
GETTING TO KNOW YOUR
Stratoliner
A COCKPIT GUIDE AND FLYING NOTES FOR THE BOEING B307 STRATOLINER
Transcontinental Stratoliner
46A
Microsoft Flight Simulator

This guide has been produced to make getting acquainted with your new Stratoliner simpler and more fun. To this end, this is not an "official" pilot's manual and should not be considered such.

The Boeing B307 Stratoliner is a tail-dragger. That is to say, it has a three-point landing gear with a castoring, lockable tail wheel at the back. Mastering a tail-dragger on the ground takes skill and practice. So, be patient at first and practice your ground-handling!

Boeing's Stratoliner was the world's first commercially-licensed, fully pressurized airliner. Designed to cruise at 20,000 feet at 220 m.p.h., it had a major competitive advantage over other designs of the day like the DC-3 as it could fly well above any adverse weather for the comfort of passengers and faster routes.

The all-metal design was based on Boeing's highly successful B-17 bomber. Taking the wings, undercarriage and tail of the B-17, Boeing added a fully-pressurized wide-body fuselage that could accommodate 33 passengers and 5 crew. Powered by either Wright or Pratt&Whitney radial engines, the new Stratoliner had a top speed of around 250 m.p.h. and a service ceiling of 23,000 feet.

A total of 10 Stratoliners were built. 3 went to Pan-American Airlines and 5 to TWA. The famous and wealthy aviator Howard Hughes ordered one for his personal use for a record attempt. World War 2 interfered with his plans so the airframe was converted into a sumptuous "flying penthouse".

The TWA examples were pressed into military service for WW2 and designated C-75. Not so the three Wright-powered examples. Instead these three were used in South America under the control of the US Army Air Force but flown by regular airline crews.

Boeing B307 Stratoliner

LEADING PARTICULARS

Principal dimensions

Length, overall	74ft.4in.
Width	11 ft.6 in.
Height (to top of fin)	20ft. 9 in.
Wing Span	107ft.3 in.
Gross wing area	1485 Sq. ft.
Tail plane Span	44ft. 0 in.

Areas

Ailerons (total)	60.2 Sq ft.
Flaps (total)	213.4 Sq ft.
Tailplane (without elevators)	230 Sq ft.
Elevators (total)	98.30 Sq ft.
Fin	149.1 Sq ft.
Rudder	39.0 Sq ft.

Control surface movements

Ailerons	
UP	12 deg.
DOWN	12 deg.
Flaps	
DOWN	45 deg
Elevators	
UP	23 deg.
DOWN	14 deg.
Rudder (each way)	30 deg.

Engine

Type: Wright 1820 series Cyclone Radial developing 1,100hp

Propeller

Type: Hamilton Standard 3-blade metal, constant speed

Diameter: 11ft. 6 in.

Tank capacities

Fuel tanks (Three tanks in each wing):

Outer (forward): 452 US gallons each

Outer (rear): 228 US gallons each

Inner: 226 US gallons each

TOTAL: 1812 US gallons

Oil tanks (4): 25 US gal each.

Weights

Gross	57,000lb (25,854 kg)
Empty	30,000lb (13,607 kg)

When it entered service, the Stratoliner was the only four-engined land-based airliner in use by a U.S. airline. The wide girth of the fuselage provided for one of the roomiest cockpits and cabins of any airliner at the time. Up to 5 crew-members could be accommodated on the flight-deck and 33 passengers could be seated in the main cabin.

The new aircraft was the first commercial airliner to feature a dedicated flight engineer's station. This significantly reduced the workload for the flight crew. The flight engineer could control all engine management and was responsible for passenger comfort, being able to adjust the supercharged pressure heating and ventilation systems.

Engine-driven pumps pressurized the cabin to an equivalent of 8,000 feet and the regulator maintained pressure up to 20,000 feet.

A total of 3,655 lbs of luggage and cargo could be accommodated in holds below the cabin floor and accessed through doors in the belly of the aircraft.

A lavatory and a galley were installed at the rear with a ladies' powder- room included. The Stratoliner really was "all-luxury".

Apart from the pressurized cabin systems, the Stratoliner had other advanced (for the day) features. The landing gear was electrically operated as were the flaps.

