GLIDER
simulator

WORLD OF AIRCRAFT

AEROSOFT®

Manual

Contents

Introduction to World of Aircraft

World of Aircraft uses a dedicated graphics and physics engine to simulate small aviation. Each edition focusses on one specific kind of aviation and will always contain the area, airport(s) and aircraft you need to explore that kind of aviation. Because it does not want to cover all the world and all kinds of aviation you get more detail for the parts that are in the simulation when compared with full blown simulators.

It is a pure VFR simulator, so it only simulates flights done without complex instruments and you navigate with your compass and your eyes. It is about the joy of being in the air and mastering your machine.

World of Aircraft: Glider Simulator

The first release, World of Aircraft – Glider Edition, puts you in the cockpit of the aircraft you find on an airfield dedicated to gliders. You will find older and modern gliders, even a motor glider and a glider with auxiliary engine waiting for you. You will even find a high detailed tow aircraft to get your gliders in the air.

Most people who have not been in a modern glider think that they glide from thermal to thermal in total silence. They can and they do, but they are also capable of the most amazing aerobatics and high-speed high G maneuvers. Often the roar of the air flowing over the canopy drowns out the sound of the variometer and the screams of the passenger. They are often flown closer to the ground than most other aircraft, certainly when they are flown using the wind flow rising over mountain slopes. Even if you look at simple performance you see that modern gliders outperform many serious motorized aircraft. Name one general aviation aircraft with a range of 3.009 km, a speed of 306 km/h, and a ceiling of 15,460 meters. And although these are world records for gliders, even the actual performance of standard gliders is amazing.

"Instead of our drab slogging forth and back to the
fishing boats, there's reason to live!
We can lift ourselves out of ignorance, we can find
ourselves as creatures of excellence and intelligence and
skill. We can learn to be free! we can learn to fly!"
— Richard Bach, Jonathan Livingston Seagull

Credits

Project conception	Aerosoft
Development	Aerosoft
Video	Jeroen Doorman
Marketing	Vanessa Quant (Aerosoft)
Project Management	Mathijs Kok (Aerosoft)
ASK and Dimona models	Joachim Schweigler
Jonathan L. Seagull	Anne Ludwig (Aerosoft)
Voices	Laura, Jon, Cedric, William, Frank et al.
Manuals:	Mathijs Kok (Aerosoft)
	Christophe Charrier (French)
	Jon Rotaetxe (Spanish)

If there are bugs blame us and not the testers, they did fine work.

Support

Support for all World of Aircraft products will be done via our forums. We will be able to support you in English, German, Dutch, French, Spanish and Russian. We can support you in our ticket system but this will always take longer and is most likely less accurate.

https://forum.aerosoft.com/index.php?/forum/1054-world-of-aircraft-glider-simulator/

When you ask our support, please see the FAQ section, and search the forum to see if the issue has been discussed before. That will save you and us time. Also be as clear as possible and tell us exactly is happening and what you would expect. Also mention what version you are using; you will see the number in the main menu.

Installing, removing, and updating

If you bought this product on Steam, the Steam platform will handle all installations and updates. While not forced we do think you should always use the latest version.

If you bought the version from other stores the files or box will contain the information you need to install it.

More information

There are thousands of fantastic sites on the internet that contain a treasure of information. We strongly suggest you check some out.

https://www.gliding.world/ Just a super useful site

There is a fantastic series of articles offered by the FAA.

- **Introduction**
  https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/glider_handbook/media/gfh_ch01.pdf
- **Components and Systems**
  https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/glider_handbook/media/gfh_ch02.pdf
- **Aerodynamics of Flight**
  https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/glider_handbook/media/gfh_ch03.pdf
- **Flight Instruments**
- https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/glider_handbook/media/gfh_ch04.pdf
- **Glider Performance**
  https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/glider_handbook/media/gfh_ch05.pdf
- **Towing**
  https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/glider_handbook/media/gfh_ch12.pdf

Above anything else, on a nice sunny day go and visit a glider club.
Getting a ride is easy and who knows, you might get hooked on gliders!

Using the simulator

Configuring

When you start the simulator up for the first time, we advise you first to give your pilot a name.

After that check out the Options menu where you can set the video mode and sounds (leave them as they are for starters). In the Details tab you set the graphics options. The higher the settings the more the graphics card will have to do and the lower the framerate. Keep in mind that when you double the range the amount of objects quadruples! For the Input menu, check the manual chapter on that.

Training

In the training menu you can learn on how to do the most important maneuvers. Take-off, landing and flying the circuit (see below). There are always four stages to each training:

- Stage 1: The AI pilot flies the aircraft; user input is disabled.
- Stage 2: The AI pilot controls Throttles, pedals and flaps, rest is for you!
- Stage 3: The AI pilot only helps with the pedals.
- Stage 4: You are on your own.

Circuit

As air traffic condenses close to an airfield there are certain procedures and regulations to make sure safety is ensured. The most important is the 'circuit'. This is the route you fly towards the runway on landing.

When all aircraft use this procedure, they have the best chance of seeing other aircraft. Normally the circuit is entered at 1000 feet (330 meters) above ground.

Free Flight

In this mode you are fully free to use the aircraft and explore the scenery

Online

Flying online you can either use the Wilga (and tow aircraft) or the Blanik (and be towed up). The other aircraft are at this moment not available in multiplayer.

When you press [Join as Blanik] you get put on the waiting list. Pending Gliders shows how many gliders are waiting for a pull.

As soon as anyone else logins for multiplayer and presses [join as Wilga] he gets matched to the first available player on the Blanik pending list and an online session starts for them.

Each session can have up to two pairs of players (so four players per session total). If no one wants to join as wilga (or there is no players connected to the game) - you only have to wait. Reciprocally the same logic applies if you press [Join as Wilga].

So, if you press join and there is no one on the matching wait list - nothing happens.

Replay

Your online flight is recorded on disk and you can replay them using the Replay menu.

Communications

By far the best way to communicate with other pilots is with a voice connection. Discord, Steam anything will work. But if you do not have anything of that running, we included a series of quick keys that send messages (in text and voice) to the other users.

	Glider	Tow aircraft
[LALT]+[1]	-	*"Clear Prop!"*
[LALT]+[2]	*"Yes"*	*"Yes"*
[LALT]+[3]	*"Wilco"*	*"Wilco"*
[LART]+[4]	*"No"*	*"No"*
[LALT]+[5]	*"Towline tight, ready"*	*"Rolling…"*
[LALT]+[6]	*"Another 500 feet please?"*	*"Ready for Release?"*
[LALT]+[7]	*"Towline released, thanks!"*	*"Roger, have a good flight!"*
[LALT]+[8]	*"Glider on downwind"*	*"Tow on downwind"*
[LALT]+[9]	*"Disconnecting"*	*"Disconnect… abort!"*
[LALT]+[0]	Coms menu	Coms Menu

LALT means Left Alt key, but of course can be remapped.

Controlling an Aircraft

The main controls of any aircraft are the control stick and the rudders.

