CATII, CATIII and CATIII ProPanel

Basic Aviation Training Devices

Qualification and Approval Guide (QAG)

CATII

CATIII

CATIII ProPanel

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FAA APPROVED QAG
Signature and Date

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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 Precision Flight Controls **CATII, CATIII and CATIII ProPanel** aviation training devices. This includes any optional airplane configurations with quality color pictures and diagrams. This QAG is provided by Precision Flight Controls, 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 oversite.

Precision Flight Controls provides a detailed operations manual with each aviation training device model produced. This includes how to properly start, operate, and shut down each trainer. This also includes how to operate and maintain the trainer as originally designed and tested. Precision Flight Controls 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 these aviation training devices is expected to become proficient in it operation before using it to satisfy any pilot experience requirements specified in the code of federal regulations. This includes maintaining its condition and functionally. These ATDs must be maintained to its original performance and functionality, as demonstrated during the original FAA functional evaluation. These devices 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.

Aviation Training Device Description and Pictures

The **CATII, CATIII and CATIII ProPanel** basic aviation training devices are based on the dimensions and layout of a production general and corporate aircraft. These trainers closely represent the overall functionality, performance, and instrumentation. The systems consist of a flight console, instrument panel, avionics panel, and associated flight and instrument controls. A combination of hardware and software components are assembled and functionally checked by Precision Flight Controls. All hardware components are designed and installed so the devices have the appearance and feel of an actual airplane.

The **CATII, CATIII and CATIII ProPanel** models provide a realistic design, avionics interface, and reliable hardware/software performance. These platforms provide 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.

Aircraft include: SEL and MEL, Cessna, Piper, Beechcraft, Mooney, Diamond and other popular flight models listed in this QAG.

The **CAT II, CAT III and CATIII ProPanel** closely represent the overall functionality, performance and instrumentation of single engine, multi-engine aircraft. The systems consists of a flight console/enclosure, avionics panel, rudder pedals, computer, monitors and instructor's station, These systems incorporate a combination of interchangeable hardware and software components that is assembled and checked by Precision Flight Controls. All hardware elements are designed so they represent the appearance and feel of an actual aircraft.

The flight controls, switches, knobs and panels are located in the proper position and are representative of the class of aircraft;

Primary flight and navigation instruments are shared in the main monitor located above the flight console. There is no stepping or excessive transport delay, and arranged so as to observe trends and provide a realistic scan pattern. All instruments are displayed on high resolution monitors at 1024 X 768 or up to 4k resolution in millions of colors;

Aviation Training Device Description and Pictures

Integrated digital avionics complete with Autopilot, Nav/Com(s) ADF, DME, GPS(s), Marker Beacons, Transponder, Audio Panel and Altitude Pre-Selector;

The system(s) design provides an effective training environment for student and certificated pilots. This includes the capability of practicing scenario based flight training events, simulated equipment failures, normal and emergency procedures, pilot evaluations, instrument procedures/experience while facilitating increased pilot overall proficiency.

The Cirrus II Flight Console Is used In the CATII BATD

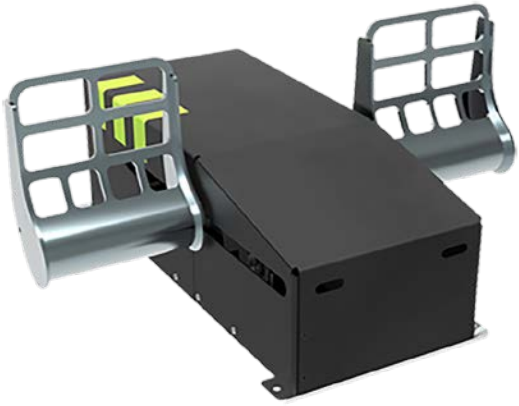
The C2 Professional Flight Console is used in the CATIII and CATIII ProPanel BATDs

CAT II: Instrument Screen, Avionics Stack and IOS Monitor

CAT III: C2 Professional Flight Console, Instrument Screen and Avionics Stack

CAT III ProPanel
C2 Flight Console, Avionics with Propanel Enclosure

Cirrus Rudder Pedals



Brunner Rudder Pedals

Typical Avionics Configuration

Enhanced Avionics (shown with PFC 530W).
A PFC 430W and 530W

Yoke Switches: PTT, Elevator Trim
and
Autopilot Disconnect

Clock/Timer (Yoke Mounted)

Standard Avionics (Avionics Panels are re-configurable to fit any slot)

Altitude-Preselect, Marker Beacon, Audio Panel and NAV/COMM

Garmin GNS430W and or GNS530W

PFC 430W and 530W Control Heads

A PFC 430W GPS Control Head (non display). Graphics are displayed on Instrument Screen

Remote Instrument Controls (RIC) for CATII, CATIII and ProPanel

The RIC (Remote Instrument Console) controls all instruments on the pilots display

