STINSON L-5 SENTINEL



COCKPIT GUIDE and FLYING NOTES STINSON L-5 SENTINEL

Contents

Introduction 2
Aircraft parameters..... 4
Aircraft covered in this simulation 4
Cockpit Guide..... 7
Cockpit notes 12
Flying the Stinson L-5 13
Checklists 16
Credits & Copyright..... 19

Introduction

Use of machines for liaison, artillery spotting, photo-reconnaissance and casualty evacuation has been going on since the aeroplane was first used by the military in WW1.

The Stinson L-5 is typical of the type of aircraft developed during WW2 for such duties. Rugged and dependable, the design is all workhorse with little or no concern for aesthetics and requiring no unnecessary embellishments. It simply does what it says on the can.

Dubbed 'The Flying Jeep', the L-5 is actually the only WW2, U.S. purpose-built STOL liaison aircraft. Other types were used of course but they tended to be converted from existing commercial designs like the Piper Cub.

Shortly before the L-5 was designed, the Stinson Aircraft Company became a subsidiary of the Vultee Aircraft Corporation, already supplying the military with a number of successful designs. Originally designed as a conversion of the Model 105 Voyager civilian tourer, military specifications brought about dramatic changes in the overall design and the whole airframe was totally re-engineered by Vultee to meet the demands of the U.S. Military High Command. Among these demands was the requirement for tandem seating for the pilot and observer, stronger and more versatile airframe structure and the ability to operate from extremely short and often makeshift airstrips.

Out went the original 80hp motor in favour of a six-cylinder Lycoming O-435 developing 190 hp. The fuselage was built from chrome-moly steel tubing and covered with doped fabric. Aluminium was in short supply and desperately needed to build more important combat aircraft. So, only the forward parts and engine cowlings of the L-5 were paneled in light alloy, as was the tail-cone, landing gear fairings and the main structures for ailerons, elevator and rudder.

The wings were made from wooden spars and ribs and covered in doped fabric. The need for complicated anti-drag wires was dispensed with by using large sheets of ply on the undersides to take the stress.

The complex tubular structures employed in the airframe gave it immense strength and durability and, as you will find when you step aboard, no concessions were made to hide any of it with paneling or upholstery. In a Stinson, what you see is what you get!

Nearly all perspex, the cockpit area affords excellent visibility in all directions and the large door windows fold down to give uninterrupted viewing below.

The design was created to be multi-functional and versions of the L-5 were produced to operate as air ambulances and could carry small amounts of freight, munitions and other cargoes. The primary use was as a front-line liaison aircraft and artillery spotter.

The aircraft's supreme ability to get into small, remote areas earned it great respect from the generals and troops alike. A true workhorse, L-5s dropped much needed medical supplies, munitions, food and other provisions to hard-pressed troops in remote areas and aside from artillery spotting, were also used to guide fighter-bombers to their targets, dropping flares and using radio communication.

The L-5 Sentinel was built between December 1942 and September 1945 during which time nearly 3,600 airframes were delivered to the U.S. Armed Forces.

The L-5 was also used by a wide variety of international operators such as Australia, China and the United Kingdom, equipping three RAF squadrons and seeing service during the Normandy landings on D-Day and on into the eventual liberation of Europe.

Seeing service in WW2, Korean and Vietnam conflicts to name but three, Sentinels have flown across deserts, operated from dense jungle airstrips and freezing conditions of snow and ice. Through all of it, pilots could depend on an aircraft that would always get them through and any pilot that flew the L-5 came away with new-found respect for the little can-do aeroplane.

Today, many have found their way into private hands and are an inexpensive entry-level into the world of warbird ownership. They make excellent glider tugs and as simple, rugged sport-planes are a source of pure fun in today's high-tech aviation world.

