



Flight Simulation Manual

Boeing Stearman

Version 2.0

Models PT-17/13 N2S-3/5

A75L300/A75N1

for

Microsoft Flight Simulator

2020

40th Anniversary Edition

For Use With Flight Simulator Only

For Use With Flight Simulator Only

TABLE OF CONTENTS

Cover Page	1
Table of contents	3
General Information	6
Controls and Operational Equipment	5
Special Keys & Assignments	9
Pilot operating instructions	10
Cockpit Layouts	15
Acrobatics	18
Custom Avatars	18
Customer Support	19
Acknowledgements	20

General Information

The Stearman (Boeing) Model 75 is a biplane used as a military trainer aircraft, of which at least 10,626 were built in the United States during the 1930s and 1940s. Stearman Aircraft became a subsidiary of Boeing in 1934. Widely known as the Stearman, Boeing Stearman or Kaydet, it served as a primary trainer for the United States Army Air Forces, the United States Navy (as the NS & N2S), and with the Royal Canadian Air Force as the Kaydet throughout World War II. After the conflict was over, thousands of surplus aircraft were sold on the civilian market. In the immediate postwar years, they became popular as crop dusters, sports planes, and for aerobatic and wing walking use in air shows.

Design and development

The Stearman was a conventional biplane of rugged construction with large, fixed tailwheel undercarriage, and accommodation for the student and instructor in open cockpits in tandem. The radial engine was usually uncowled, although some Stearman operators choose to cowl the engine, most notably the Red Baron Stearman Squadron.

Operational history

Post-war usage

After World War II, the thousands of primary trainer PT-17 Stearman planes were auctioned off to civilians and former pilots. Many were modified for crop-dusting use, with a hopper for pesticide or fertilizer fitted in place of the front cockpit. Additional equipment included pumps, spray bars, and nozzles mounted below the lower wings. A popular approved modification to increase the maximum takeoff weight and climb performance involved fitting a larger Pratt & Whitney R-985 Wasp Junior engine and a constant-speed propeller. An iconic movie image is a Stearman crop-duster chasing Cary Grant across a field in North by Northwest (the airplane that chased Grant was actually a Naval Aircraft Factory N3N Canary; the plane that hits the truck is a Stearman). Christopher Reeve and Scott Wilson are shown flying 1936 variants in the 1985 movie The Aviator.

Variants

The U.S. Army Air Forces Kaydet had three different designations based on its power plant:

PT-13

with a Lycoming R-680 engine. 2,141 total all models.[2]

PT-13 Initial production. R-680-B4B engine. 26 built.

PT-13A R-680-7 engine. 92 delivered 1937-38. Model A-75.

PT-13B R-680-11 engine. 255 delivered 1939-40.

PT-13C Six PT-13Bs modified for instrument flying.

PT-13D PT-13As equipped with the R-680-17 engine. 353 delivered. Model E-75.

PT-17

With a Continental R-670-5 engine. 3,519 delivered

PT-17A 18 PT-17s were equipped with blind-flying instrumentation.

PT-17B Three PT-17s were equipped with agricultural spraying equipment for pest-control.

PT-18PT-13 with a Jacobs R-755 engine, 150 built.

PT-18A Six PT-18s fitted with blind-flying instrumentation.

PT-27

Canadian PT-17. This designation was given to 300 aircraft supplied under Lend-Lease to the RCAF. The U.S. Navy had several versions including:

NS

Up to 61 delivered. powered by surplus 220 hp (164 kW) Wright J-5 Whirlwind.

N2S

Known colloquially as the "Yellow Peril" from its overall-yellow paint scheme.

N2S-1 R-670-14 engine. 250 delivered to the U.S. Navy.

N2S-2 R-680-8 engine. 125 delivered to the U.S. Navy.

N2S-3 R-670-4 engine. 1,875 delivered to the U.S. Navy.

N2S-4 99 US Army aircraft diverted to the U.S. Navy, plus 577 new-build aircraft.

N2S-5 R-680-17 engine. 1,450 delivered to the U.S. Navy.

Stearman 70

Original prototype, powered by 215 hp (160 kW) Lycoming radial engine. Temporary designation XPT-943 for evaluation.

Model 73

Initial production version. 61 built for U.S. Navy as NS plus export variants.

Model 73L3

Version for Philippines, powered by 200 hp (150 kW) R-680-4 or R-680C1 engines. Seven built.

Model A73B1

Seven aircraft for Cuban Air Force powered by 235 hp (175 kW) Wright R-790 Whirlwind. Delivered 1939–1940.