CATII BATD (legacy) shown with Mooney Style Yoke

CATII BATD shown with legacy Avionics Panel and Beech Style Yoke

Engine Control Levers

SEL, MEL, and Vernier

Single Engine (Throttle Mixture)

Single Engine (Throttle Prop Mixture)

Mulit-Engine Engine (Throttle, Prop, Mixture)

Multi- Engine (Prop, Throttle, Mixture)

Multi-Engine

Throttle Prop Mixture

Carburetor, Throttle Mixture

Throttle Mixture

Hardware and Software Components List

Item	Component	Manufacturer	Model	Version	Details
1	Cirrus II or C2 Flight Console Choice of Beech, Mooney, Cessna or SAAB Yoke	PFC	Beech, Mooney, Cessna and Saab	Ver 1 or Higher	Cast aluminum control yokes, elevator, A/P disconnect, CWS, push to talk
2	Flight Instrument Display Monitor	PFC	PFCIP	N/A	LCD display for flight, navigation and engine instrumentation
3	Trim Control Indicators Aileron, Rudder and Elevator	PFC			Dial Controls for Rudder and Aileron Trim and Elevator Trim Switch and or Elevator Trim Wheel
4	Rudder Pedals with Proportional Toe Braking	PFC or Brunner	CRP BRP	Ver 1 or Higher	Aluminum/Steel construction Self-centering or dynamic control loading
5	Radio Stack	PFC	DAVI	Ver 1 or Higher	Avionics Suite: Alt Pre-Select, Audio Panel, Marker Beacon, Dual Com/Nav, DME, Transponder, ADF and Autopilot
6	GPSW Control Panel	PFC	PFC 430W/530W or Garmin's GNS 430/530	Ver 1 or Higher	Real or Simulated Garmin GNS 430/530 PFC 430W or PFC 530W
7	Engine Controls	PFC	SEL MEL		Lever or Vernier Style interchangeable Controls
8	TO/GA switches Horn silence switches	PFC	N/A	N/A	Panel or throttle quadrant mounted
9	Panels/Switches Master start panels, magneto switches, battery switches, alternator switches, parking brake. landing gear panel, flaps panel, pitot, heat, anti-Ice, nav light, strobe light, landing light, taxi light, aileron trim, elevator trim, rudder trim, cowl flaps levers, carb heat ,fuel boost pump(s), fuel tank selectors,	PFC	N/A	N/A	Ancillary panels provide fully functional system(s) interfacing

Hardware and Software Components List

Item	Component	Manufacturer	Model	Version	Details
10	Pilots Instrument Screen	PFC	PFCIP	N/A	Hi-Resolution instrument LED panels
11	Instrument Controls, RMI, OBS, HDG,CRS,ALT,BARO, A/S,DG and	PFC	RIC	N/A	8 Digital Encoders
12	Digital Clock/Stopwatch Panel or Yoke Mounted	Davtron	MA77 or MA800	PFC	Digital Clock/Timer
13	Circuit Breaker Panel (optional CB panel mounted in Avionics Panel0	PFC	PFC CB	N/A	Popable Circuit Breakers
14	Hobbs Meter	Hobbs			
15	2 or 4 way intercom	PFC	N/A	N/A	Pilot, Co-Pilot, instructor and observer inputs
16	Speaker system(s) internal sounds and external sounds	PFC	PFC	N/A	Cockpit sounds, ATC, ATIS, MKR beacon, Morse code external Sounds, engine, flaps, landing fear, runway, braking, skidding
17	Instructor's station	Laminar Research	X-Plane Professional	Version 8.0 or Higher	24"-30" LCD Mouse and Keyboard or Touchpad
18	Environment Simulation Control Software		X-Plane8 or Better		Visual and Navigational Database
19	Primary Flight Computer	PFC	PFC	Intel I7 Solid State	Custom High Performance
20	Instrument Procedures Data Base	DAFIF or Jeppesen	N/A	N/A	Provides for FAA published instrument navigation procedures, data base per 14 CFR 97 (en-route and approach)
21	Core Flight and Navigation Software	X-Plane	N/A	Version 8+	Core Software Visuals and Database
22	Reality XP GPS Software	Reality XP	430w/530w	N/A	430/530 Software
23	Windows O/S	Microsoft	N/A	Version 7-10	Computer O/S
24	Linux O/S	Linux	N/A	Ubuntu	Visual O/S

Design Criteria List

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 CATII CAT III and CATII Propanel airplane ATD.

Basic ATD Requirements

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

The **CATII , CAT III and CATII Propanel** models meet 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 **CATII, CAT III and CATII Propanel** model meet 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 **CATII CAT III and CATII Propanel** models meet 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. Precision Flight Controls, Inc. verifies that the CATII CAT III and CATII Propanel 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 **CATII, CAT III and CATII Propanel** models meet 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 indicato**r (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 ±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 **CATII, CAT III and CATII Propanel** models meet 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 **CATII, CAT III and CATII Propanel** models meet 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) These ATDs have 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 Jeppesen and DAFIF nav database to support the instrument approach and navigation capabilities.