Sadly, of the ten original airframes, only one survives. Beautifully restored to perfect flight condition, it now rests in retirement at the Smithsonian as part of the Air and Space collection.

So this is now your chance to hop aboard, strap in and experience the thrill of taking command of a true aviation legend.

Only three examples of the Wright-powered airframes were produced for Pan-American Airways.

These machines differed in many areas to the Pratt & Whitney-powered versions used by TWA.

New levels of luxury.

The Stratoliner offered levels of luxury and comfort never before experienced by air-travelers. The cabin had a unique layout with seats that could be converted into spacious sleeping bunks with their own windows.

IMPORTANT!!!

This panel has a switch (1) which when used allows you to toggle between the standard navigation instruments and a GNS suite.

To use the navigation systems, either traditional or GNS you MUST switch ON the Avionics Switch (2)

1. GNS suite switcher
2. Avionics Master Switch
3. OMI Marker unit
4. Transponder
5. Autopilot
6. NAV1 Radial Indicator
7. ADF(NDB) Indicator
8. NAV1 RMI
9. NAV2 RMI
10. Fuel Truck (toggle)
11. Services (Toggle)
12. Windshield wiper switches
13. Ignition Magnetos
14. Propeller Feathering Buttons
15. Main U/C Warning lights
16. Tail Wheel Warning Lights
17. Landing Gear Switch
18. Flaps Position Indicator
19. Flaps Switch
20. Engine Starter Panel
21. Propeller De-Icing Controls
22. Landing Light Switches
23. Cabin Lighting Rheostats

UPPER INSTRUMENT PANEL

24. Pitot Heat Switch and light
25. Generator Ameters
26. Park Brake Warning light
27. Inverter Switch and light
28. NoSmoking Lights Switch
29. Seat Belt Lights Switch
30. Panel Lights Switch
31. Beacon Light Switch
32. Cabin Lights Switch
33. Compass Light Switch
34. Services (Toggle)
35. Eng.#1 Generator Switch
36. Eng.#2 Generator Switch
37. Fuel Pump Switches

UPPER INSTRUMENT PANEL

INSTRUMENT PANELS

The main pilots' instrument panel contains all the necessary gauges required to fly the aeroplane including instruments for engine management from the pilots' seats. These instruments are repeated on the engineer's panel where, in real life, the engineer would be responsible for engine management during a flight.

1. Heading Compass
2. Altimeter
3. Gyro compass
4. Artificial Horizon Indicator
5. Airspeed Indicator
6. Turn/Slip Indicator
7. Vertical Speed Indicator
8. Radio Compass
9. Critical Height Warning Light
10. Manifold Pressure
11. Tachometers
12. Sperry Gyro-Pilot
13. Oil Pressure & Warning Lights
14. Oil Temp. (Engines 1 & 2)
15. Cylinder Temp.(Engines 1 & 2)
16. Carb. Temp.(Engines 1 & 2)
17. Oil Temp. (Engines 3 & 4)
18. Cylinder Temp.(Engines 3 & 4)
19. Carb. Temp.(Engines 3 & 4)
20. Fuel Press. & Warning Lights
21. Outside Air Temperature
22. Wing Fuel Tank Contents (6)
23. Chronometer

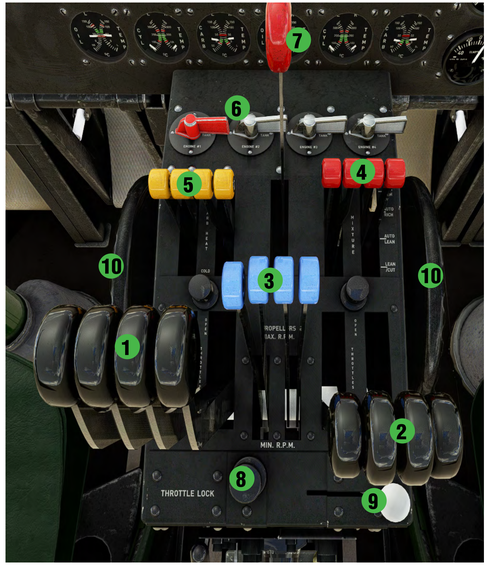
MAIN INSTRUMENT PANEL

FOR A BETTER VIEW

THE LARGE CONTROL WHEELS AND COLUMN TEND TO MASK SOME OF THE CRITICAL INSTRUMENTS.