Model A73L3

Improved version for Philippines. Three built.[6]

Stearman 75

(a.k.a. X75) Evaluated by the U.S. Army as a primary trainer. The X75L3 became the PT-13 prototype. Variants of the 75 formed the PT-17 family.

Stearman 76

Export trainer and armed versions of the 75.

Stearman 90 and 91

(a.k.a. X90 & X91) Productionized metal frame version, becoming the XBT-17.

Stearman XPT-943

The X70 evaluated at Wright Field.

Airplane

The wings are of internally braced wood construction with aluminum alloy leading and trailing edges. Both the empennage and fuselage are welded tubular steel structures, provided the aluminum alloy fairing. The ailerons are a riveted structure of formed aluminum alloy. With the exception of the engine and fuselage cowling, the wings, fuselage, empennage and ailerons are fabric covered. The landing gear is of the fixed cantilever type with hydraulic brakes. Overall dimensions of the airplane are as follows :

Length	24' – 9"
Span	32' – 2"
Height	9' – 8.5"

Power Plant

The PT-17/N2S-3 Airplane is powered by a Continental R-670-4 air-cooled engine, rated at 220 hp, at 2075 rpm at sea level. Maximum allowable flight rpm is 2075. Compression ratio 5.4:1, direct drive. The PT-13/N2S-5 is powered by the Lycoming R-680-B4E rated at 225 hp. The A75L300/A75N1 are equipped with the Lycoming R-680-13 rated at 300 hp.

Fuel – Oil

The fuel tank is located in the center section of the upper wing and has a capacity of 46 U.S. Gallons (38.23 Imp. gallons) with an expansion space of 1.4 U.S. Gallons (1-1/4 Imp. Gallons). The fuel system is of the gravity feed type.

Service this airplane with 73 octane gasoline – Spec. AN-VV-F-761 only. If not available, the next higher grade will be used in an emergency.

The oil tank is mounted on the forward side of the firewall in the engine compartment and has a capacity of

4.4 U.S. Gallons (3.67 Imp. Gallons) with an expansion space of 1.4 gallons (1.17 Imp. Gallons)

Replenish oil supply with aircraft engine oil, Spec. AN-VV-446. For temperatures above 4 deg C (39 deg F.) use Grade 1120. Operating under extreme cold conditions, use Grade 1080.

Controls and Operational Equipment

Pilot seats are of Standard Air Corps Types, in both front and rear cockpits. The seats may be adjusted through five inches, in increments of one-half inch. To raise or lower the seat, pull the release lever on the right-hand side of the seat upward and move the seat up or down to the desired height. When released, the handle is returned to the locked position by a spring. If the locking pin attached to the release lever will not engage, move the seat slightly forward or downward until the pin slides in place. **(Not Simulated - views can be adjusted on the simulator options menu)**

For Use With Flight Simulator Only

Ailerons and Elevator Control

The ailerons and elevators are controlled by inter-connected control sticks in each cockpit, through a series of push-pull tubes and bell cranks. Pushing the stick forward, deflects the elevator down against the airstream, causing the nose of the airplane to drop. Pulling the stick back deflects the elevator upward and causes the nose of the airplane to raise. If the stick is pushed to right or left, the ailerons are deflected in the opposite directions, causing the airplane to roll about the longitude axis in the direction the stick is moved.

Elevator Trim Tab Control

Elevator trim tab controls are mounted on the left-hand side of each cockpit and control the trim tabs through a system of cables and pulleys. The tab control is fitted with a dial that indicates in degrees the displacement of the tab with respect to the elevator. The control is moved aft to correct for a nose heavy condition and pushed forward to correct for tail heavy condition.

Rudder Controls

The rudder is controlled through a system of cables and pulleys, by two pedals in each cockpit. Pushing the right pedal forward, turns the rudder to the right, into the airstream, causing the airplane to turn to the right. Pushing the left pedal forward, turns the rudder to the left, causing the airplane to turn to the left. Toe type brake controls are incorporated with the rudder pedals. Toe pressure when applied to the top of the pedals, serves to actuate the braking system. Independent brake control is obtained on each wheel.

Tail Wheel

The tail wheel is the steerable, free-swiveling type, mounting a 10" smooth contour tire. A shock absorber of the air-oil type is provided. The GAS Stearman is equipped with a tail wheel lock located on the right side of the cockpit. The tail wheel should be locked before takeoff and landings and unlocked during taxiing and ground handling. The tail wheel lock is located on the right side of the cockpits just aft of the control panel support.