- **Control Stick,** can move forwards and backwards to control pitch using the elevator and left and right to control roll via the ailerons.
- **Rudder pedals,** control the yaw via the rudder. On many controllers this is done by twisting the joystick!

Most aircraft will also have flaps and spoilers.

- **Flaps**, controls surface that are lowered from the wings. They will increase the amount of lift the wing can generate but increase drag. They are often used for take-off and always for landing.
- **Spoilers:** also known as speed brakes, these are control surface that normally extend vertically from the wing top surface. They increase drag to slow the aircraft down and reduce the generated lift. They are extended in flight to reduce speed (or to increase your sinkrate without overspeeding) and after landing to remove the lift generation from the wings.
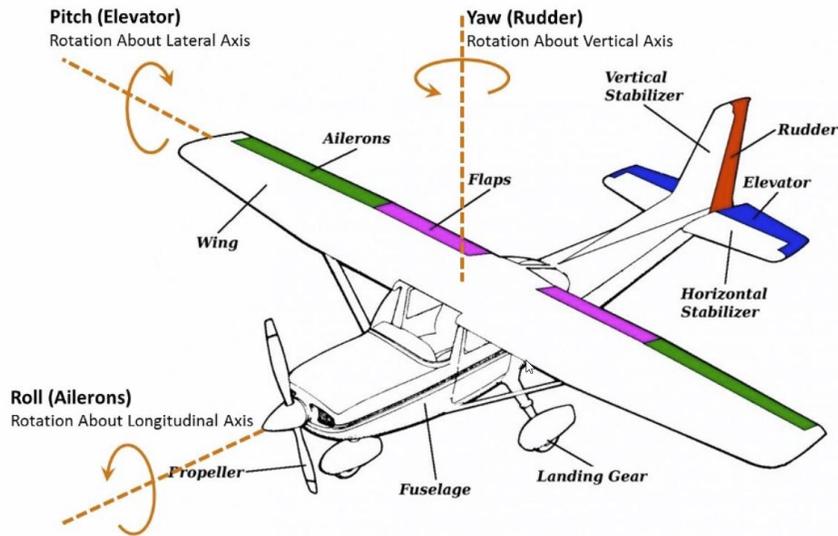
Energy

For novice pilots the concept of energy management is often hard to understand, for a novice glider pilot it is vital to understand. In its most basic form, the energy an aircraft has determines if or where and aircraft will hit the ground. Avoiding a lot of complex things there are three kinds of energy that matter:

Speed: if your speed is over the minimal speed, you can convert speed into altitude. A glider that has no engine can zoom the airport at high speed and still climb exchanging speed for altitude . Keep in mind it will run out of speed and you will have to divert to exchanging altitude for speed.

Altitude: if you got enough altitude between you and the ground you can convert that altitude into speed (and as we have seen speed can be turned into altitude, just keep in mind you lose energy in the conversion, sometimes a lot).

An engine: having an engine beats speed and altitude as it can ADD energy while the two previous methods will always cause energy to be lost. This does not mean an engine will sort out all your energy problems!

Any pilot always wants a lot of energy stored into this aircraft until the moment he touched down and needs to stop. Energy is what keeps pilots happy. No matter what source, **engine, speed, or altitude**, it can be exchanged. Most aircraft crashes happen because the aircraft simply does not have the energy to fly high enough to avoid terrain.

- Low and slow = big problems
- Fast and high = no problem

Thermals

Thermals are pockets of rising air, used by glider pilots to gain altitude. Finding them is a bit of a black art as there might be clues but you can never be certain. They are caused by the ground being heated by the sun so look for places that are likely to absorb heat. Plowed fields, tarmac/asphalt etc. As the wind blows the thermal away from the source as it rises you need to keep that in mind as well.

The best way is to fly with the seat of your pants. Trim the aircraft well and fly constant speed and level. Go to the area where the birds circle (they understand thermals better then any pilot will ever do) or look a promising cloud to go to. Observe the behavior of your aircraft. The nose will dip just before entering rising air. Even better: is one wing pushed upwards? Turn against it and you will enter the thermal. Then try to find the best rise by changing your turning radius. When established: <u>constant speed and turn angle</u>!

Of course, activating the vario tone will help a lot!

Controller and keyboard profiles

Although it is possible to fly WoA with just a keyboard, we strongly advise using a dedicated controller, if possible, a joystick. Even a cheap one will increase your control of the aircraft tremendously. There are 5 default controller configurations (profiles) included. Select the one that seems most suited to your hardware. You will find more about the assignments in Appendix A

- **FULL KEYBOARD AND LAPTOP KEYBOARD**
  If you do not have any controller, you can use either of these profiles. The Full Keyboard profile is also active as secondary option when you selected a profile with a controller. In other words, while you can use a button on your controller to toggle the gear, you can always use the [g] key as well.

  All camera and slew controls are slowed down with LEFT SHIFT and sped up with LEFT CONTROL. All Voice related commands are given with the [SHIFT] key. Many keys have a secondary option that is activated using the [LEFT ALT KEY]

- **GAME CONTROLLER**
  Using a simple game controller will increase your control. Any game controller should work as long as it is seen as a Human Input device in Windows. You will be able to control almost all options of the simulator with the game controller.

- **SIMPLE JOYSTICK T.1600**
  We have selected the ubiquitous Thrustmaster T.1600 series that is sold in many versions (as a space simulator set, an Airbus set etc.). It is a great stick with throttle control and a twist option to control your rudder. Virtually all options the simulator offer can be controlled with this joystick.

- **H.O.T.A.S. CONTROLLER**
 HOTAS means Hands On Throttle And Stick and is intended to let the pilot control the aircraft without having to move his hands from the controller. It includes a joystick and throttle control and many buttons. We selected the Saitek X-52 Flight Control System as example of this category. It will work seamlessly with the Saitek X-55 and X-56. You will not need your keyboard with a controller like this.

Making your own profile

If none of the provided profiles fit (or if you want to change some assignments). We advise you to start with the profile that matches your setup best. We will try to collect more profiles via our support department and will share those.

To change an assignment, double click on the field you want to change and click the button you want to assign to that action. If the name shows 'Axis' you cannot assign a button but only a controller axis. If you want to remove an assignment select 'Not Assigned'. If you see '???' it means you still need to set that assignment before the profile can be saved.

Please note that you can assign two keys (or axis) to each action. You can also use multiple controllers.