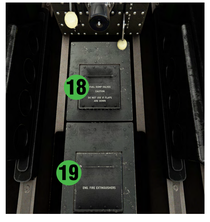
TO REMOVE THE YOKES FOR BETTER VISIBILITY, CLICK ON THE SMALL PILOTS' PANEL LIGHTS MOUNTED ON THE FORWARD PART OF EACH SIDE CONSOLE.

MAIN INSTRUMENT PANEL



PEDESTAL

1. Throttles
2. Throttles (co-pilot, slaved)
3. Propeller Controls
4. Mixture Controls
5. Carburettor Heat Controls
6. Manifold pressure selectors(INOP)
7. Tailwheel Lock
8. Throttle Lever Lock
9. Emergency Autopilot Switch
10. Elevator Trim Control
11. Tail Wheel Lock
12. Radio Suite
13. ADF Receiver
14. Rudder Trim Control
15. Aileron Trim Control
16. Ground/Flight Power Control
17. Wing De-Ice Control
18. Fuel Dump Valves
19. Engine Fire Control Panel



FUEL DUMP PROCEDURES

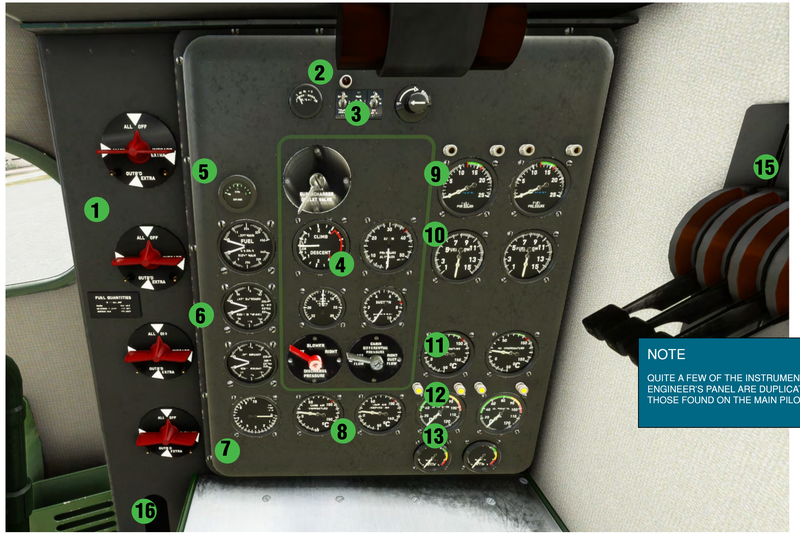
NEVER OPERATE THE FUEL DUMP VALVES IF THE FLAPS ARE DOWN!

LIFT THE COVER LID AND YOU WILL FIND TWO LEVERS. ONE FOR THE LEFT WING AND ONE FOR THE RIGHT. PULL UP TO JETTSION FUEL.

ENGINE FIRE CONTROL

LIFT THE COVER LID AND YOU WILL FIND A SELECTOR LEVER TO SELECT EACH ENGINE. AFT OF THIS IS A LARGE RED EXTINUGISHER LEVER WHCIH YOU PULL UP TO OPERATE THE EXTINGUISHER.

AT THE BACK OF THE CONTROL BOX ARE TWO SMALLER LEVERS. THESE ARE SUPPLY CUT-OFFS FOR FUEL AND OIL. YOU MUST TURN THESE OFF AND MAKE SURE THAT THE ENGINE IS CUT BEFORE USING THE EXTINGUISHER.



ENGINEER'S PANEL

1. Engine Fuel Selectors x 4
2. Inverter Switch
3. Generator Ammeters
4. Cabin Pressure Control Sub-Panel
5. Suction
6. Fuel Tank Contents x 6
7. EGT
8. Carburettor Air Temperatures
9. Fuel Pressures
10. Fuel Flow
11. Oil Temperatures
12. Oil Pressures
13. Hydraulic Pressures
14. Cabin Pressure Levers (INOP)
15. INOP

NOTE

QUITE A FEW OF THE INSTRUMENTS ON THE ENGINEER'S PANEL ARE DUPLICATES OF THOSE FOUND ON THE MAIN PILOTS' PANELS.