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, turbulence, visibility, ceiling parameters

(3) The IOS is capable of recording both horizontal and vertical tracks of the aircraft movement. These recordings can be stored and then played back for review using a mouse, keyboard and IOS monitor.

(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) These ATDs have 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.** These devices use Navigraph NavData along with Jeppesen NavData to support the instrument approach and navigation capabilities.

The system provides worldwide navigational database. All navigational data is based on procedures as published per 14 CFR part 97.

The **Instructor's 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 by using either a keyboard or mouse.

Software Checks For Proper Hardware Configuration During System Startup

- ATC communications or a Line-Oriented Flight Training (LOFT) type training scenario in which the instructor can evaluate pilot performance without having to act as ATC.

- Live ATC communication can be provided via PilotEdge (third party service).

- The instructor's station can pause, freeze or reset the simulation anytime and then reposition the aircraft anywhere in flight or on the ground.

The instructor can manipulate the following simulation parameters independently of the simulation with the following methods or devices (using mouse, keyboard or touch tablet).

- Aircraft geographic location: Mouse, Keyboard or Notebook
- Aircraft heading: Mouse, Keyboard or Touch Tablet
- Aircraft airspeed: Mouse, Keyboard or Touch Tablet
- Aircraft altitude: mouse, Mouse, Keyboard or Touch Tablet
- Wind direction and speed: Mouse, Keyboard or Touch Tablet
- Turbulence: Mouse, Keyboard or Touch Tablet
- Visibility: Mouse, Keyboard or Touch Tablet
- Cloud cover: Mouse, Keyboard or Touch Tablet
- Dry, Wet, Icy Runway: Mouse, Keyboard or Touch Tablet
- Seasonal Changes: Mouse, Keyboard or Touch Tablet
- Wind/Rain/Snow: Mouse, Keyboard or Touch Tablet
-

FAILURES INCLUDED BUT NOT LIMITED TO:

Failures Include (Engine)

- Engine Fire
- Engine Failures
- Oil Pressure
- Oil Temperature
- Oil Quantity
- TIT Temperature
- Fuel Pump / Fuel pressure
- Fuel System failures
- Power Loss

Failures Include (Instruments)

- AI
- DG
- VSI
- ASI
- TC
- CD/LOC/GS
- PFD/MFD/Audio
- ECIAS
- STBY Instruments

Failures include (Systems)

- Vacuum system
- Pitot system
- Static
- Electrical system
- Generator / Alternator
- Landing Gear Failures
- Flaps
- Brakes

Failures Include (Avionics)

- NAV 1
- NAV 2
- COMM 1
- COMM 2
- GPS
- Autopilot
- Transponder
- DME
- ADF

X-Plane Professional software has navigational databases, obtained and compiled from the NIMA's DAFIF data and/or Jeppesen for the United States, ICAO region K. All navigational data is based on procedures as published in 14 CFR Part 97 and is updated and maintained by Precision Flight Controls. Jeppesen NavData is available via the Jeppesen website and updateable via subscription on a 28 day cycle or as needed.

- Aircraft geographic location: Mouse or Keyboard
- Aircraft heading: Mouse or Keyboard
- Aircraft airspeed: Mouse or Keyboard
- Aircraft altitude: Mouse or Keyboard

Weather:

- Wind direction and speed: Mouse/Keyboard
- Turbulence: Mouse/Keyboard
- Visibility: Mouse/Keyboard
- Cloud cover: Mouse/Keyboard

The instructor can manually preset or set failures prior to the beginning of a training session and can simulate failures without stopping or freezing the simulation. Each failure may be set by using the keyboard and mouse via the instructor's station.

The IOS is capable of recording both horizontal and vertical tracks of the aircraft movement. These recordings can be stored and then played back for review using a mouse, keyboard and IOS monitor.

Fuel management allows the user to easily manage the fuel weight and position.

The scenarios function allows the user to create save and recall a flight/training scenario for a later time. For example; the user may want to start the simulation with the aircraft located at Los Angeles International Airport with CAT III conditions on a specific runway or taxiway with improper fuel balance.

ADDITIONAL FEATURES:

Airport set page prepares the aircraft for flight, e.g., Fuel on Board, Weight and Balance, Fluids Quantities, Oxygen Levels, etc. Airport positioning allows the user to move/slew the aircraft to any location in the air or on the ground.

Approach page lets the user view the vertical and lateral flight path with the ability to pause or freeze the aircraft's position.

The environment section allows the user to easily change clouds and visibility, time of season and add rain, snow and winds.

The Map page is useful for tracking the aircraft in flight and verifying the aircrafts position along a route, also the instructor can use the map for issuing ATC commands.

The instructor has the ability to **Pause** and **Freeze** the simulation at any point using a keyboard and/or mouse.