The aircraft

There are five aircraft included in this product. Two standard gliders, two motorized gliders and one tow aircraft that will help you get the glider in the air.
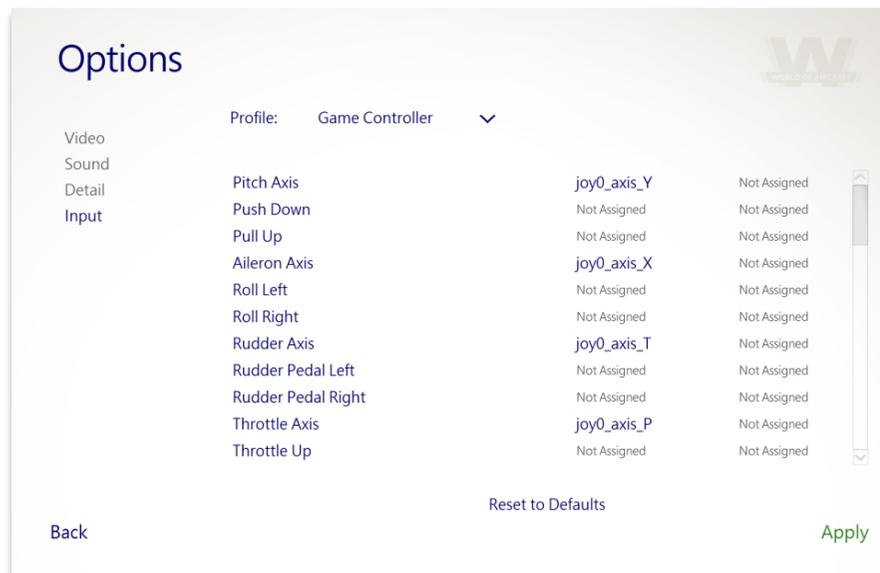
Pzl-104 wilga

The PZL-104 Wilga was developed by the Development Design Office of the PZL factory (Poland). It was designed to be a sturdy and simple aircraft able to operate from small unpaved runways. The high wing has additional lift surfaces so it is a real STOL (Short Take-Off and Landing) aircraft that can fly at very low speeds and has very gentle stall characteristics.

The pilot and navigator were placed next to each other to make communication easier. This also makes the Wilga a very good training aircraft. Many years after it was designed many are still in use all over the world to tow gliders or to take parachutists to drop from altitude.

In many ways this is a real Eastern European aircraft. It lacks many of the niceties that the mostly US aircraft had during the same period and it also has some quirky features like a starting system that uses compressed air. Unlike some aircraft that can be flown with two fingers the Wilga needs two hands. Many of the controls are large and rather cumbersome but that is one of the charms of the Wilga. They might not be very refined but they do work and in fact they work very well and are utterly reliable.

When you take your first flight in the Wilga you are in for a shock. The engine is very large and very loud. The Wilga shakes as the engine warms up (that does take a while) and there is a distinct smell of avgas and oil in the cockpit (you can add oil in flight!). You will not see much other than the sky as the large engine and massive propeller causes the tail wheeled aircraft to be tilted backward a lot. With the warmed engine the aircraft is ready to take-off. At take-off power it seems like the engine will explode, noise levels are incredible, and it seems bits will fly off. It is hard to keep straight at low speeds without tail wheel steering. But after a very small run the aircraft transforms itself from a lumbering beast to a rather nimble aircraft. The flying characteristics are docile, and it never seems out to surprise you. If you convert enough noise to speed it will fly very stable. Landing is a non-event if you keep the speed in mind. Throttle back and the massive drag and weight slows the Wilga down very fast.

Although we provide a lot of tables and data in this manual you should use them as a guide. The Wilga will tell you at what speed she wants to take off and at what speed she will still fly. Just be careful with the throttle, when you reduce power to idle the Wilga becomes the proverbial brick.

The PZL-104 has high mounted wing that includes slot flap drooped aileron and fixed wing slats. The fuselage is made up from a semi-monocoque metal frame with partially fabric covered panels. The power plant consists of the radial reciprocating air-cooled engine AI-14RA with a two-blade rotor controllable pitch propeller. The twin fuel tanks are in the wings. The cockpit is closed, four-passenger, with dual control, has the big glass areas for better visibility and has two removable doors. Equipment differs but most aircraft are equipped with basic navigation instruments and communication radios.

Propeller control

The Wilga and the Dimona have both throttle (the big yellow lever in the Wilga) and propeller controls (the smaller grey lever). If you rather not bother with this just leave the propeller lever fully forwards.

The propeller lever controls the pitch of the propeller blades and can be best compared to a woodscrew. Imagine a crew with very fine thread, it will be easy to screw in but with each turn will only move into the wood a small amount. A screw with very course thread will be much harder to turn but move into the wood a lot faster.

You can also see it like a manual gear in a car. In first gear the car will only move slowly but will have a lot of power, for example to go uphill, in a high gear the engine rpm will be low while the speed is high, but you will have little power to increase speed.

In an aircraft you use the variable pitch to optimize the engine power. At low speeds you use a fine pitch (lever forward), at high speed, or when you want to cruise at low rpm you use a coarser pitch.

How to fly the wilga

The Wilga is one of those aircraft that laughs at its manuals. It flies slower and faster than the manual states it does, it can carry more and can use less runway. But it is up to the pilot to get it out of the aircraft. The Wilga, however, will help a lot as it flies slow and never surprises you. On take-off it will tell you when it wants to fly and on landing it is easy to judge when she is about to stall. Just keep in mind when you cut the throttle the airspeed will drop dramatically.

Towing procedures

Towing a glider is not a procedure without risk. The tow and glider pilot will have to work together to make it a safe procedure. For this, the Chat can be used when there is no voice communication between the two pilots.

Take-off

The tow pilot needs to understand how the additional drag will increase the length of the take-off and he needs to be aware at what point a safe take-off is no longer possible.   Of course, this depends on the weight of the glider and weather conditions, but to make things a bit easier there is a small flag placed next to the runway at ¾ of the length. If you do not feel comfortable, this is the point where you abort.

Take up slack

The tow aircraft taxies forwards very slowly to take up the slack on the line. The glider can keep a bit of pressure on the brakes to avoid being 'jerked' forwards.

Hold

With the line tight, this is the moment where to do your last checks, if you want to abort, this is the moment. Check if your brakes are released and speed brakes are in

Take-off

If there is no voice communication the glider pilot indicates he is ready by waggling the rudder. The tow pilot radios he is about to take-off with a glider.

The tow pilot applies smooth power without any hesitation (otherwise the glider might roll onto the two rope). Keep in mind that due to ground effect the aircraft might seem ready to climb but is actually not.

Normally the glider will lift first and should correct for crosswind immediately to avoid the tow aircraft being slewed sideways. The glider should stay behind the tow aircraft. The glider should NOT be over 20

feet above the tow aircraft to avoid the tow aircraft being pitched forwards.

Climb

The tow aircraft should establish a steady constant airspeed climb with only very slow changes in speed. Normally full throttle is used, and efficient propeller control is advised. Bank angles should be limited to 20 degrees and preferably only after notifying the glider pilot. Maximum tow speed for the Blanik is around 160 km/h (86 mph/76 knots).

The glider pilot should remain in his position directly behind the two aircraft (above the propwash).

Thermals

The tow pilot should avoid known thermals as the glider pilot will find it hard to stay behind the tow aircraft and might need to extend speed brakes. This creates a less predictable situation and thus is dangerous.

Release

When approaching the release point the glider pilot will try to get some tension on the tow line so the tow pilot will feel the release.

When the tow rope is released, the glider turns 90 degrees right and the tow aircraft starts a 90 degrees left descending turn.

