Microlight Aircraft and Composite Engineering

Swift'Light-PAS

Engine kit for Swift'Light

Flight Manual

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Warning

You are going to be a powered Swift pilot! Congratulations, and welcome on board the highest performing foot launch aircraft on the market.
The Swift is designed to be easy to fly and safe.
BUT, like all forms of flight the Swift requires an appropriate training, which encompasses the flying of the Swift as well as knowledge of the weather conditions and the air mass.
Furthermore, the Swift'Light is not certified; flying this machine is done entirely under the pilot's own responsibility and risk. One must calculate whether or not one is going to fly in respect to weather conditions and one's physical and mental state on any particular day, and, of course, the condition of one's flying machine. The pilot has the whole responsibility of maintenance and pre-flight checks of his / her Swift.
Flying, however prudent, carries risk of accident causing injury and even death.
Aeriane s.a. (ltd) takes no responsibility or guarantee in respect to these risks and offers no guarantee to any aeronautic norms or regulations. Therefore Aeriane is not covered by any third party insurance pertaining to any in-flight risks.
Reading and comprehension of this manual is indispensable before the 1st flight. Don't hesitate to ask questions if there are some aspects that are not clear.

FLY SAFELY!

We welcome feed back to this manual, so any suggestions you may have, please pass them on to us.

Full reading and comprehension of this manual is imperative before the 1st flight!

Contents

Same safety issues

- Caution with the propeller.

  Folded propeller passes unnoticed, but opens violently when the engine starts. This propeller is not in the pilot's visual field: pay attention that nobody is in the propeller's neighbor before starting the engine!

- Open the propeller softly when starting the engine.

  A violent propeller opening can damage the propeller, but also the reduction gear axis. See the right procedure in the chapter "start the engine".

- Electric starter: maximum 5 seconds.

  To keep a reasonable ratio weight/power, the electric starter is not oversized. Do not overheat it: use it 5 seconds, then 20 seconds cooling before a new use.

- Shut off the engine before landing.

  In case of hard landing, this wills highly decrease the damage. Also, even at idle, the engine is still "pushing" and gives a smaller landing slope, making difficult a precise landing.

- In flight engine starting: be careful!

  The engine unit is intended to be start several times during a flight. However, it is always possible that the engine will not start… Engine running or not, always stay in the safety cone of a landable field.

- Be careful with the Center of Gravity!

  The engine kit is made to keep the CG position in the correct range. This is a big issue on flying wings. It is very important to assemble the engine kit following carefully the adaptation manual and to not add equipments that can move the CG position.

- Rudder and steerable front wheel.

  To simplify and keep the weight as low as possible the engine kit, the front wheel is steered by direct action on the front fork (like a trike), but the rudder pedals works in the ""aircraft way". To avoid any confusion, have a good taxi training before the first flight. Follow this rule (at least at the beginning):
  - During taxi, steer the Swift'Light on the ground using the steerable front wheel and drive the Swift to the take off strip. Stop when perfectly aligned for taking off.
  - For the take off run, mentally lock the front fork straight, and move only the rudder pedals.

  Using both front fork and rudder pedals during take off running wheel will lead to mistakes!

- Disconnect the battery before disassembling the Swift!

  To avoid unexpected electric starter switching on!

Introduction

The Swift'Light is designed to be very light and strong. The wings are very tough in flight and the machine is made to be rigged frequently. The main problems are encountered when the rigging procedure is not carried out according to manufacturer specifications, these are found in the **RIGGING MANUAL**. So, you must carry out to the letter the procedure to avoid wasted energy and damage, notably on the skin of the wings.
If you follow the rigging sequence precisely,

- The machine will rig quickly
- You wont leave out anything that could be dangerous
- And you will have a perfect result

Consult also the **TUNING/MAINTENANCE MANUAL** for maintenance. If there are repairs or spare parts needed then look in **SPARE PARTS LIST**.