Available A/C Configurations and Performance Table

Beechcraft Bonanza A36

Beechcraft Bonanza A36TC

Beechcraft B55 Baron

Beechcraft BE76

Beechcraft B58

Beechcraft B58TC

Beechcraft B95

Cessna 152

Cessna172N

Cessna 172P

Cessna 172S

Cessna 172R

Cessna 182T

Cessna T182

Cessna 182RG

Cessna 206

Cessna 210M

Cessna 310

Cessna 414A

Cessna 421C

Diamond DA20

Mooney M20J

Mooney M20K

Piper Warrior PA28

Piper PA28 Arrow III

Piper PA28 Arrow IV

Piper PA 28 Archer III

Piper Malibu PA46

Seneca I PA34

Piper Seneca III

Seneca V PA34

Piper Seminol PA44

Available A/C Configurations and Performance Table

#	Manufacturer	Model Number	Acft Type	Vso	Vs1	Vx Best Angle	Vy Best Rate	Vglide	Va	Vne Never Exceed	Vmca Minimum Control Speed	KTAS at Cruise @ 75% Power Setting	Rate of climb (fpm) at best rate (Vy), at full power or as recommended	Single Engine Climb Rate (at Vyse)
1	Beechcraft	A36	SEL	58	68	78	96	110	140	204	N/A	SL 160	1200	N/A
											6000 -----ft	168	650	N/A
2	Beechcraft	A36TC	SEL TC	59	68	80	110	110	139	203	N/A	SL 162	1100	N/A
											12000 -----ft	183	900	N/A
3	Beechcraft	B55	MEL	69	75	84	107	120	157	224	78	SL 176	1750	400
											6000 -----ft	188	1100	60
4	Beechcraft	BE76	MEL	60	70	71	85	95	157	194	65	SL 152	1300	220
											6000 -----ft	166	850	50
5	Beechcraft	B58	MEL	75	85	86	104	120	156	223	81	SL 188	1650	380
											6000 -----ft	200	1250	150
6	Beechcraft	B58TC	MEL TC	78	84	102	115	122	170	235	80	SL 184	1475	220
											12000 -----ft	216	1200	100
7	Beechcraft	B95	MEL	65	74	73	95	103	139	208	71	SL 154	1005	200
											6000 -----ft	163	705	-10
8	Cessna	152	SEL	31	36	55	67	60	104	149	N/A	SL 101	715	N/A
											6000 -----ft	105	465	N/A
9	Cessna	172N	SEL	44	50	59	61	65	99	158	N/A	SL 116	770	N/A
											6000 -----ft	120	760	N/A
10	Cessna	172P	SEL	46	51	60	76	65	99	158	N/A	SL 112	700	N/A
											6000 -----ft	118	388	N/A
11	Cessna	172S	SEL	48	51	62	74	68	105	163	N/A	SL 114	730	N/A
											6000 -----ft	121	550	N/A
12	Cessna	172R	SEL	47	51	60	75	68	99	163	N/A	SL 110	740	N/A
											6000 -----ft	119	465	N/A
13	Cessna	182T	SEL	45	50	58	80	75	110	170	N/A	SL 135	1040	N/A
											6000 -----ft	145	945	N/A
14	Cessna	T182T	SEL	45	50	58	80	75	110	175	N/A	SL 139	1040	N/A
											12000 -----ft	149	945	N/A
15	Cessna	182RG	SEL	37	42	65	81	70	101	182	N/A	SL 148	1150	N/A
											6000 -----ft	154	670	N/A
16	Cessna	T206	SEL TC	47	59	69	89	80	125	182	N/A	SL 135	1150	N/A
											12000 -----ft	145	955	N/A
17	Cessna	210M	SEL	50	64	79	96	85	119	199	N/A	SL 164	860	N/A
											6000 -----ft	170	615	N/A
18	Cessna	310M	MEL	75	84	86	107	96	147	223	75	182	1540	330
											6000 -----ft	187	1150	101
19	Cessna	414A	MEL	71	81	85	112	107	145	237	79	SL 175	1500	250
											6000 -----ft	180	980	150
20	Cessna	421C	MEL TC	77	86	88	111	109	151	238	80	SL 185	1210	270
											12000-----ft	195	1120	150
21	Diamond	DA20	SEL	36	44	60	75	73	106	164	N/A	SL 122	750	N/A
											6000 -----ft	126	560	N/A