Descent (tow aircraft)

The tow aircraft should make sure the reduction in throttle setting is done gradually as the engine was working at close to max capacity and it will not appreciate a very fast cool down. Side slipping and flaps should be used to avoid low throttle settings.

As the tow line is hanging behind the aircraft at a 30-to-40-degree angle, the tow pilot needs to make sure it cannot be entangled in obstacles or be a danger to other aircraft.

Emergency signals

When the tow aircraft has a critical problem, it will rock its wings, this indicates the glider needs to release the tow line without any delay.

When the glider has a problem and cannot release it moves to the left of the tow aircraft (the tow pilot will feel that) and rock its wings. The tow aircraft can then tow the glider to the airport at minimal speeds.

General characteristics

- Crew: one
- Capacity: three passengers
- Wingspan: 11.12 m *(36 ft 5 in*)
- Wing area: 15.50 m2 *(166.85 sq ft)*
- Empty weight: 900 kg *(1,984 lb)*
- Gross weight: 1300 kg *(2,868 lb)*

Performance

- Cruise speed: 195 km/h *(121 mph, 105 knots)*
- Range: 670 km *(416 mi, 361 nmi)*
- Service ceiling: 4,040 m *(13,255ft)*
- Rate of climb: 5.5 m/s *(1,082 ft/min)*

H36 Dimona

The Hoffmann H36 Dimona is not your regular small aircraft. It is in the rather exclusive class of touring motor gliders; aircraft that are a cross between motor aircraft and gliders. They got the long wings of a glider but a standard (though often rather small) aircraft engine. You can either use them as a normal aircraft or switch off the engine and glide for a while.

Truth be told, the H36 Dimona is not a brilliant aircraft. As a motor aircraft it a bit unwieldy, as a glider it just not has the performance you would hope for and as a touring motor glider it seems to combine the worst of both types of aircraft. But it has something that few aircraft have, character. Just minutes after you first climbed in (it is a bit like a sports car, you lower yourself in the seat) it is clear, this is not a Cessna, it is something else. Visibility is superb all around even as you slide the canopy down. On both sides the long slender wings seem to stretch forever. All controls are utilitarian and feel solid. It is an old bird but she seems to give you confidence. Take-off is a matter of lining up and throttle up. No need to do anything, after an amazing short run she flies of the runway on her own. Just be careful in crosswind, those long wings

have a mind of their own. Soon thereafter you will notice she seems to have grown into a huge Antonov on take-off as the control forces are much greater than you would expect. But this also means she flies very calm and there is not a hint of the nervousness some other aircraft have. Just be careful when you get in thermals because when she gets a whiff of that her glider background takes over and you will have to work to keep her straight and level. Even though most Dimona's are flown as pure motor aircraft these days feel free to switch the engine off and save some fuel. Landing is a non-event, just like the take-off. Just keep in mind that the long wings will make her unwilling to land. As you park, she has one last surprise, the engine is unwilling to stop and she 'diesels' and sputters a bit when you switch the ignition off. And then you know, this is not a machine, this is a friend!

How to fly the Dimona

The Dimona has it quirks when you fly it. It needs some serious rudder to keep your turn coordinated and you may have the feeling you are in a much larger aircraft. Everything seems to happen a bit slow. If you keep that in mind (plus the limited power of the engine) you should be fine.

When you want to go from motorized flying to gliding it is best to run the engine at idle for a minute to cool it down before shutting it done. Landing is normally done like a normal glider with the engine just above idle. The landing should be with both main and tail gear at the same time and is normally pretty hard due to the stiff landing gear.

Crosswind landing are rather hard in the Dimona as the tailwheel is linked to the rudder. Thus, the aircraft tend to go towards the side the rudder is pointing at.

General characteristics

- Crew: one
- Capacity: one passenger
- Wingspan: 16.0 m *(52 ft 6 in)*
- Wing area: 15.24 m2 *(164.0 sq ft)*
- Aspect ratio: 16.8:1
- Airfoil: Wortmann FX 63-137
- Empty weight: 497 kg (1,096 lb)
- Gross weight: 770 kg (1,698 lb)
- Fuel capacity: 80 liters (18 imp gal; 21 U.S. gal)
- Propellers: 2-bladed Hoffmann HO-V 62-R/L 160 T, three position, fully feathering

Performance

- Cruise speed: 182 km/h *(113 mph, 98 knots)*
- Never exceed speed: 275 km/h *(171 mph, 148 knots)* sea level to 6000 feet
- Range: 1,090 km *(680 mi, 590 nmi)*
- Maximum glide ratio: 27:1 at 105 km/h *(65 mph)*
- Rate of sink: 0.91 m/s (179 ft/min) at 79 km/h *(49 mph)*
- Wing loading: 48.56 kg/m2 *(9.95 lb/sq ft)*

ASK 21
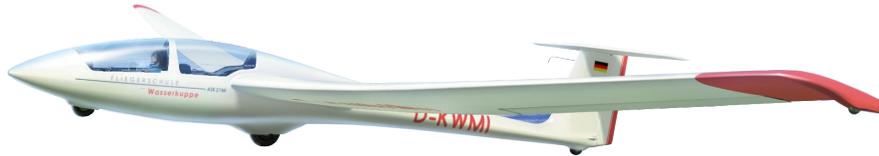
The Schleicher ASK21 is one of the best-known gliders as it is used in many glider schools. It has very predictable handling, a rather large and not very noisy cockpit. It gives new pilots confidence and there is no glider that has more students into rated pilots than any other glider. More than 900 have been constructed and they are still in production.

While being very easy to fly, it is also capable of moderate aerobatics, see below. The rather robust wings guarantee good low speed characteristics (it can be safely flown at 65 km/h (35 knots)) and it has very docile stall and spin characteristics (you will need to install a spin kit though). Recovery is fully standard and when initiated directly can be done with minimal loss of altitude.

Flying the ASK 21

As said the ASK 21 is not hard to fly and has little or no known weaknesses. Just keep in mind that pitch controls your airspeed. The cockpit is not very large, but the seats are comfortable. As in many gliders it can get incredibly hot though.

As the spoilers are highly effective, you can stay pretty high on approach and use the spoilers to slow down and loose altitude. Also, side slipping is a very effective method to slow down and loose altitude in this aircraft.

Just before touch down reduce the airbrakes to avoid touching down with the wheel brakes applied too much. After landing, and below stall speed) the stick should be held full back.