Transport

It is strongly recommended to transport the Swift Light in its XC container. It supports the wings with no pressure points and in respect of the wing twist. The walls are relatively insulated and reflect a good amount of sunlight; this protects the wings from UV and hot temperature. It is very important not to get it too hot to which composite materials are sensitive. The wings are well protected from mechanical insult.
Caution: The Swift "cross country" container is not watertight. If the rain wets the container, it is best to dry the wings and the container without delay. Take the Swift out to dry !

Handling

Don't put point pressure on any of the skin (rocks etc). The wing is reinforced where you have to handle it following the procedure below. Always support the wing with **flat hands** on the bottom surface, level with the spar (the thickest part of the wing) or at either end of the wing. Avoid putting pressure on the top surface, as it is not re-enforced.

Careful of **the big leverage effect** owing to the great span of the wing when:

- Pushing on a winglet to move the glider, this twists the cockpit, as this can bend the structure.
- When slotting on a wing make sure it is well lined up with the spar or else you could damage the spar box. And, always support the wing tip until the wing is fully slotted onto the spar.

Storage

The wings must be stored in the **dry**, out of direct sunlight and avoid extreme temperatures.
If the wings get wet they must be dried ASAP.
If the wings are not stored in the XC container then wing supports must be wide and in respect of the twist of the wings.

Engine

Always disconnect the battery when unrig, and re connect it just before adding the engine cover. An unexpected movement of the electric starter can be very dangerous!

Pointers

Careful when adding equipment:

1. **The Swift is very sensitive to the Centre of Gravity position**: don't add things that may alter the C.G. position, i.e. things that weigh more than ½ kg in the nose of tail fairing.
2. **Careful not to interfere with the air flow**, i.e. a camera remote control cable fixed to the undersurface, top surface or particularly the leading edge of the wing, can seriously change the behavior of the wing.

1. Description

a. Description – purpose

The Swift'Light is originally a foot launchable sailplane. It is designed mainly to fly in thermal lift and at low speed, without engine. This machine is comfortable, strong and especially safe. It has the best performance in its category. This engine kit is intented to give full autonomy to the Swift'Light, giving it the ability to taxi and take off without any help. But the engine unit doesn't turn the Swift'Light into an aircraft or an ultra light.
The powered Swift'Light is more an ultralight sailplane with self launch device.
This is why we choose usually to make think as simple as possible but not always in the « aircraft » mind:

- front wheel steering as a trike instead of the aircraft way
- no spring or damping on the gears
- small fuel tank
- engine close to the pilot's ears

Our main purpose is to keep the Swift'Light qualities and behavior with the engine.