Fuel Tank Gauge

A sight type fuel gauge extends from the bottom of the tank and is visible to both members of the crew. It is calibrated in fourths of capacity and must be read with the airplane in level flight. **The aircraft loads with a 50% fuel load.** Refueling may be accomplished using the Weight and Balance option or “in game” by following this sequence.

1. Selecting the Refueling option on the EFB,
2. Select “Refueling Step” camera view.
3. Activate the barrel pump crank
4. Disconnect hose by left mouse clicking the base of the fuel gauge under the wing **OR**
5. Reset position back to cockpit and close refuel option on the EFB.



Fuel Valve

A fuel shut off valve, remotely operated by control handles mounted on the left side, below the instrument panel in both cockpits, controls the flow of fuel to the engine.

Parking Brake

A pull handle is located on the right side of each cockpit, below the instrument panel for the control parking brake. **The Parking Brake must be engaged before activating security features with the exception of the Pitot Tube Cover. Releasing the Parking brake will remove all security features except the Pitot Tube Cover**

For Use With Flight Simulator Only

Control Surface Lock

There's a red handle for the operation of the control surface lock, which secures the rudder, ailerons and elevator installed in each cockpit. The lever is located on the left-hand side of each cockpit, near to the engine controls. **The Parking brake must be engaged before setting the lock which will freeze the control surfaces and failure to deactivate the will prevent releasing the parking brake, thus preventing flight.**

Engine Controls

The throttle control lever is mounted on the left side of each cockpit which controls the throttle valve through a system of rods and bell cranks. Pushing the throttle lever forward increases the rpm of the engine, pulling the lever aft decreases the rpm.

Mixture Lever

A mixture control lever is mounted adjacent to the throttle lever in each cockpit which controls the carburetor mixture valve through a system of rods and bell cranks. Forward movement of the control lever enriches the carburetor mixture, aft movement leans the mixture.

Carburetor Air Control

The control for admitting heated air into the carburetor is located on the right side of the airplane between the front and rear cockpits and is accessible to both pilots. A spring latch on the control lever keeps it locked in the desired position and only cold air goes into the carburetor. Moving the control aft increases the proportion of heated air and only hot air goes into the carburetor.

Propellor Pitch Control (A75L300 Only)

Located on the throttle quadrants of the A75L300 in both cockpits; the propellor pitch control is connected to a cable that runs to a controller, mounted on the engine, block that manages the hydraulic pressure acting on a piston to move the blades to low pitch, counterweights attached to the root of the blades provide a force to move the blades to high pitch.

Fire Extinguishers

The PT-17 fire extinguisher is located in a holder on the left side of the cockpit and can be accessed from within or out of the cockpit. If outside the airplane, pull down extinguisher door located on the left side of the fuselage. PT-13 has the fire extinguisher located in the rear cockpit on the right.

For Use With Flight Simulator Only

Aircraft:

The Golden Age Simulations Models presented are PT-17 N2S-3, the PT-13 N2S-5, and the post-war modification A75L300/A75N1 fitted with the Lycoming R-680-13 and a Hamilton Standard 2B20 constant speed prop. **All models are native MSFS aircraft. The Default flying model is MODERN. The User Interface Option Cockpit Interaction System Default is "Locked". Failure to properly set these options will result in a negative user experience.** The engine sound files: Wwise PT17 Stearman sound environment Continental W670 and the Lycoming R-680 engine variant with cockpit sound effects. Our flight model was developed by an experienced flight modeler, in collaboration with two pilots with experience in this type. A paint kit is provided and located in the Golden Age Simulations folder found in your Community Folder. In the case of Flight Model customization or Liveries we ask that GAS be credited with the model in the release notes, and they be offered to the Community as freeware.

PILOT OPERATING INSTRUCTIONS

Pre-Flight Inspection

A selection of Camera views available via Camera Menu\Instruments\Preflight 1-7 which will position the user around the aircraft allowing for interaction with prop, chocks, tied downs, pitot tube cover, oil fill and fuel filling operations.

Engine Start Options

The following applies to all three aircraft models:

The state of the engine and ambient temperature should be considered in selecting correct sequences and steps.

- Fuel Valve set to off
- Magnetos set to off
- Battery set to off
- Alternator set to off
- Mixture – 0%
- Throttle – Cut Off
- Primer locked

Note the outside ambient temperature via a mouse click on the thermometer below the fuel valve switch.