Aerobatics

While being designed as a trainer the ASK21 is a very capable aircraft that is used for aerobatics (class A Aerobatic) and cross-country flights. It is approved for these maneuvers:

- inverted flying
- slow rolls
- loops
- spins
- stall turns
- Split 'S'
- Immelmann turn
- steep climbing turn
- Chandelle
- Lazy Eight

The ASK21 Mi is a lot less aerobatic – why mention Mi version here? (it is classed as a utility aircraft after all) due to the lower load factors and it is certified for:

- spins
- steep climbing turn
- Lazy Eight
- loop upward

General characteristics

- Crew: 2
- Length: 8.35 m *(27 ft 5 in)*
- Wingspan: 17 m *(55 ft 9 in)*
- Height: 1.55 m *(5 ft 1 in)*
- Wing area: 17.95 m2 *(193.2 sq ft)*
- Aspect ratio: 16:1
- Airfoil: FX S02-196 / FX 60-126
- Empty weight: 360 kg *(794 lb)*
- Max takeoff weight: 600 kg *(1,323 lb)*

Performance

- Stall speed: 65 km/h *(40 mph, 35 knots)*
- Never exceed speed:
    - 280 km/h (170 mph, 150 knots) in smooth air
    - 200 km/h (110 knots) in rough air
    - 180 km/h *(97 knots)* on aero-tow
    - 150 km/h *(81 knots)* on winch launch
- g limits: +6.5 -4 at 180 km/h *(97 knots)*
- Maximum glide ratio: 34 at 90 km/h *(49 knots)*
- Rate of sink: 0.64 m/s (126 ft/min) at 67 km/h *(36 knots)*
- Wing loading: 33.4 kg/m2 *(6.8 lb/sq ft)*

Ask 21 Mi

The ASK 21 Mi has a small engine delivering 41 kW. This is enough to allow the ASK21 Mi to take off eliminating the need for a tow aircraft and extending the cross-country capabilities. However, that does not mean this is a motor glider in the original sense of the word. The ASK21 Mi is classed as a 'motorized glider'. Like the ASK 21 it is a durable and robust aircraft, easy to fly and handle on the ground, you do not need any person to hold your wing.

The air-cooled rotary engine is extremely reliable with an electronic ignition and fuel injection system that allow it to run up to 90 minutes on the internal tank. Using its engine, it can keep up with GA aircraft in controlled airspace and on busy airports.

The engine is fixed in the fuselage and the propellor extends from the fuselage and drives the propeller with a belt. This ensures minimal air resistance and keeps the maintenance to an absolute minimum.

How to fly the Ask 21 Mi

The ASK 21 Mi flies almost the same as the engineless ASK 21, it is just a bit heavier, so the performance is a bit less. Using the engine is very simple, use the command to raise the propeller with the [key and start the engine with the E key. If you want to fold it in first run the engine at

4000 RPM for a minute to ensure optimal oil flow, then stop the engine with the E key and wait 5 seconds before lowering the propeller with the] key.

If you want to start from the ground just raise the propeller, start the engine, give it 30 seconds to warm up actually before applying full throttle. Try to get the low wing off the ground as soon as possible. Climb performance is limited, but do not be tempted to keep the engine at full throttle. Let the RPM get back to 7100 in climb after 3 minutes.

Avoid longer periods of low-speed flight to avoid overheating of the exhaust.

Aerobatics

The ASK21 Mi is a lot less aerobatic due to the lower load factors and it is certified for:

- spins
- steep climbing turn
- Lazy Eight
- loop upward.

General characteristics

- Crew: 2
- Length: 8.35 m *(27 ft 5 in)*
- Wingspan: 17 m *(55 ft 9 in)*
- Height: 1.55 m *(5 ft 1 in)*
- Wing area: 17.95 m2 *(193.2 sq ft)*
- Aspect ratio: 16:1
- Airfoil: FX S02-196 / FX 60-126
- Empty weight: 360 kg *(794 lb)*
- Max takeoff weight: 600 kg *(1,323 lb)*
- Engine system
  - Rotary engine type: IAE 50R-AA
  - Engine power: 56 PS/41 kW
  - Capacity: 294 cm³
  - Fuel tank fuselage: 23l *(6.1 US-Gal.)*
  - Take-off roll: 250 m *(820 ft)*
  - Rate of climb: 2.7 m/s *(531 ft/min)*
- Propeller
  - Manufacturer: AS
  - Diameter: 1,55 m *(5.08 ft)*
  - Blades: 2

Performance

- Stall speed: 80 km/h *(44 mph, 39 knots)*
- Never exceed speed:
  - 280 km/h (170 mph, 150 knots) in smooth air
  - 200 km/h (110 knots) in rough air
  - 180 km/h *(97 knots)* on aero-tow
  - 150 km/h *(81 knots)* on winch launch
- g limits: +6.5 -4 at 180 km/h *(97 knots)*
- Maximum glide ratio: 34 at 90 km/h *(49 knots)*

- Rate of sink: 0.64 m/s (126 ft/min) at 67 km/h *(36 knots)*
- Wing loading: 33.4 kg/m2 *(6.8 lb/sq ft)*

Let l-13 Blaník

This two-seater trainer has been for many pilots the aircraft they got their first flight in. It is used all over the world with over 3000 aircraft build since 1958. Even though it is a Czech aircraft, the US Airforce (and many other Air Forces) used it for a very long time for basic flight training (under the TG-10C name). The Blaník has exception good low speed handling with effective rudders control. It is highly forgiving.

The glider is so well designed for novices that even with a retracted undercarriage the aircraft will make a smooth landing! This is even the advised method on very soft ground. Take-off with retracted gear however is not allowed and rather dangerous.

How to fly the Blanik

The Blanik is a very docile glider with excellent behavior in stalls and spins. It is slightly pitch sensitive and care should be taken not to brake too hard to avoid the nose pitching down. Landing is done with a very slight tail down attitude.

During the tow partial flaps can be used to get the aircraft off the ground fast. Retract when at safe height (or when 60 knots is reached). Partial flaps can also be used in thermals to reduce the turning radius.

You will find the Blanik accelerates very fast in a dive so make sure you do not exceed the placarded limits. Use air brakes where needed.

After landing avoid heavy use of the brakes and keep the control column fully back.

Aerobatics

While being designed as a trainer the Blanik is a very capable aircraft that is used for modest aerobatics. It is approved for these maneuvers:

- stall turns
- slow rolls
- loops
- spins
- split / inverted spin
- Chandelle
- steep climbing turn
- Chandelle
- Lazy Eight
- Cuban Eight

General characteristics

- Crew: 2
- Length: 8.4 m (27 ft 7 in)
- Wingspan: 16.2 m (53 ft 2 in)
- Wing area: 19.15 m2 (206.1 sq ft)
- Aspect ratio: 13.7
- Empty weight: 292 kg (644 lb) equipped
- Gross weight: 500 kg (1,102 lb)

Performance

- Stall speed: 62 km/h (39 mph, 33 knots) (Flaps 0°), 56 km/h (34.8 mph; 30.2 knots) (Flaps 10°)
- Never exceed speed: 240 km/h (150 mph, 130 knots)
- Rough air speed max: 145 km/h (90.1 mph; 78.3 knots)
- Aerotow speed: 140 km/h (87.0 mph; 75.6 knots)
- Winch launch speed: 100 km/h (62.1 mph; 54.0 knots)
- Terminal velocity: with full airbrakes 258 km/h (160 mph; 139 knots)
- g limits: +5 -2.5 at 136 km/h (84.5 mph; 73.4 knots)
- Maximum glide ratio: 28.2 at 93 km/h (57.8 mph; 50.2 knots)
- Rate of sink: 0.84 m/s (165 ft/min) at 83 km/h (51.6 mph; 44.8 knots)
- Wing loading: 26.1 kg/m2 (5.3 lb/sq ft)