RADIOS

You have a choice of radio suites in the cockpit. For general IFR navigation work you may wish to stay with the conventional "old-school" receivers and instruments. The upper panel has the following navigation instruments:
A NAV1 direction indicator **B** ADF direction indicator
C NAV1 RMI and **D** NAV2 RMI

At the rear of the pedestal are four radio head units and an ADF receiver for NDB radials. Two upper head units operate as comms receivers, COM1 and COM2. The lower head units are receivers for NAV1 and NAV2 frequencies.

Each head unit is equipped with two digital read-outs one on the right for Standby frequency (the one you tune) and the other on the left for active (the actual frequency that drives the navigation instrument(s)).

Two large knobs tune the mHZ and kHz frequency. A small knob at the bottom left of each unit switches the display from Standby to Active.

Below these four head units as the ADF receiver with individual digit knobs. Once tuned to the correct NDB, the needle pointer of the ADF gauge will point toward the radial.

PLEASE NOTE

It is not the intention of this guide to teach navigation or how to use navigation instruments. There are many guides readily available on the web or tuition via the simulator.

FOR THE MODERN PILOT

For a more modern approach to your navigation needs, we have included an optional GNS suite running the very latest software. These units are standalone instruments and can operate as GPS -driven navigation systems, radios and much more. Using the toggle switch provided will change out the traditional instrument array to these GNS units. NAV1 is driven from the GNS530 and NAV2 from the GNS430 unit.

SPERRY GYROPILOT

It should be remembered that this unit is not designed as a navigation aid and was never meant to be one. When you are flying long distances you can keep your airplane in straight and level flight by means of the Automatic GyroPilot. It detects flight deviations the instant they occur and corrects them immediately and with precision. Use this pilot only in ordinary weather conditions and never in extremely turbulent air.

NOTE: The servo controls (speed valves) are INOP in this simulation.

Before using-Configure the aircraft for a stabilized flight, correctly trimmed and wings leveled. Set all engine controls for cruise. Ensure that there is enough vacuum pressure, and the Attitude gauge is free (uncaged). Select the heading bug position. If the new heading is to the left of current, rotate rudder knob **(2)** counterclockwise until heading bug scale **(1)** value coincides with the center white marker. Rotate **(2)** clockwise if new heading is to the right. Select the desired bank (max 30 deg) by rotating the aileron knob **(3)** in the same manner as the rudder knob **(2)** – counterclockwise for left bank and clockwise for right bank. Check that position of the bank bug **(5)** coincides with desired bank angle.

1. Index & Gyro cards 2. Heading Adjust 3. Bank Adjust 4. Pitch Adjust 5. Bank indicator 6. Pitch Reference (bug) 7.Pitch indicator 8. Suction Gauge 9. ON/OFF 10. Cage Knob 11. Illumination

Turn the gyropilot ON by pushing power button **(9)**. Check that the green light is ON to confirm the unit is active. The aircraft will start turning towards the selected heading due to the gyropilot inputs to rudder and ailerons.

Once the desired heading is obtained, it will be maintained by keeping the wings leveled.

If a climb or descent is desired, slowly rotate the elevator knob **(4)** clockwise to pitch up (climb) and counterclockwise to pitch down (descend) until the VS gauge shows the rate expected.
The pitch bug **(6)** will move up/down accordingly. Once close to reach the reference altitude, start repositioning the pitch bug up/down so to maintain zero VS at that level (bear in mind the gyropilot will not capture the selected altitude).

With gyropilot engaged

To start a new turn, just rotate the rudder knob **(2)** as needed to reposition the heading bug scale **(1)**. The gyropilot will command the rudder for a shallow turn (coordination ball uncentered). If the new heading is close to the current, rudder input should be enough. For large heading changes, it will be necessary to add a bit of bank to speed up the turn (centered ball), then rotate the aileron knob **(3)** to position bank bug **(5)** as explained in previous paragraph. When the new heading is reached bank bug will auto reset to 0.

For climbs or descents use the same procedures described above.

Caging the Attitude gauge with the attitude caging knob **(10)** makes the gyropilot command an immediate wing leveled position, ignoring the heading and bank bugs (that are not auto reset). Uncaging the Attitude will make the gyropilot continue with the turn as it was commanded before.

Gyropilot for the technically-minded.