Aircraft parameters

LENGTH	**24ft 1in**
HEIGHT	**7ft 11in**
WINGSPAN	**34ft 0in**
WING AREA	**155 sq.ft.**
EMPTY WEIGHT	**1477lbs**
GROSS WEIGHT	**2050lbs**
MAX. SPEED	**130MPH**
CRUISE SPEED	**112MPH**
INITIAL CLIMB	**975FPM**
SERVICE CEILING	**15, 800ft**
RANGE	**400 miles**

POWERPLANT	**LYCOMING O-435 6 cylinder 190hp**
PROPELLER	**FIXED PITCH Wood 7ft 7 ins diameter**

Aircraft covered in this simulation



'Dangerous Liaison' Serial no: 4268591



OY-1 Serial no: 9868



VMO6 Serial no: 03968 WB



A-96

This machine force-landed near Porrentruy by 2ndLt. Roy G. Abbot in late 1944 and was later repaired.



Serial No: 42 98989

Stinson L-5s played a key role in the Normandy landings on D-Day in 1944 and onward. Invasion stripes were painted on all allied aircraft so that ground-forces would not confuse them with enemy aircraft.



The RAF SE Asia Command operated Stinsons during WW2. This machine is KJ420 of the Malaya Command Flight from 1945



The United States re-designated all its L-5 Sentinels in 1962. The new designation was U-19A. This example, serial no: 42988633 is from that period.

Cockpit Guide



As you will see, the cockpit of your Stinson L-5 is a mass of open framework tubing, wires and huge areas of perspex. It's about as close as you can get to an open cockpit without actually being open!

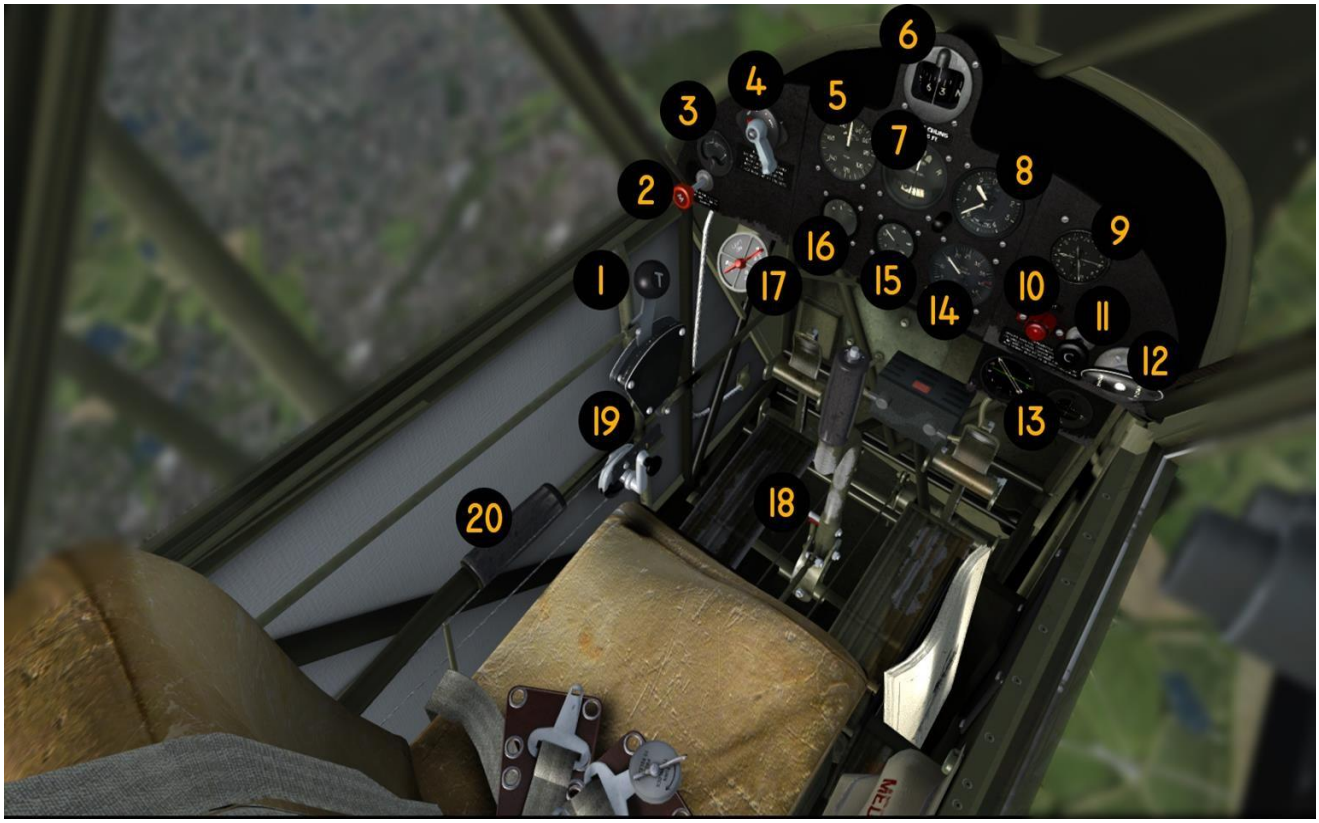
Everything is laid out in an orderly manner, controls are very simple and only the bare necessities o f life are provided. As an aid to modern navigation we have installed something that the wartime pilot never had – NAV(VOR) and ADF radio receivers and instrumentation. It is our one concession to modern aviation.