Appendix A: default profiles

Full Keyboard

Full Keyboard

All camera and slew controls are slowed down with SHIFT and sped up with CONTROL

Commands shown like this are given with [LEFT- SHIFT]

Commands shown like this are given with left [LEFT-ALT]

ESC MENU		F1 COCKPIT CAM	F2 ORBITING CAM	F3 FLY BY CAM	F4 CHASE CAM	F5 FREE CAM	F6	F7	F8	F9	F10	F11	F12 STEAM SCREENSHOT

PRTSCR	SCROLL LOCK	PAUSE PAUSE

`	1 THROTTLE UP *RADIO 1*	2 THROTTLE DOWN *RADIO 2*	3 *RADIO 3*	4 RPM UP *RADIO 4*	5 RPM DOWN *RADIO 5*	6 *RADIO 6*	7 *RADIO 7*	8 *RADIO 8*	9 *RADIO 9*	0 RADIO MENU	- CHAT	=	BACK

INS	HOME RESET CAM & VIEW	PAGE UP MAP ZOOM IN

NUMLOCK	/	*	- ZOOM OUT

TAB STEAM OVERLAY	Q VARIO TOGGLE	W	E ENGINE START	R	T TOW TOGGLE	Y	U	I	O	P	[PROP UP	] PROP DOWN	\

DEL *CAM BACKW*	END *CAM FORW*	PAGE DWN MAP ZOOM OUT

7	8 PITCH DOWN *TRIM DOWN*	9	+ ZOOM IN

CAPS	A	S	D	F FLAPS UP	G GEAR TOGGLE	H OHHH HELP! *KILL ME*	J	K SPOILER DEPLOY	L TOGGLE LABELS	;	'	ENTER

4 ROLL LEFT *TRIM LEFT*	5 *CENTER TRIM*	6 ROLL RIGHT *TRIM RIGHT*

SHIFT	Z RUDDER LEFT	X RUDDER RIGHT	C CANOPY TOGGLE *MOUSE PAN*	V FLAPS DOWN	B	N	M MAP	, SPOILER RETRACT	.	/	SHIFT

↑ PAN UP *CAM UP*

1	2 PITCH UP *TRIM UP*	3	ENTER

CONTROL	WIN	ALT	SPACE WHEEL BRAKES / RESPAWN	ALT	WIN	≡	CONTROL

← PAN LEFT *CAM LEFT*	↓ PAN DOWN *CAM DOWN*	→ PAN RIGHT *CAM RIGHT*

0	,

Laptop Keyboard

Laptop Keyboard

All camera and slew controls are slowed down with SHIFT and sped up with CONTROL

Commands shown like this are given with [LEFT- SHIFT]

Commands shown like this are given with left [LEFT-ALT]

ESC		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
MENU		COCKPIT CAM	ORBITING CAM	FLY BY CAM	CHASE CAM	FREE CAM					ZOOM IN	ZOOM OUT	STEAM SCREENSHOT

`	1	2	3	4	5	6	7	8	9	0	-	=	BACK
	THROTTLE UP	THROTTLE DOWN		RPM UP	RPM DOWN					RADIO MENU	CHAT		
	RADIO 1	RADIO 2	RADIO 3	RADIO 4	RADIO 5	RADIO 6	RADIO 7	RADIO 8	RADIO 9				CAM FWD

TAB	Q	W	E	R	T	Y	U	I	O	P	[	]	\
STEAM OVERLAY	VARIO TOGGLE	PITCH DOWN	ENGINE START		TOW TOGGLE						PROP UP	PROP DOWN	
		TRIM DOWN											CAM BACK

CAPS	A	S	D	F	G	H	J	K	L	;	'	ENTER
	ROLL LEFT	PITCH UP	ROLL RIGHT		GEAR TOGGLE	OHHH HELP!		SPOILER DEPLOY	TOGGLE LABELS	FLAPS UP	RUDDER LEFT	RUDDER RIGHT
	TRIM LEFT	TRIM UP	TRIM RIGHT			KILL ME						

SHIFT	Z	X	C	V	B	N	M	,	.	/	SHIFT
			CANOPY TOGGLE				MAP	SPOILER RETRACT		FLAPS DOWN	
			MOUSE PAN								

CONTROL	WIN	ALT	SPACE				ALT	WIN	≡	CONTROL
			WHEEL BRAKES / RESPAN							

	↑	
	PAN UP	
	CAM UP	

←	↓	→
PAN LEFT	PAN DOWN	PAN RIGHT
CAM LEFT	CAM DOWN	CAM RIGHT

Game Controller

Note that the other commands are as configured for the Full Keyboard.