Available A/C Configurations and Performance Table

#	Manufacturer	Model Number	Acft Type	Vso	Vs1	Vx Best Angle	Vy Best Rate	Vglide	Va	Vne Never Exceed	Vmca Minimum Control Speed	KTAS at Cruise @ 75% Power Setting	Rate of climb (fpm) at best rate (Vy), at full power or as recommended	Single Engine Climb Rate (at Vyse)
22	Mooney	M20J	SEL	55	62	77	88	91	120	198	N/A	SL 158	1000	N/A
											6000 -----ft	167	720	N/A
23	Mooney	M20K	SEL	56	63	71	96	87	118	196	N/A	SL 158	1030	N/A
											6000 -----ft	163	695	N/A
24	Piper Warrior	PA28	SEL	44	50	79	63	73	108	153	N/A	SL 112	700	N/A
											6000 -----ft	121	450	N/A
25	Piper Arrow III	PA28	SEL	45	50	76	90	79	118	183	N/A	SL 140	950	N/A
											6000 -----ft	145	500	N/A
28	Piper Arrow IV	PA28	SEL TC	60	65	79	97	79	124	186	N/A	SL 150	950	N/A
											6000 -----ft	160	550	N/A
27	Piper Archer III	PA28	SEL	45	50	76	64	76	113	154	N/A	SL 120	680	N/A
											6000 -----ft	125	400	N/A
28	Piper Malibu /Matrix	PA46	SEL TC	69	79	90	118	90	133	198	N/A	SL 165	1150	N/A
											12000 -----ft	178	1050	N/A
29	Piper Seneca I	PA34	MEL	60	67	78	91	105	127	189	70	SL 150	1360	180
											6000 -----ft	168	950	-40
30	Piper Seneca III	PA34	MEL	62	67	76	92	104	135	205	66	150	1400	250
											6000 -----ft	170	1275	160
31	Piper Seneca V	PA34	MEL TC	61	67	83	88	105	139	204	66	SL 180	1460	253
											12000 -----ft	195	750	172
32	Piper Seminole	PA44	MEL	58	62	82	88	104	135	202	63	SL 153	1350	220
											6000 -----ft	163	800	-50

Visual System Description and Pictures

As shown in the Available A/C Configuration Pictures all BATD screens utilize a portion of the instrument panel for external visual. The visual environment is controlled by the Instructor's Station. From the Instructor's station weather can be changed on the fly:

- Visibility
- Cloud Layers
- Rain, Fog
- Day-Night Time Changes
- Terrain Visibility
- Traffic

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	Yes
(3) **Approach**	
(i) Normal (with & without flaps) Check gear horn warning if applicable	Yes
(ii) Single engine approach and landing (multi-engine)	Yes
(iii) Best glide no power	Yes
(iv) Landings	Yes
d. Instrument Approaches	
(1) **Nonprecision**	
(i) GPS and LPV	Yes
(ii) GPS - WAAS (optional)	Yes
(iii) All engines operating	Yes
(iv) One engine inoperative (Multi-engine only)	Yes
(v) Approach procedures (VOR, VOR/DME, LOC procedures on an ILS, LDA, RNAV (RNP) or RNAV (GPS) to LNAV, LNAV/VNAV or LPV)	Yes

Functions and Maneuvers	Yes, No, or N/A
(2) **Precision**	
(i) ILS	Yes
(ii) GLS (optional)	No
(iii) Effects of Crosswind	Yes
(iv) One Engine Inoperative (Multi-engine only)	Yes
(v) Missed Approach	Yes
(A) Normal	Yes
(B) With One Engine inoperative (Multi-engine only)	Yes
e. Surface Operations (Post Landing)	
(1) Approach and landing roll	Yes
(2) Braking operation	Yes
(3) Reverse thrust operation, if applicable	Yes
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
(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)	Yes
(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
(5) **Parking and Engine Shutdown**	
(i) Systems operation	Yes
(ii) Parking brake operation (if installed)	Yes
g. Can simulate engine failure, including failures due to simulated loss of oil pressure or fuel starvation.	
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

Functions and Maneuvers	Yes, No, or N/A
(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 airplane position and track.	Yes
(3) Displays airplane altitude and speed.	Yes
(4) Displays NAVAIDs and airports.	Yes
(5) Can record and replay airplane ground track history for entire training session.	Yes
(6) Can invoke instrument or equipment failures.	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 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.

Instructor's Operating System (IOS)

(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, turbulence, visibility, ceiling parameters

(3) The IOS is capable of recording both horizontal and vertical tracks of the aircraft movement. These recordings can be stored and then played back for review using a mouse, keyboard and IOS monitor.

(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) These ATDs have 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.** These devices use Navigraph NavData along with Jeppesen NavData to support the instrument approach and navigation capabilities.

The system provides worldwide navigational database. All navigational data is based on procedures as published per 14 CFR part 97.

The **Instructor's Station** permits 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 by using either a keyboard or mouse.

(e) ATC communications or a Line-Oriented Flight Training (LOFT) type training scenario in which the instructor can evaluate pilot performance without having to act as ATC.

(f) Live ATC communication can be provided via PilotEdge (third party service).

(g)The instructor's station can pause, freeze or reset the simulation anytime and then reposition the aircraft anywhere in flight or on the ground.

The instructor can manipulate the following simulation parameters independently of the simulation with the following methods or devices (using mouse, keyboard or touch tablet).