Select Cockpit Camera View "Hand Prop Start" Click on the propeller to pull blades through simulating removing the oil that has settled in combustion chamber of the lower cylinders. Note: TOOLTIP

< 5°C = 5 prop rotations
 20°C = 2 prop rotations
 >20°C = 1 prop rotation

Return to Cockpit "Pilot" View

- Fuel Valve – Set to On
- Battery – Set to On

For Use With Flight Simulator Only

- Alternator – Set to On
- Magnetos – Set to Both
- Mixture – Set to 100%
- Throttle – Set to 10 – 20%
- Prop Pitch set to Minimum (A75L300)
- Prime Engine

Primer Operation all models

Operation: Unlock the primer lever via the WheelUp/WheelDown then with a LeftSingle we click on the lever twice, finally we lock with WheelUp/WheelDown. The TOOLTIP indicates the operations (unlocking/priming/locking).

PT-17 and PT-13

Primer is located on the Crew Start Panel (select Instrument Camera View –Oil Fill - Inertial Starter Panel)

Reveal Crank (LeftSingle crank socket) LeftSingle crank to Wind Intertia Starter (Simulated)

Stow Crank (LeftSingle crank socket)

Prime Engine

When starting for a first flight, the engine is considered cold, 3 strokes of engine primer. Note CHT

0 primer stroke for a hot engine

3 primer stroke for a cold engine

NOTAM – over or under priming based of engine state hot/cold will cause engine start failure

Start Engine by (a) LeftSingle Red Intertia Starter Release or (b) LeftSingle Prop

A75L300/A75N1

Engine Start sequence operation performed in Cockpit.

Prime Engine

When starting for a first flight, the engine is considered cold, 3 strokes of engine primer. Note CHT

0 primer stroke for a hot engine

3 primer stroke for a cold engine

NOTAM – over or under priming based of engine state hot/cold will cause engine start failure

LeftSingle Lift Starter Cover

LeftSingle Starter Button 2-3 seconds to engage starter

Engine Start Failure Checklist

Over/Under Prime

Inadequate Prop Pull Through

Failure to hold starter button 2-3 seconds

Low Fuel State

Electronic Flight Bag “EFB”

This model is equipped with a user interface tablet “EFB” which allows the user to select crew configuration, manage security features tie downs, wheel chocks, flight control lock, pitot tube cover and pilot figures as well as a “Quick Start” page to configure the aircraft and start engine.

The security features are active in this model. Failure to manage these features will prevent flight and in the case of the pitot tube cover, air speed readings.

NOTAM! The Default presentation of the aircraft on the ground/apron/hangar is with Tie Downs, Wheel Chocks and Pitot Tube Cover in place. Crew not loaded. This is how you would normally approach an aircraft prior to inspection and walk-around. If the user wishes to view the selected aircraft in the Hangar, return to the Hangar after loading the aircraft and managing the security

For Use With Flight Simulator Only

devices.

The EFB is activated by using the left mouse button with cursor placed over the compass correction card. Alternatively, the security features can be selected from the cockpit camera menu category “Instruments”. Page 2 of the EFB contains short cuts for setting aircraft status, Cold and Dark, Ready to Taxi, and Ready for Take Off



For Use With Flight Simulator Only

Checklist

A simple interactive checklist is available in the Tool Bar menu. A cockpit orientation will follow below.