THROTTLE DOWN

PROPELLER RPM DOWN

RESET VIEW

GEAR TOGGLE

THROTTLE UP

PROPELLER RPM UP

FLAPS UP

⇧ NOSE DOWN
⇩ NOSE UP
⇦ ROLL LEFT
⇨ ROLL RIGHT

⇧ VIEW DOWN
⇩ VIEW UP
⇦ VIEW LEFT
⇨ VIEW RIGHT

⇦ RUDDER LEFT
⇨ RUDDER RIGHT
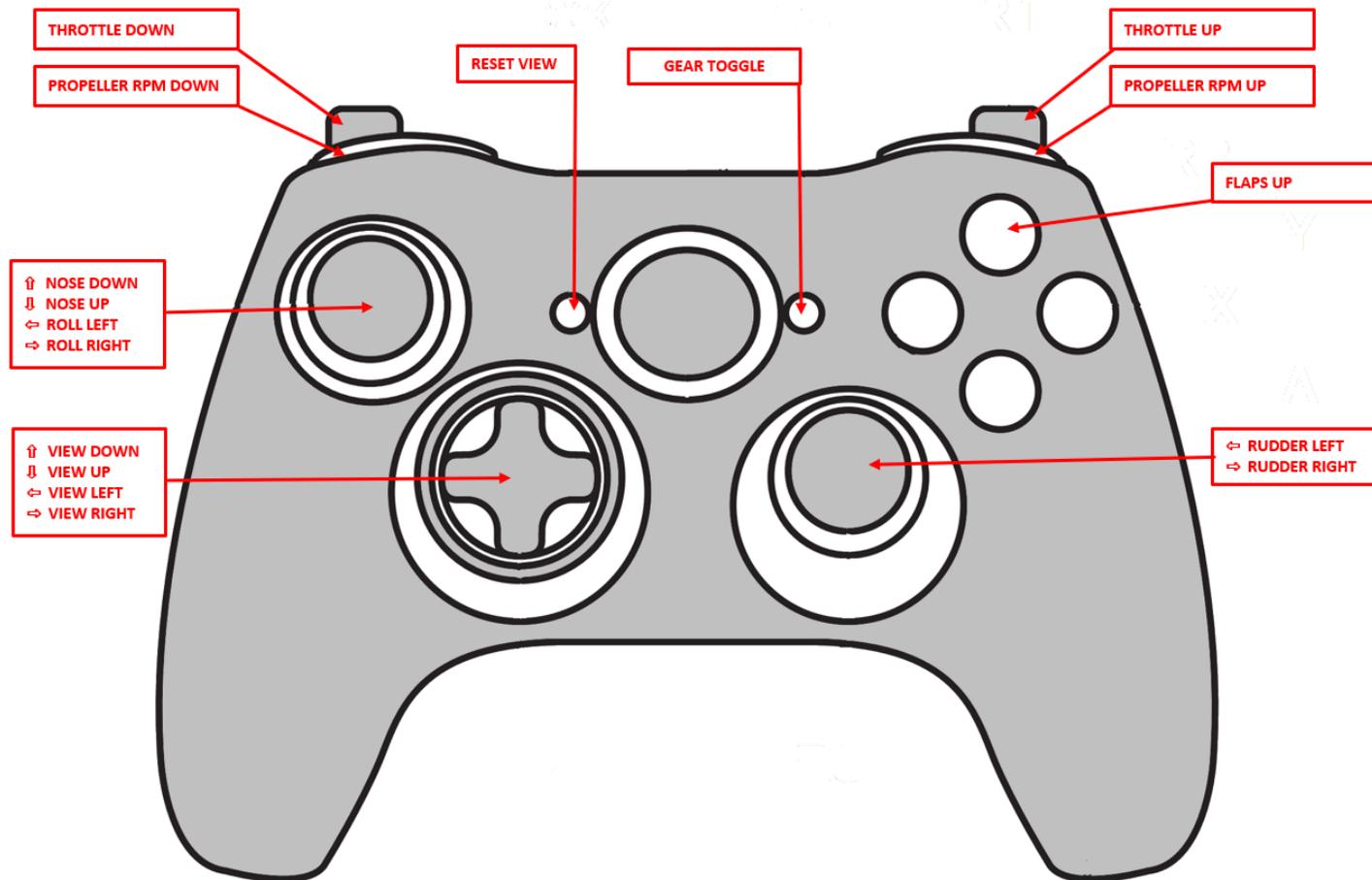
Simple controller (based on Thrustmaster TCA Sidestick / T.1600)

Note that the other commands are as configured for the Full Keyboard.

PAN VIEW

RESET CAMERA

ENGINE TOGGLE

RESET VIEW

WHEEL BRAKES

↻ RUDDER RIGHT
↺ RUDDER LEFT
⇧ NOSE DOWN
⇩ NOSE UP
⇦ ROLL LEFT
⇨ ROLL RIGHT

⇧ PROPELLER RPM UP
⇩ PROPELLER RPM DOWN

⇧ PROPELLER DEPLOY
⇩ PROPELLER RETRACT

⇧ FLAPS UP
⇩ FLAPS DOWN

⇧ SPOILER DEPLOY
⇩ SPOILER RETRACT

GEAR TOGGLE

⇧ MOVE CAMERA UP
⇩ MOVE CAMERA DOWN

CANOPY TOGGLE
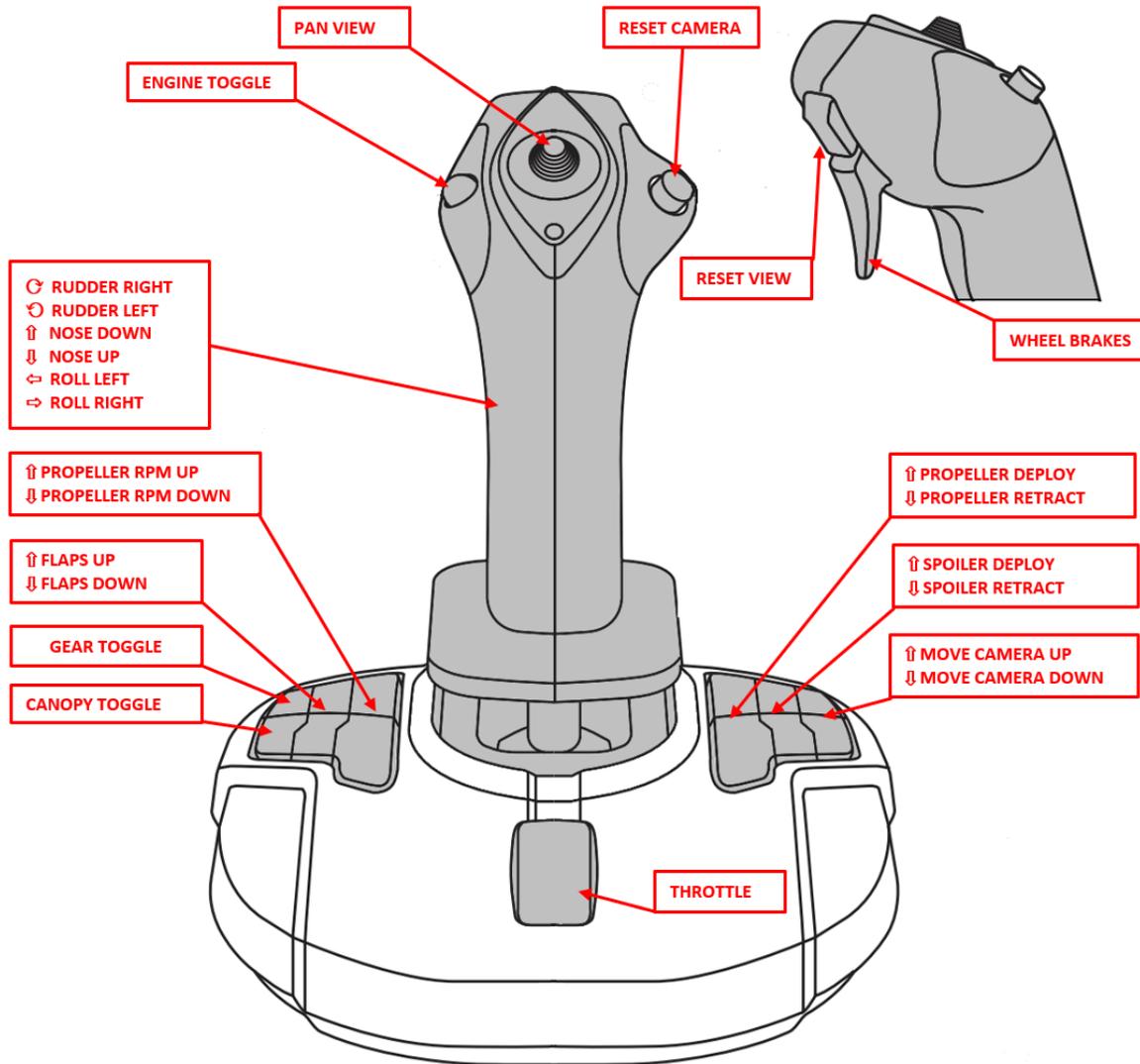
THROTTLE

H.O.T.A.S Controller (based on Saitek X52)

Note that the other commands are as configured for the Full Keyboard.