- Aircraft geographic location: Mouse, Keyboard or Notebook
- Aircraft heading: Mouse, Keyboard or Touch Tablet
- Aircraft airspeed: Mouse, Keyboard or Touch Tablet
- Aircraft altitude: mouse, Mouse, Keyboard or Touch Tablet
- Wind direction and speed: Mouse, Keyboard or Touch Tablet
- Turbulence: Mouse, Keyboard or Touch Tablet
- Visibility: Mouse, Keyboard or Touch Tablet
- Cloud cover: Mouse, Keyboard or Touch Tablet
- Dry, Wet, Icy Runway: Mouse, Keyboard or Touch Tablet
- Seasonal Changes: Mouse, Keyboard or Touch Tablet
- Wind/Rain/Snow: Mouse, Keyboard or Touch Tablet

FAILURES INCLUDED BUT NOT LIMITED TO:

Failures Include (Engine)

- Engine Fire
- Engine Failures
- Oil Pressure
- Oil Temperature
- Oil Quantity
- TIT Temperature
- Fuel Pump / Fuel pressure
- Fuel System failures
- Power Loss

Failures Include (Instruments)

- AI
- DG
- VSI
- ASI
- TC
- CD/LOC/GS
- PFD/MFD/Audio
- ECIAS
- STBY Instruments

Failures include (Systems)

- Vacuum system
- Pitot system
- Static
- Electrical system
- Generator / Alternator
- Landing Gear Failures
- Flaps
- Brakes

Failures Include (Avionics)

- NAV 1
- NAV 2
- COMM 1
- COMM 2
- GPS
- Autopilot
- Transponder
- DME
- ADF

X-Plane Professional software has navigational databases, obtained and compiled from the NIMA's DAFIF data and/or Jeppesen for the United States, ICAO region K. All navigational data is based on procedures as published in 14 CFR Part 97 and is updated and maintained by Precision Flight Controls. Jeppesen NavData is available via the Jeppesen website and updateable via subscription on a 28 day cycle or as needed.

- Aircraft geographic location: Mouse or Keyboard
- Aircraft heading: Mouse or Keyboard
- Aircraft airspeed: Mouse or Keyboard
- Aircraft altitude: Mouse or Keyboard

Weather:

- Wind direction and speed: Mouse/Keyboard
- Turbulence: Mouse/Keyboard
- Visibility: Mouse/Keyboard
- Cloud cover: Mouse/Keyboard

The instructor can manually preset or set failures prior to the beginning of a training session and can simulate failures without stopping or freezing the simulation. Each failure may be set by using the keyboard and mouse via the instructor's station.

The IOS is capable of recording both horizontal and vertical tracks of the aircraft movement. These recordings can be stored and then played back for review using a mouse, keyboard and IOS monitor.

Fuel management allows the user to easily manage the fuel weight and position.

A scenarios function allows the user to create save and recall a flight/training scenario for a later time.

ADDITIONAL FEATURES:

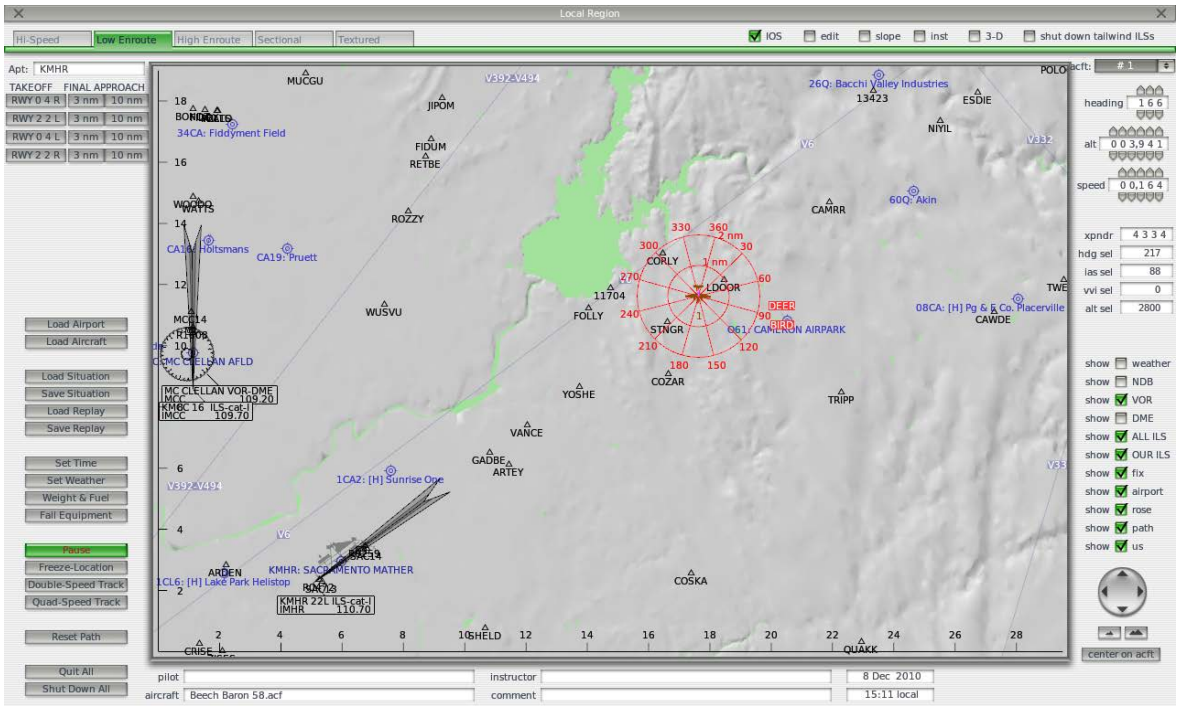
Airport set page prepares the aircraft for flight, e.g., Fuel on Board, Weight and Balance, Fluids Quantities, Oxygen Levels, etc. Airport positioning allows the user to move/slew the aircraft to any location in the air or on the ground.