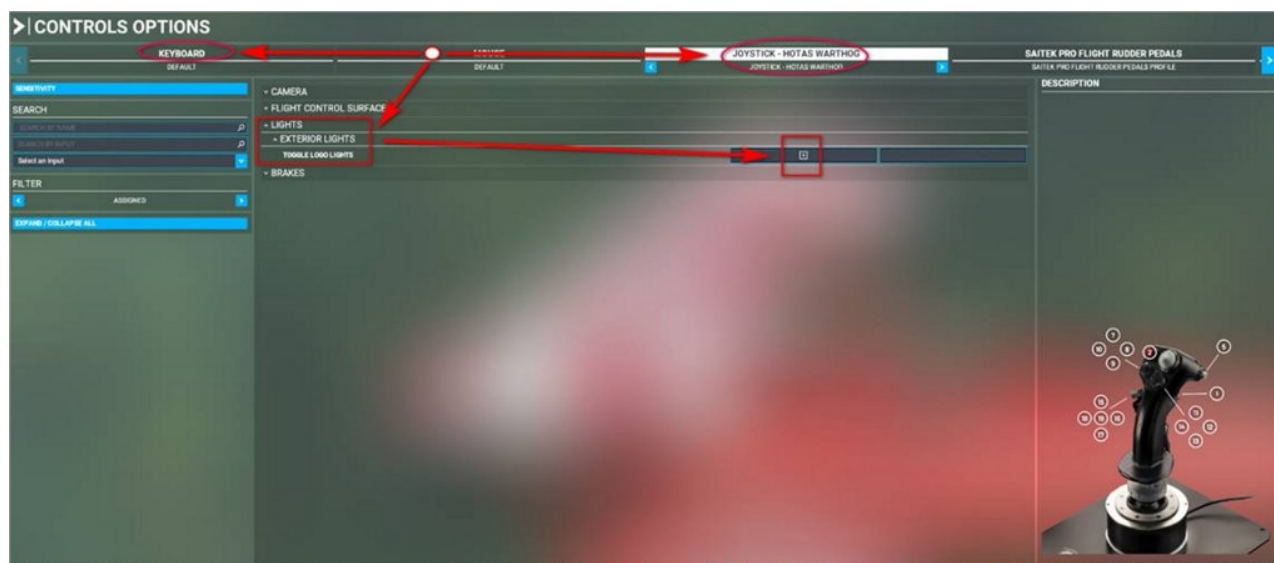


The PT-17 and PT-13 models have two cockpit configurations, Military and Civilian. The difference between the two is the option to display smoke during acrobatic maneuvers. Both are fitted with a radio and transponder in the "Data Case" The A75L300/A75N1 are configured as Civilian.

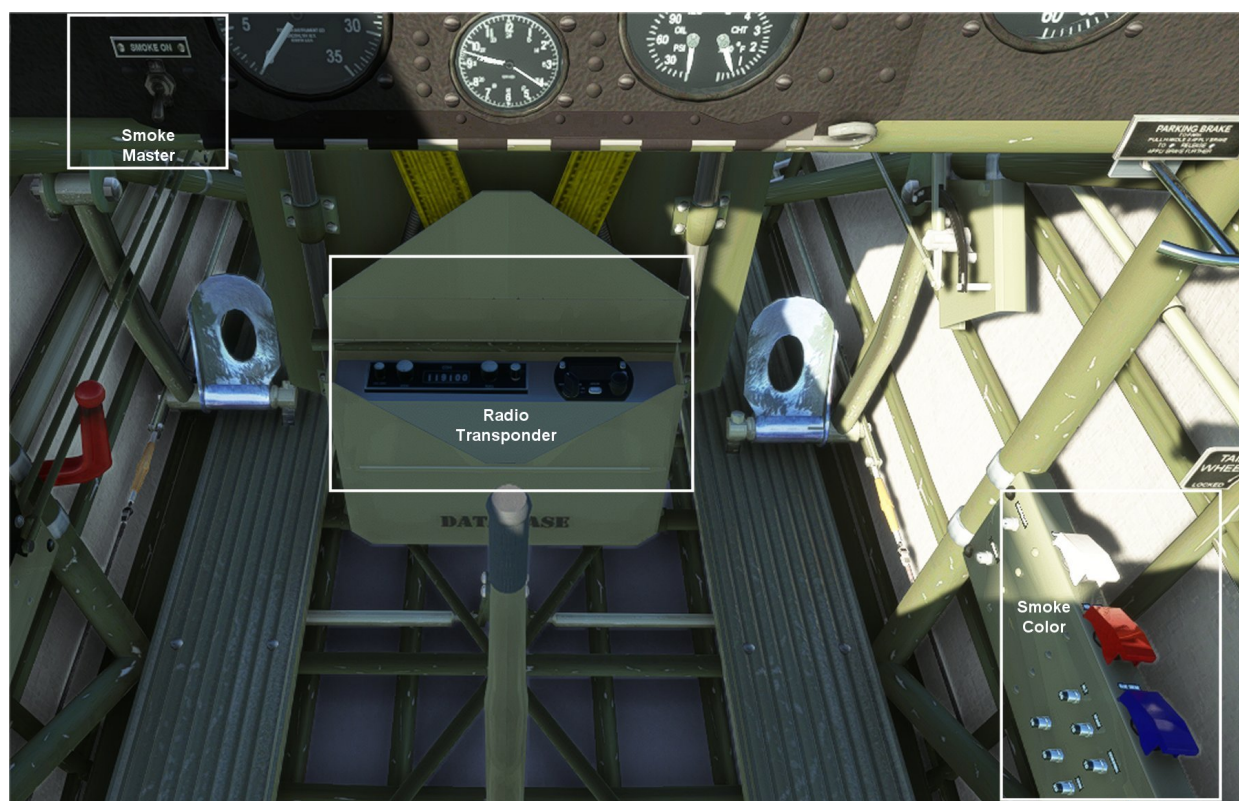
The Smoke function is activated by the switch located to the right of the tachometer and with the smoke color selectors mounted on the top of the fuse panel.