Everything else is pretty much as a wartime pilot would have seen it. There are four areas to study in this cockpit:

Main Front cockpit, Left and Right sides and the Rear or Observer's cockpit.

Let's take a look at the Main Front cockpit first.

MAIN FRONT COCKPIT



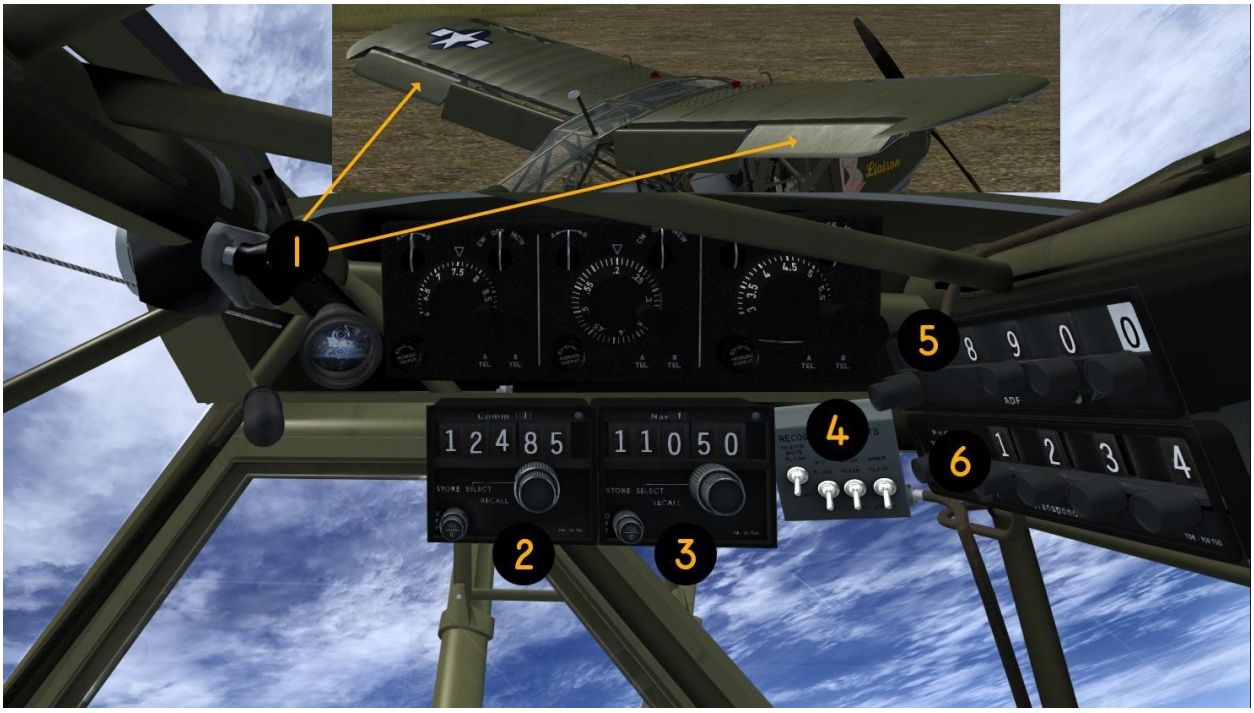
1. **Throttle**
2. **Mixture control**
3. **Battery state**
4. **Magneto control**
5. **Airspeed Indicator**
6. **Gyro Compass**
7. **Turn/Slip Indicator**
8. **Altimeter**
9. **Chronometer**
10. **Starter**
11. **Carburetor Heat Control**
12. **Engine Primer**
13. **Navigation instruments (VOR/ADF/Glidepath)**
14. **Tachometer**
15. **Oil Pressure**
16. **Oil Temperature**
17. **Fuel tank selector**
18. **Park Brake Lever**
19. **Elevator Trim control**
20. **Flap handle.**