Approach page lets the user view the vertical and lateral flight path with the ability to pause or freeze the aircraft's position.

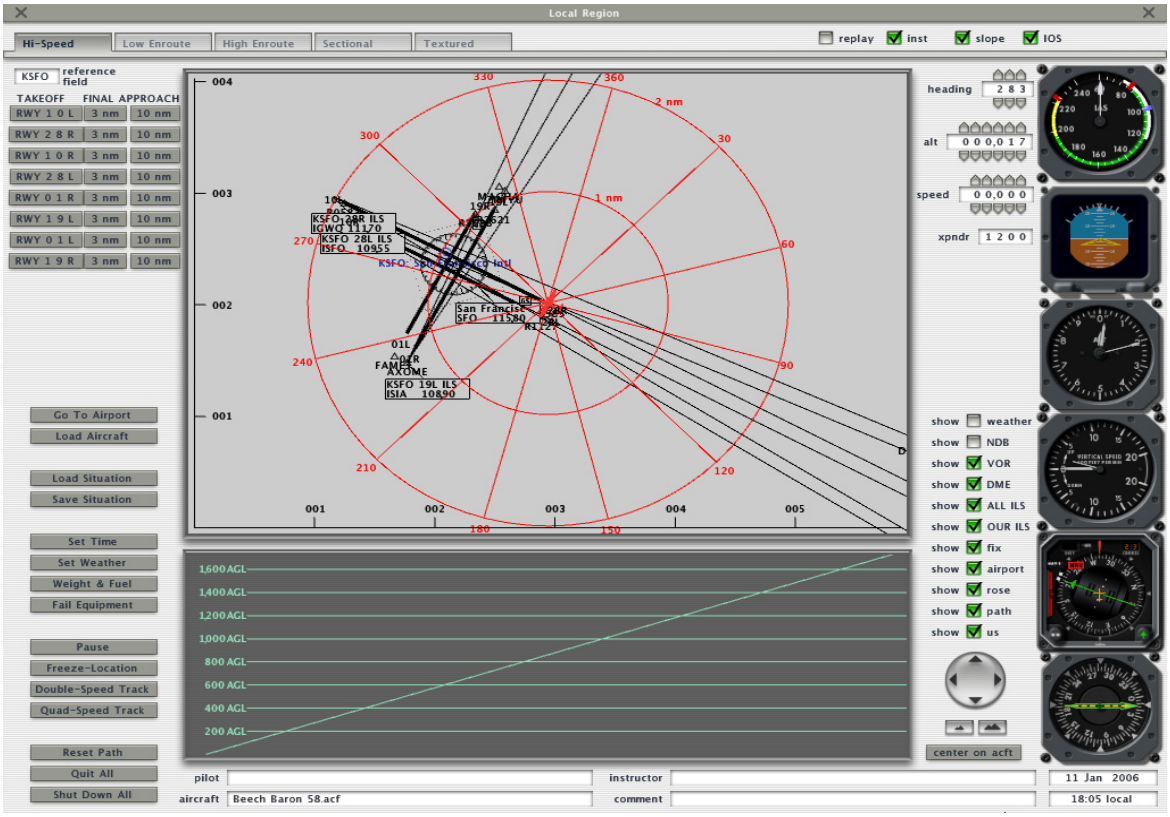
The environment section allows the user to easily change clouds and visibility, time of season and add rain, snow and winds.

The Map page is useful for tracking the aircraft in flight and verifying the aircrafts position along a route, also the instructor can use the map for issuing ATC commands.

The instructor has the ability to **Pause** and **Freeze** the simulation at any point using a keyboard and/or mouse.



The Weather Page allows the user to quickly set up weather condition, e.g. cloud types, wind speed and direction, turbulence, runway conditions and altimeter settings.

