane with traditional “round” gauge instruments, Redbird 530, and Redbird 140 Autopilot.

Meets all requirements under “All Configurations”

AC 61-136, Appendix 2, Paragraph 8: BATD Design Criteria

b. Control Requirements:

- (1)(e) This configuration has controls for:
- Wing Flaps.
 - Pitch Trim.
 - Communication and Navigation Radios (Redbird 530).
 - Clock and timer.
 - Transponder.
 - Altimeter.
 - Microphone with push-to-talk switch.

This configuration has controls that function optionally depending on user preference:

- Gear Handle
- Propeller Control

This configuration does not have controls for:

- Carburetor Heat—N/A by type of aircraft represented.
- Cowl Flaps—N/A by type of aircraft represented.

See Figures— 2, 3, 4, 8

d. Display Requirements:

- (1) This configuration has instruments and indicators appropriate and applicable to the aircraft being represented:
- Traditional flight instruments. See Figure— 8
 - Sensitive altimeter that meets the requirements listed in this item.
 - Magnetic compass.
 - Heading indicator that meets the requirements listed in this item.
 - Airspeed indicator that meets the requirements listed in this item.
 - Vertical speed indicator that meets the requirements listed in this item.
 - Gyroscopic rate-of-turn indicator that meets the requirements listed in this item.
 - Slip and skid indicator that meets the requirements listed in this item.
 - Engine instruments applicable to the aircraft being represented.
 - Suction gauge applicable to the aircraft being represented.
 - Flap setting indicator applicable to the aircraft being represented.
 - Pitch trim indicator that meets the requirements listed in this item.
 - Communication radio that meets the requirements listed in this item. (Redbird 530)
 - Navigation radio that meets the requirements listed in this item. (Redbird 530)



Approved Configuration: TD BASIC- Glass

This configuration represents a single engine land, fixed gear, fixed pitch propeller, high wing, airplane with a Glass Cockpit Redbird 1000 PFD & MFD and an Integrated Redbird 700 Autopilot.

Meets all requirements under “All Configurations”

AC 61-136, Appendix 2, Paragraph 8: BATD Design Criteria

b. Control Requirements:

(1)(e) This configuration has controls for:

- Wing Flaps.
- Pitch Trim.
- Communication and Navigation Radios (Redbird 1000).
- Clock and timer.
- Transponder.
- Altimeter.
- Microphone with push-to-talk switch.

This configuration has controls that function optionally depending on user preference:

- Gear Handle
- Propeller Control

This configuration does not have controls for:

- Carburetor Heat—N/A by type of aircraft represented.
- Cowl Flaps—N/A by type of aircraft represented.

See Figures— 2, 3, 4, 9

d. Display Requirements:

- (1) This configuration has instruments and indicators appropriate and applicable to the aircraft being represented:
- Glass Cockpit Redbird 1000 PFD & MFD with standby instruments. See Figure— 9
 - Sensitive altimeter that meets the requirements listed in this item.
 - Magnetic compass.
 - Heading indicator that meets the requirements listed in this item.
 - Airspeed indicator that meets the requirements listed in this item.
 - Vertical speed indicator that meets the requirements listed in this item.
 - Gyroscopic rate-of-turn indicator that meets the requirements listed in this item.
 - Slip and skid indicator that meets the requirements listed in this item.
 - Engine instruments applicable to the aircraft being represented.
 - Suction gauge is not applicable to the aircraft being represented.
 - Flap setting indicator applicable to the aircraft being represented.
 - Pitch trim indicator that meets the requirements listed in this item.
 - Communication radio that meets the requirements listed in this item. (Redbird 1000)
 - Navigation radio that meets the requirements listed in this item. (Redbird 1000)



Section 4: Figures and Photos

Figure 1: Yoke- Standard



Figure 2: Throttle Quadrant- Complex Single Engine Vernier



Figure 3: Switch Panel- Left Side



Figure 4: Switch Panel- Right Side



Figure 5: Keyboard and Trackpad



Figure 6: Instructor's Keys



Figure 7: Flight Simulation Session Start Screen

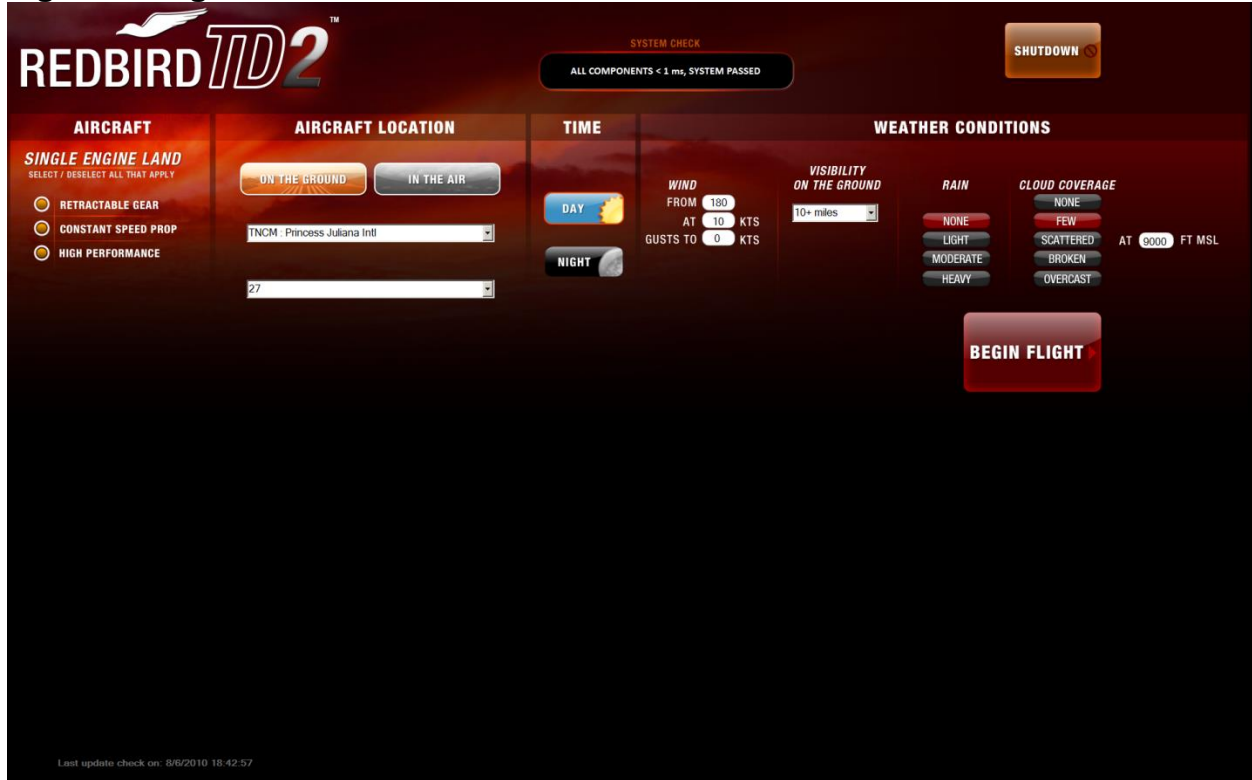


Figure 8: TD2 BASIC- Standard Instrument Panel



Figure 9: TD2 BASIC-Glass Instrument Panel



Figure 10: Assembled Unit



Figure 11: Redbird Horizon (Optional Expanded Visuals)