LEFT SIDE (ELECTRICAL PANEL)



1. **Navigation Lights Switch**
2. **Landing Light control switch**
3. **Panel Lights Switch**
4. **Main Battery Switch**
5. **'Cold-dark' Start Switch**
6. **Generator Switch**
7. **Switch for toggling weather covers tiedowns and pre-flights etc.**

RIGHT SIDE



1. **Aileron Droop control**
2. **Comms Radio**
3. **Nav1 Radio**
4. **Recognition Lights Control Box**
5. **ADF Radio**
6. **Transponder.**

NOTE:

By turning the control handle mounted on the top rail, you will 'droop' the ailerons to add more lift for flap operations. Aileron effectiveness is not altered.

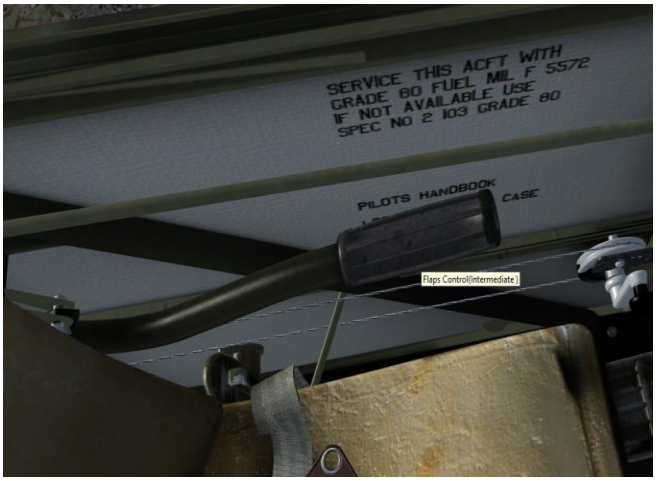
IMPORTANT INFORMATION ON FLAP OPERATION

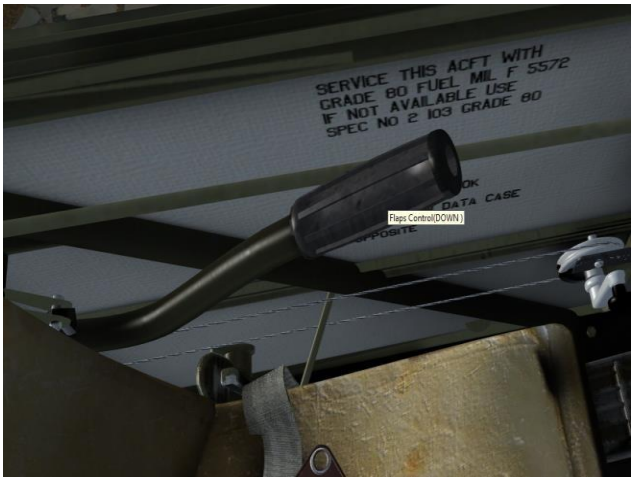
Flap control inputs in FSX/P3D is limited. So, to enable the aileron droop to have an effect on lift/performance, we have given the flap lever an extra notch.