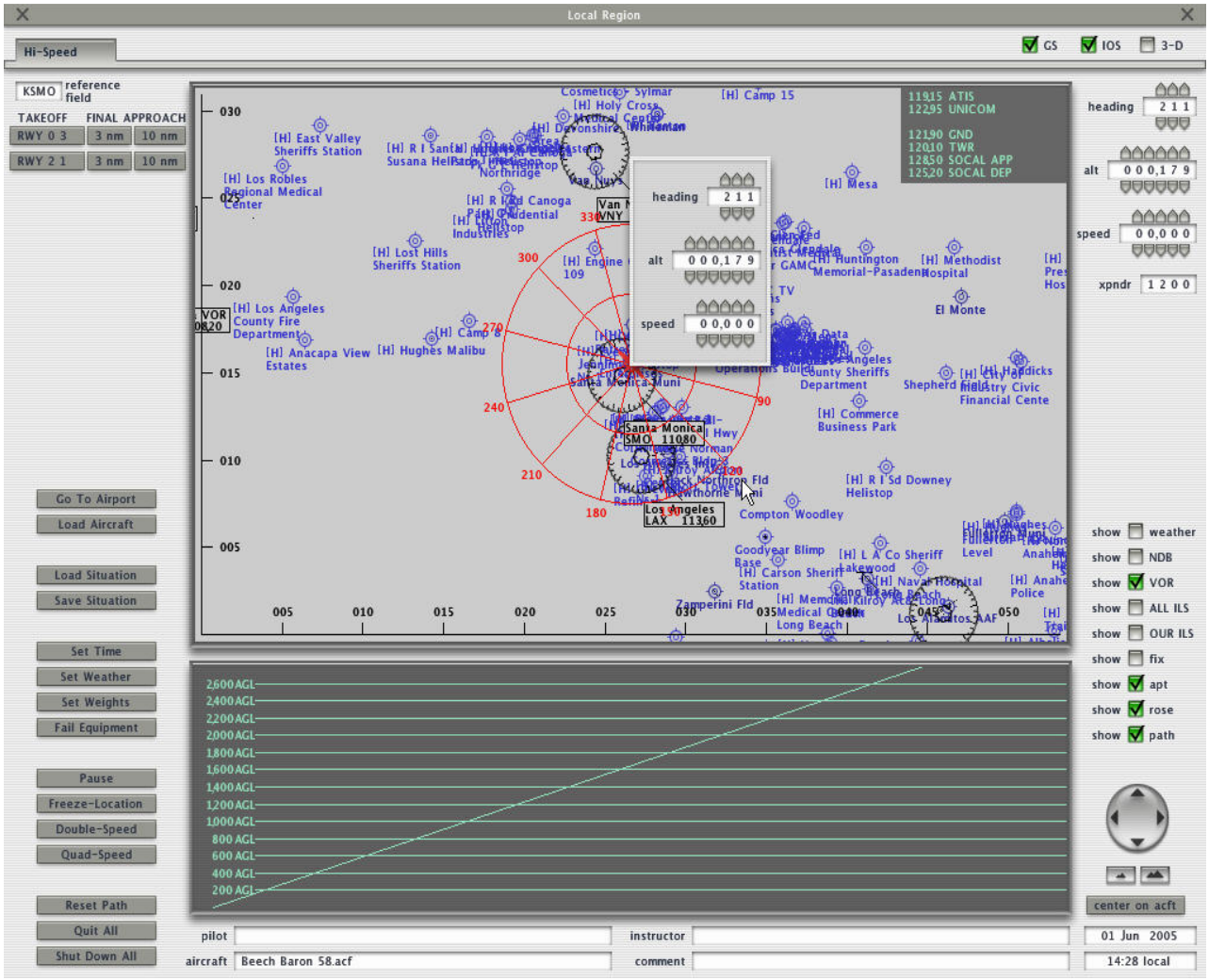


The moving map page is useful for tracking the aircraft in flight and verifying the aircrafts position along a route, also the instructor can use the map for issuing ATC commands.

Failures Screen (2 of 9 shown above)

Access to all type of failures such as, landing gear, flaps, icing, alt air, flight controls, engine, navaids, avionics are almost limitless. Multiple failures can be achieved simultaneously as well.

The Systems Failures Page allows the user to set up system failures on the fly (immediate) or on an event.



The IOS screen shown above in map mode displaying Glide Path, Airports, Fixes, VORs, NDBs, Aircraft Track, Compass Rose, Weather and Frequencies

System Descriptions

The CAT II and CAT III systems have modular components while the CATIII ProPanel incorporates all of the components of the CATIII into an enclosure.

CAT II Includes:

1. Cirrus II Flight Console
2. Cirrus Rudder Pedals
3. Avionics Stack
4. Software
5. Computer(s)
6. Instructor's Station
7. Interchangeable Throttle Quadrants

CAT III Includes:

1. C2 Flight Console
2. Cirrus Rudder Pedals
3. Avionics Stack
4. Software
5. Computer(s)
6. Instructor's Station
7. Interchangeable Throttle Quadrants

CATIII Propanel Includes:

1. C2 Flight Console
2. ProPanel Enclosure
3. Cirrus Rudder Pedals
4. Integrated Avionics Stack
5. Software
6. Computer(s)
7. Instructor's Station
8. Interchangeable Throttle Quadrants