The function can also be assigned a shortcut on the keyboard or a joystick for "Toggle Logo Lights" action (located in LIGHTS section in Control Options menu). See example:

For Use With Flight Simulator Only



The Civilian model is illustrated below



For Use With Flight Simulator Only

Cockpit Configurations

The Front and Rear Cockpits vary slightly in features and will be described in detail. The model can be flown from either cockpit.

PT-17/PT-13 Cockpit

These models share the same cockpit configuration and layout of instruments. In this example the "Civilian" version is used for orientation purposes.



- | | |
|------------------------|---|
| 1. Elevator Trim | 9. Parking Brake |
| 2. Throttle Quad | 10. Carb Heat Switch |
| 3. Outside Air Temp | 11. Tail Wheel Lock |
| 4. Fuel Cut Off Valve | 12. Electrical Panel |
| 5. Magneto Switch | 13. Adjustable Panel Spot Light - Rear Cockpit Only |
| 6. Master Smoke On Off | 14. Smoke Color Selectors |
| 7. Instrument Cluster | 15. Data Case – Radio and Transponder |
| 8. EFB Toggle | 16. Control Lock |

For Use With Flight Simulator Only

PT-17/13 Crew Start Panel

1. Intertia Starter Crank
2. Engine Primer
3. Intertia Starter Release (Engine Start)

For Use With Flight Simulator Only

A75L300 Cockpit



- | | |
|------------------------|---|
| 1. Carburetor Heat | 10. Instrument Cluster |
| 2. Elevator Trim | 11. EFB Toggle |
| 3. Throttle Quad | 12. Parking Brake |
| 4. Outside Air Temp | 13. Tail Wheel Lock |
| 5. Fuel Cut Off Valve | 14. Electrical Panel |
| 6. Magneto Switch | 15. Adjustable Panel Spot Light - Rear Cockpit Only |
| 7. Engine Start Switch | 16. Smoke Color Selectors |
| 8. Engine Primer | 17. Data Case – Radio and Transponder |
| 9. Smoke Master Switch | 18. Control Lock |

Acrobatics

For Use With Flight Simulator Only

The following maneuvers are permitted:

Loop, Snap Roll, Chandelle, Immelmann Turn, Wing Over, Vertical Turn (Hammerhead), Wing Over, Prolonged Spin, Aileron Roll at speed less than 125 knots (144 mph) Do not exceed an indicated airspeed of 180 knots or engine speed of 2280 RPM

Prohibited Maneuvers:

Prolonged inverted flight, Inverted Spins, Outside loops

AI Sounds

For those who wish to use these aircrafts for AI flights: sounds in Wwise format are provided and installed for each aircraft/engine pair.

Custom Avatars

The model has been developed to use custom "vintage" animated avatars, GAS Caroline and GAS Bernard. They are specifically developed for this model and may not be compatible with other models not developed by Golden Age Simulations. They may be activated through the "General Options" menu, selecting Misc allows the use to place the avatars in the both front and rear cockpit positions.



COPYRIGHT

This software is offered as payware and remains the property of Golden Age Simulations. By agreeing to the terms and conditions you confirm that its use will be limited to the system(s) upon which it is installed. It may not be copied, converted, distributed, repackaged, or resold without expressed written permission from Golden Age Simulations.

For Use With Flight Simulator Only

Golden Age Simulations will not be held responsible for any damages or loss caused by using this software.

Custom liveries and flight modeling modifications are allowed with the understanding that they may only be distributed as freeware and that Golden Age Simulations be credited with the model development.

This software is designed for entertainment purposes and should not be used for aviation training.

All rights reserved. Copyright 2024 Golden Age Simulations

Technical Support
Goldenagesimulationstech@gmail.com

Golden Age Simulations
Paul Corish – Project Lead
Didier “LaGaffe” Lead Developer
Gil Halpin – Modeling/Research

Beta Testers
Kevin “Heywood”
Thomas “FyingisCool”
Jan “Priller”

Flight Model Consultants
Alain “Barnstormer”
AJ “Stearmandriver2”