So, when using the flap handle, the first position is your 'intermediate' flap position. The second is 'full down'. If you then pull the flap lever up another notch, you are still in the down position, but you will be instructed through the tooltip, to use the aileron droop control. Outside, you will see the flaps and ailerons combining as large flap area. There will also be a noticeable increase in drag/loss of airspeed.

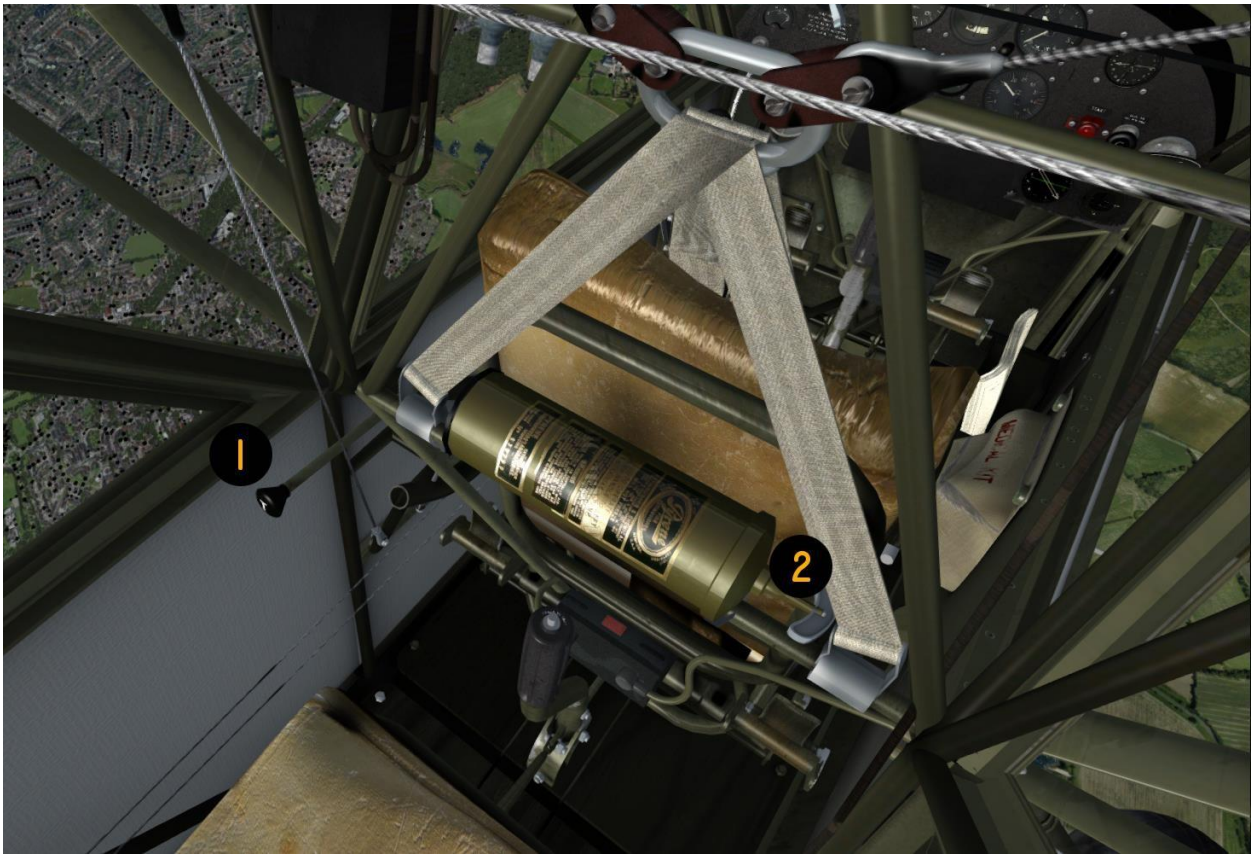








REAR (OBSERVER) COCKPIT



1. **Throttle**
2. **Fire Extinguisher**

Cockpit notes

There are some non-standard items fitted to this cockpit for simulation purposes. These are:

Cold-Dark Switch

Positioned on the electrical panel on the left side, **5**

This switch is only to be used if you want to configure the aircraft for a cold-dark start - i.e. all switches off, all controls set to 0 all systems 'dead'. Toggling this switch will also remove the pilots from the external view.

Secure Aircraft Switch

This switch will toggle on the wheel chocks and pre-flight flags etc.

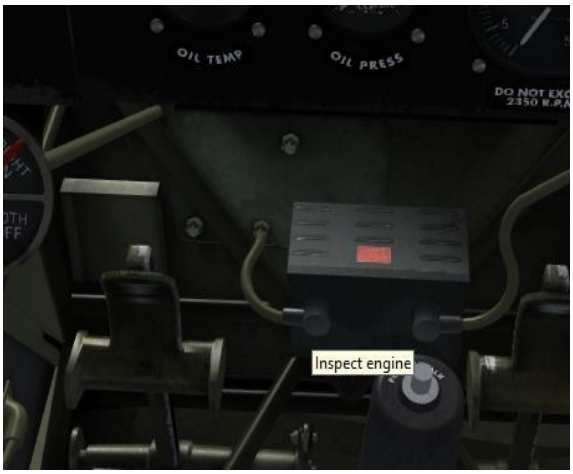
Navigation suite

To aid modern navigation within the simulator, we have provided a pair of radio receiver heads for Navigation (VOR1) and ADF and a pair of instruments (VOR/ADF and RMI). You can use these to navigate when flying an IFR flight plan or for waypoint navigation.

Fire extinguisher

Technically, the Stinson L-5 had no way to extinguish an engine fire if it got out of hand. A hand-held extinguisher is mounted in the rear cockpit in case of general fire. We have used this to enable you to extinguish an engine fire in the simulation. You must prime the extinguisher by clicking the handle and then pump the handle to discharge the bottle. The engine fire should then extinguish. **Engine inspection**

Immediately ahead of the rudder pedals in the pilot position, is the battery. The left terminal of which is actually a switch, which when clicked will toggle the engine panel on and off to allow you to inspect a fully modelled and detailed Lycoming engine. Please remember that the battery switch must be ON for this to work.





Flying the Stinson L-5

The first thing to remember about these aeroplanes is that they are flying at its basic level. Do not expect any level of sophistication or complexity.

We are assuming that you are starting from a "Cold-Dark" state – EVERYTHING off or zeroed, and all systems effectively dead. To get to this state quickly you can use the Cold Dark switch on the electrical panel on the left side.

First thing to do is turn on some power, so use the Master Battery Switch.

Next to the Cold Dark switch is the Generator switch. Turn this on and the red light should extinguish, indicating that the circuit is 'live'.

Now select the tank you wish to use by turning the tank selector control to the required quadrant on the stand-pipe bezel.

Push the red mixture knob in fully for 'Full Rich'

Depending on the weather, right click the primer control to unlock and pump the primer for about 5 strokes.

Switch the magnetos to BOTH and hit the red starter button on the right side of the panel.

Stand by for some vibration and judder. This will settle when the throttle is eased forward a little. The fixed wooden propeller is prone to go out of balance and sets up a significant vibration at idle.