⇓ ENGINE START

PROPELLER RPM

THROTTLE

⇓ TOW RELEASE

⇑ PROPELLER DEPLOY
⇓ PROPELLER RETRACT

⇓ CANOPY TOGGLE

RESET CAMERA

PAN VIEW

RESET VIEW

MOVE CAMERA UP

MOVE CAMERA
LATERAL

MOVE CAMERA DOWN

↻ RUDDER RIGHT
↺ RUDDER LEFT
⇑ NOSE DOWN
⇓ NOSE UP
⇐ ROLL LEFT
⇒ ROLL RIGHT

WHEEL BRAKES

⇓ GEAR

⇑ FLAPS UP
⇓ FLAPS DOWN

⇑ SPOILER DEPLOY
⇓ SPOILER RETRACT
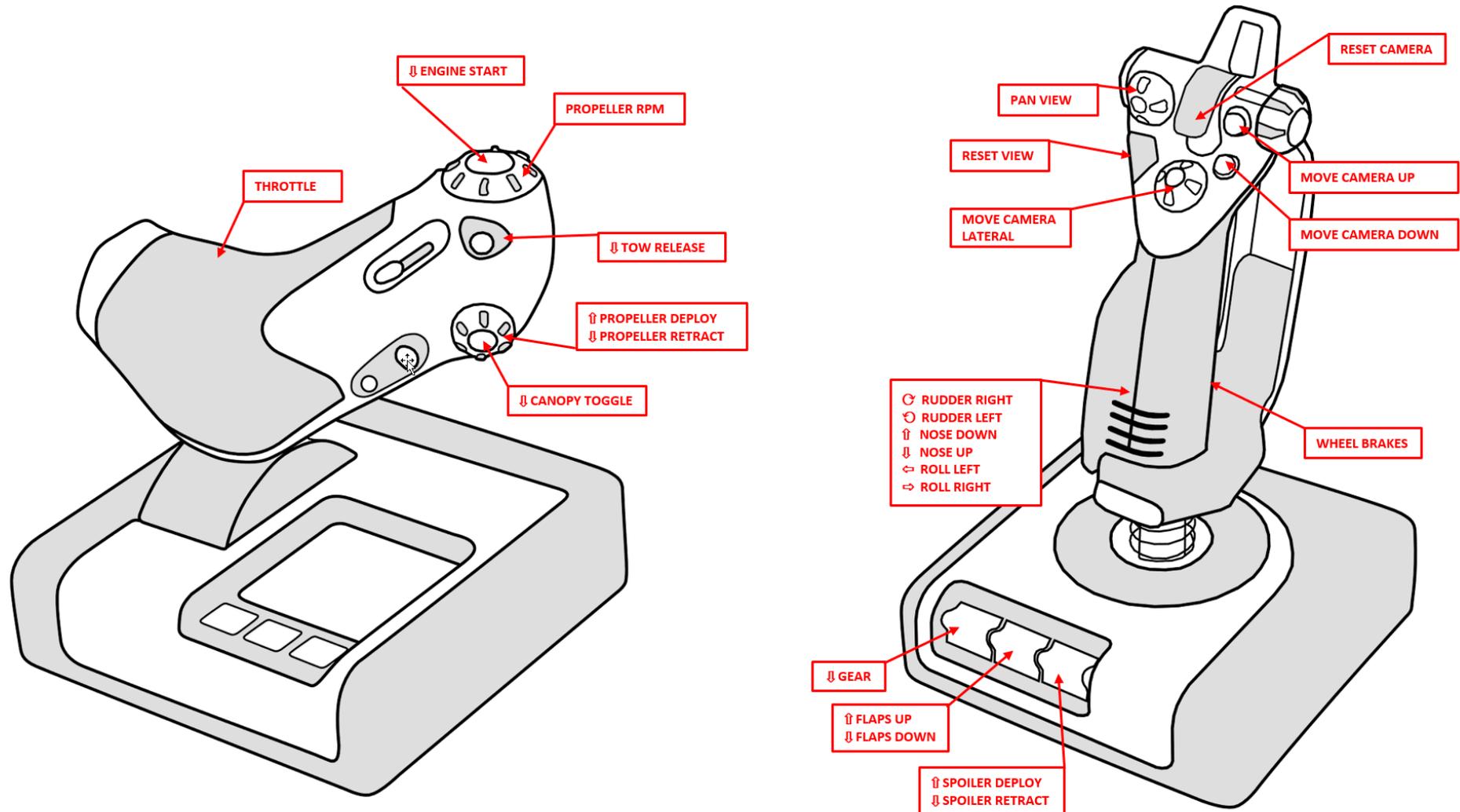
Saitek X55

Created and provided by Christophe Charrier

WORLD OF AIRCRAFT : X-56 Stick & Throttle Bindings
GLIDER SIMULATOR

RELEASE / ATTACH ROPE

↑	MOVING THE CAMERA UP
→	MOVING THE CAMERA TO THE RIGHT
↓	MOVING THE CAMERA DOWN
←	MOVING THE CAMERA TO THE LEFT

↑	ROTATING THE CAMERA UP
→	ROTATING THE CAMERA TO THE RIGHT
↓	ROTATING THE CAMERA DOWN
←	ROTATING THE CAMERA TO THE LEFT

PAUSE MENU

SWITCH THE VARIO TONE

MAGIC BUTTON (PRESS AND HOLD)

↑	QUICK RADIO MESSAGE 2
→	QUICK RADIO MESSAGE 3
↓	QUICK RADIO MESSAGE 4
←	QUICK RADIO MESSAGE 1

BRAKE / RESET

↑	TRIM DOWN
→	TRIM RIGHT
↓	TRIM UP
←	TRIM LEFT

SPOILER AXIS

THROTTLE AXIS

↕	
↔	
O	SELF DESTRUCTION

↕	
↔	
O	RESET CAMERA

RESET THE COMPENSATOR

↕	PITCH AXIS
↔	ROLL AXIS
O	RUDDER AXIS

↑	FRONT CAMERA (COCKPIT VIEW)
↓	ORBITAL CAMERA

GEAR IN/OUT

↑	FLYBY CAMERA
↓	CHASE CAMERA

↑	FREE CAMERA
↓	CHANGE THE MAP

↑	MOVE CAMERA FORWARD
↓	MOVE CAMERA BACK

↑	ZOOM IN CAMERA
↓	ZOOM OUT CAMERA

O	
O	RPM / MIN AXIS

O	
O	QUICK RADIO MESSAGE MENU

OPEN / CLOSED CANOPY

↑	FLAPS IN
↓	FLAPS OUT

↑	RAISE THE PROPELLER
↓	RETRACT THE PROPELLER

O	
O	QUICK RADIO MESSAGE 9

ENGINE START

↑	MAP ZOOM IN
↓	MAP ZOOM OUT

↑	QUICK RADIO MESSAGE 6
→	QUICK RADIO MESSAGE 7
↓	QUICK RADIO MESSAGE 8
←	QUICK RADIO MESSAGE 5

↑	SWITCH CHAT
↓	TOGGLE LABELS