Within turns, use bank bug with caution. Best results are obtained with bank angles between 10-15 degrees. When using max or close (20-30 deg), they should be manually reduced as current heading approximates to bug position, to avoid overshooting the target (there might be oscillations during the capture process).

When using rudder input only, the gyropilot will command a turn towards the smallest trackangle. However, when using the bank bug, direction of turn will depend on side of bank selected (left/right). An opposite bank bug will command an extended, uncoordinated turn, that might be useful in certain circumstances (for example, making a 360 degrees change).

NOTE

WE HAVE ATTEMPTED TO SIMULATE THIS SPERRY GYROPILOT AS CLOSELY AS POSSIBLE TO THE REAL THING WITHIN THE PARAMETERS OF THE HOST SIMULATOR. IT IS NOT FAULTLESS AND IS DESIGNED TO GIVE THE PILOT A REASONABLE APPROXIMATION OF WHAT IT WAS LIKE TO FLY DISTANCES WITH SUCH AN INSTRUMENT.

THESE WERE THE DAYS WHEN AUTOPILOTS WERE A THING OF THE FUTURE OR AT BEST, IN THEIR INFANCY. USING SUCH A DEVICE TODAY IS BOTH EDUCATIONAL AND FUN!

WE URGE YOU TO TRY OUT THE SPERRY ON YOUR NEXT LONG-DISTANCE TRIP.

Flying the Stratoliner.

The Boeing B307 Stratoliner is not a difficult aeroplane to fly. However, there are one or two unusual (for the day) features you should be aware of before your first flight.

Novel for the times, the Stratoliner used electrically operated systems for the landing gear and flaps. The switches and controls for these can be found on the upper instrument panel.

The landing gear itself was designed in such a way that the main wheels could still support the aircraft on the ground, when the gear is retracted. This allowed for a certain amount of maneuverability even after a wheels-up belly landing. This was a similar system employed by the DC-3.

The engine preparation and start procedures MUST be followed correctly for successful engine starts. There is a specific order in which various switches and controls must be used. Follow them and you will not have any problems starting the big radials.

The Stratoliner has a fully-castoring tail wheel which can and must be locked for takeoff and landing. The big airliner will have a tendency to wander off the straight and narrow if you don't use the lock.

The flight deck was the first to feature an engineer's station in a non-military aircraft. There are important controls such as fuel tank selectors located here. A lot of the instruments is repeated from the pilots' main panels.

There are three fuel tanks in each wing. Fuel cannot be transferred from one wing to the other but each pump in each wing can supply fuel to either of that wing's engines.

A full set of checklists is included in this manual and also a complete set of interactive checklists are available via the sim. It is often a good idea to set up "auto-complete" for the checklists for the first flight and watch each process as it runs and completes.

For a touch of realism, you can add a diorama to the external views which can include a period re-fueling truck and a set of period boarding steps and flight attendant. A luggage trolley and luggage is also added and the under-belly luggage compartment door is swung open. Use the switches (10 & 11) on the upper instrument panel.

By selecting the GROUND POWER position of the Ground/Flight switch, you can toggle on the GPU starting generator. This supplies enough power for the systems of the aircraft and also enough power to start the engines. Once running, you switch the lever to FLIGHT position and this brings the on-board batteries on-line, toggling off the GPU outside.

After passengers are aboard and freight is loaded, turn off the Services switch and the Fuel Truck Switch also.

Check that the Park-Brake is ON.

Now, with GROUND POWER selected, open the tank valves and select the appropriate tanks for each engine using the controls first on the engineer's station (valves) and then the pedestal (selectors).

Check the flaps for operation and then switch OFF the flaps switch. Check that the gear switch is down and you have three green lights on.

Turn on the courtesy switches (NoSmoking and SeatBelts) and any cockpit/cabin lighting as desired.

Each engine has a Starter Switch, Boost Switch and Primer Switch. These are arranged so that you switch up or down for the desired engine. For example for Engine#1 you switch UP.

Engine starting procedure (per engine) is as follows:

1) Engine boost pump ON (Check Fuel Pressure)
2) Primer ON
3) Starter ON - this will start the prop spinning wait 5 seconds to allow prop to spin up.
4) Magnetos to BOTH (whilst prop is spinning)

The engine should fire and settle to an idle. Turn off the Engine Boost and Primer switches.