Idle should be at around 650 RPM

Check your oil temperature and pressure, oil pressure should be between 15 and 40 P.S.I. at idle. Around 30 p.s.i is normal at 800 RPM (warming engine speed).

Increase to 1,000RPM and check the gauges.

Increase to 1,800RPM and do a mag check. First from BOTH to RIGHT then to LEFT. You should experience a small drop in RPM, signalled primarily by a change in engine pitch. Return switch to BOTH.

If all is OK you are ready to taxi.

The Stinson L-5 has a steerable tailwheel which is controlled when using the rudder. **There is no tailwheel lock.**

Takeoff

Lined up and ready, parking brake on.

Lower flaps to intermediate position.

Make sure the mixture knob is fully in.

Smoothly, increase throttle to achieve 2300 RPM and then release the parking brake. Please remember that the engine will not achieve the desired RPM instantly. Wait for the revs to build before releasing the brake.

Catch any tendency to swing with the rudder as you pick up speed down the strip.

The tail will lift at around 50 MPH, light back pressure on the stick will see you airborne. Careful here...the tail will rise quickly because of prop-wash. Ensure you have the speed to get airborne. Hold the stick forward a little, keeping the main wheels planted until you reach your takeoff speed.

With the aeroplane at maximum load and no appreciable headwind, you will need around 400 - 500 ft of strip to get airborne, depending on the height of the field. With power at maximum and flaps at 30 you should be able to clear 50 ft. in around 750 -800ft. Obviously these figures decrease if you extend the flaps to full and/ or droop the ailerons.

Climb and Cruise

Best rate of climb is approximately 600 feet per minute at 80 - 85 mph. (to 5,000 ft.)

Always remember to lean off the mixture as you climb above 5,000ft. You will not achieve good power if you do not do this.

Cruise at 6,000ft at 2230 RPM will give you 100MPH and is economical flying at these figures.

Approach and Land

Set mixture to full rich (pushed all the way in)

Pull out the Carburettor Heat control.

Set flaps to full down and ailerons on droop. (Refer to section on aileron droop earlier in this manual)

With engine idling (glide) and flaps and ailerons down, the best approach speed will be 56 MPH

With part throttle, maintain an approach at 67 MPH until just before the threshold.

At the threshold, close the throttle fully and flare to a gentle three-point, tail-down landing.

In short field approaches much higher approach angles can be achieved using full flap and ailerons. Application of power will flare the aeroplane out prior to touchdown.

With such benign stalling characteristics you will quickly learn that the Stinson will land perfectly safely at any speed below 50 mph (within reason!) , subject to approach angle, flap settings and so on. Landing on short fields should be fun and we encourage you to try increasingly steep angles of approach with late power-on flares. It is all about getting your airspeed down to low levels and then managing your angle of attack. The L-5s descent rate is actually steeper than a Piper Cub's!

When parked, run the engine at 800 RPM for 60 seconds and then pull out the mixture control.

This will stop the engine. As soon as the prop has stopped, turn off all switches and turn the fuel control to one of the OFF positions.

Use the 'Cold Dark' switch to remove the pilots. (remember to return the switch to OFF to re-install the pilots and reset the system)

Use the 'Secure Aircraft' switch to toggle on the pitot pre-flight flag, engine and cockpit covers and the prop cover. This will also toggle on the moorings under the wings.

That's all there is to flying a Stinson L-5. It's a great aeroplane for 'low and slow' flying and to inspect your scenery collection.

Basic Instrument flying can be done using the Navigation suite, after you have tuned the radios correctly. Waypoint touring is a lot of fun in a Stinson L-5 Sentinel.

Keystrokes:

Shift/E **Pilot door**

Shift/E+2 **Observer's door**

Shift/E+3 **Front windows**

Shift/E+4 **Rear windows**

Whatever keystroke you use for **Water Ballast Valve** will droop the ailerons from outside view. So, from outside, using keystrokes for flaps and water ballast you can simulate the aileron droop/flap combination remotely.

Checklists

Pre-start and Start

Place aircraft into wind and apply parking brake

Ignition (Mags) **OFF**

Fuel selector	**FULLEST TANK**
Carb Heat	**FULLY IN – COLD**
Throttle	**10%**
Mixture	**FULLY IN – FULL RICH**
Engine Primer	**UNLOCK AND 5 STROKES**
Battery Switch	**ON**
Ignition Magnetos	**LEFT – RIGHT – BOTH**
Starter Button	**PUSH START**

Warm up

Throttle **to give 800-900 RPM**

Warm until pressure and temps are normal operating levels

Oil Pressure **30 psi**

Oil Temperature **at least 10-20 degrees**

Tanks **Check each in turn for sufficient fuel delivery**

Magneto check

Run engine at approximately 1800 RPM. Briefly, turn mag control from BOTH to RIGHT TO LEFT. You should experience a SLIGHT drop in revolutions. You will probably hear the change in pitch rather than see much on the RPM scale. Turn further to OFF briefly and the engine should cut. Quickly return the control to BOTH and the engine should restart and settle to the idle setting.

Takeoff

Mixture FULL RICH (control fully IN)

Carb Heat COLD (control fully IN)

NORMAL AIRFIELD OPERATIONS

Flaps Intermediate setting

Throttle Smoothly to 100%

Release Brakes

Correct any swing with rudder

TAKEOFF RUN Approximately 800-900 feet to clear 50ft obstacle

TAKEOFF SPEED	Approximately 48 -50 mph

SHORT STRIP

Flaps	Full down
Ailerons	Drooped
TAKEOFF RUN	Approximately 500-800 feet to clear 50ft obstacle depending on AUW and head wind strength.
TAKEOFF SPEED	Approximately 45-48 mph

ALLOW LONGER RUNS FROM DIRT OR MUD STRIPS, GRASS FIELDS AND SAND

WARNING – The tail will come up really quickly due to prop-wash. In certain cases you may need to use forward stick to keep the mains on the ground until sufficient speed is achieved. Use of nose -down trim will assist with this.

CLIMB (max AUW)

Raise flaps and ailerons if droop is used.

Best climb speed	82 MPH at 600fpm to 5,000 ft and 77 MPH at 350fpm to 10,000 ft
Mixture	Lean off as you climb above 5,000ft.

CRUISE

Throttle	To give 2230RPM
Best Speed	At above throttle, 100MPH at 6,000ft

Approach and land

Fuel tanks	Checked and switched to fullest tank
Mixture	FULL RICH (fully IN)
Carb Heat	FULL HEAT (fully OUT)
Flaps	FULL DOWN
Ailerons	DROOPED
Trim	As required
Speed	67 MPH (Throttle at idle -glide speed)
	56 MPH (Throttle at discretion and AOA adjusted)

The Stinson L-5 has a very steep rate of descent at low speed with flaps and ailerons drooped.

Use a steep angle of approach – flaps and ailerons allow for this. Near vertical approaches are not uncommon with a power-on flare in the last moments. The key is speed – keep it as low as possible without stalling.

Aim for three-point attitude when touching down. When all three wheels are down, brake hard.

SHUTDOWN

Parkbrake	**ON**
Mixture	**FULLY OUT**
Fuel selector	**Both tanks OFF**
Master Battery	**OFF**
Secure Aircraft	**Switch ON**

For a clean, COLD/DARK reset, use the COLD/DARK switch. Then return the switch to OFF.

Credits & Copyright

Developed and designed by Aeroplane Heaven

Distributed by The Producers Ltd.

Thanks to Richard at Fink Creative and T. E. Lawrence

© Copyright 2017 Aeroplane Heaven. All rights reserved. All trademarks and brand names are trademarks or registered trademarks of the respective owners and their use herein does not imply any association or endorsement by any third party.