Select FLIGHT with the GROUND/FLIGHT switch and check removal of the GPU outside. Switch ON the generators and check for oil pressure, fuel pressure and temperature for all engines.

Tune your radios and set any navigation frequencies etc., call the tower for taxi clearance and UNLOCK the tail wheel. You have four powerful radial engines so it doesn't take much to get her moving. The Stratoliner has good manners on the ground and is easy to taxi, just keep your speeds down!

Before takeoff, place fuel selectors on MAIN, Mixtures to full-rich, propellers to maximum R.P.M., Fuel Booster pumps (37) ON, Carb. Heat -cold.

Now, check the magnetos. To do this, run each engine in turn up to 1,500 R.P.M. Turn the mag switch from BOTH to RIGHT and observe the Tachometer. You should see a rev drop of around 100 R.P.M. , no more. This should be the same for Right and Left Magnetos. Return the Magnetos to BOTH. Return engines to idle.

Call the tower for takeoff clearance and then release the parkbrake. With a smooth action slowly increase the throttles to give 2,500 R.P.M. and 35 inches of mercury (Manifold Pressure). The tail will rise at around 60 M.P.H. When this happens, keep a steady grip on the controls and correct any tendency to swing. At 90-100 M.P.H. pull gently back on the yoke and lift off. Keep level until the speed has risen to around 120 M.P.H. then slowly start a gentle climb.

Raise the landing gear. Throttle back to give around 30 inches and 2,250 R.P.M and continue to climb at around 175 M.P.H. at 1,200 feet per minute. Normal cruise speed is 222 M.P.H. (at 19,000 ft) and engines should be adjusted to give 1,850 - 2,000 R.P.M or 23 inches of mercury on the gauge.

Landing is quite straightforward using progressive flaps and balanced power settings. LOCK THE TAIL WHEEL BEFORE TOUCHDOWN!

With careful engine management and accurate flying, the Stratoliner has a range of up to 1,300 miles. Comfortable cruising in the World's first pressurized airliner!

Microsoft Flight Simulator

Checklists.

A fully interactive checklist is provided with the simulator package but we have also included a set of abbreviated checklists with this guide, for reference.

PRE-START

Parking Brake	ON
Services Switch	ON
Fuel Truck Switch	ON
Ground/Flight Switch	GROUND
Fuel Contents	CHECKED
Landing gear switch	DOWN 3 Greens
Navigation Lights	ON
Beacon Light	ON
Landing Lights	OFF
Flap Switch	OFF
Propeller Controls	Max R.P.M.
Fuel Tank Levers	MAINS
Mixtures	FULL RICH
Pitot Heat	ON
Trims	NEUTRAL
Altimeter	SET
Autopilot	OFF
Inverters	ON

START

#1 Boost Pump	ON (Check Pressure)
#1 Primer	ON
#1 Starter	ON wait 5 secs
Magnetos	BOTH
Boost Pump	OFF
Primer	OFF

Repeat for all engines

WARM -UP

Fuel Truck Switch	ON
Services Switch	OFF
Ground/Flight Switch	FLIGHT
Instruments	CHECKED
Throttle (per engine)	1,500 R.P.M.
Mag-check	100 RPM DROP
Services Switch	OFF
Door check	CLOSED
Radios	TUNED & SET

TAXY

Tail-wheel lock	OFF
Flaps	As required
Trimming	NEUTRAL
Brakes	RELEASED

TAKEOFF

Propeller Controls	Max R.P.M.
Tail-wheel lock	ON
Mixtures	FULL RICH
Throttles (smoothly)	MAXIMUM

CLIMB

Airspeed	130 - 170 M.P.H.
Landing Gear	UP No lights
Flaps	UP
CRUISE	
Flaps	UP
Propeller Pitch Preset	“CRUISE”
Mixtures	AS REQUIRED
Throttles	AS REQUIRED
AutoPilot Ae145	AS REQUIRED

APPROACH

Airspeed	140 M.P.H.
Flaps	As required
Propeller Controls	Max R.P.M.
Landing Gear	DOWN 3 Greens
Tail-wheel lock	ON

LANDING

Airspeed	100 M.P.H.
Flaps	FULL
Throttles	AS REQUIRED
Touchdown	90 M.P.H.

Microsoft Flight Simulator