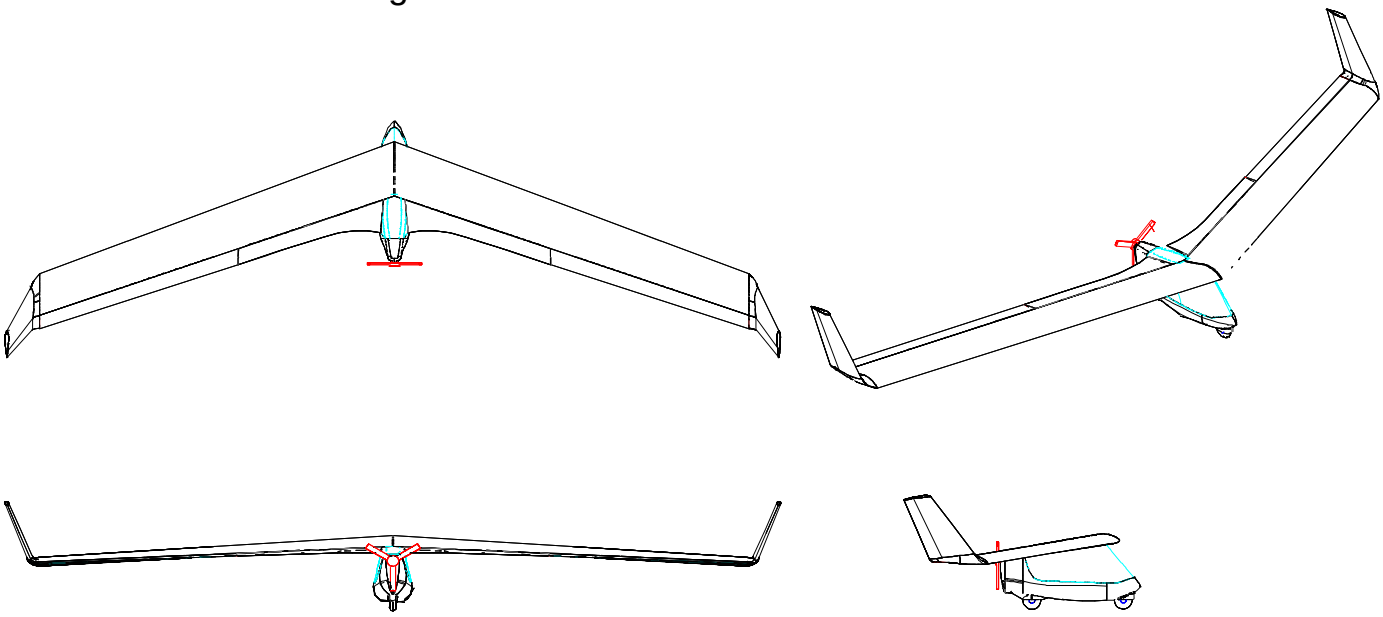
The kit is designed to make the changing from one version to the other easy.

The Swift'Light-PAS is not designed for aerobatic flights.

b. Engine and propeller

Engine SOLO 210, one cylinder 2 stroke with cylinder head turned to the bottom, electric starter, battery charged by the engine.
Reduction gear using PolyV belts Hutchinson, ratio 1 : 2,5.
Engine feeded by carburetor with floater or membranes, depending on the versions.
Fuel : 2-stroke mixture (with 2,5 % synthetic lubricant).
Exhaust sytem: silencer, or tuned exhaust pipe + silencer, depending on the version.
Arplast foldable propeller, opened by centrifugal force at very low speed. Blades are folded when the engine is stopped by elastic.

c. 3-view drawing



2. Limits – speeds – Weights – load factors

The swift light is a foot launch able glider designed to fly in lift.
Unlike other footlaunchable aircraft, with the Swift'Light it is easy to fly much faster than the Vne (Never Exceed speed). To fly safely it is important to keep in mind the speed limits, and always stay under these limits.

- Aerobatic maneuvers and spins are forbidden.
- Authorized maneuvers:
  - 60° of bank in the roll axis
  - In pitch: - 30° nose up in respect to the horizon
    - 30° in a dive in respect to the horizon

The swift light must be equipped with a **parachute** that is rocket launched attached to the structure and to the pilot. The parachute contributes to the static balance of the machine C of G.

- Pilots weight range: 55 to 100 kg (120 à 220 lbs)

- **Vne (Never Exceed speed): 120 km/h or 74 mph**
- Vra (Maximum speed in Rough Air): 100 km/h or 62 mph
- Va (Maneuvering speed)[1]: 85 km/h or 53 mph
- Vfe (Maximum speed with flaps set to 20° or more): 80 km/h or 50 mph
- Vs (Stall speed, flaps set to 0°) at maximum take-off weight: 37 km/h or 23 mph

- Maximum load factors: + 5,3 g/- 2,65 g (tested with 1.5 safety coefficient).

Here is some data to get the idea of the forces experienced by the glider during these maneuvers.

a. Load factor (g-force) in respect to bank in a stable turn

Bank ?	30°	45°	60°	70°	80°
Load factor n (g)	1,15 g	1,41 g	2 g	3 g	**6 g**

b. Theoretical maximum load factor during speed to height conversion

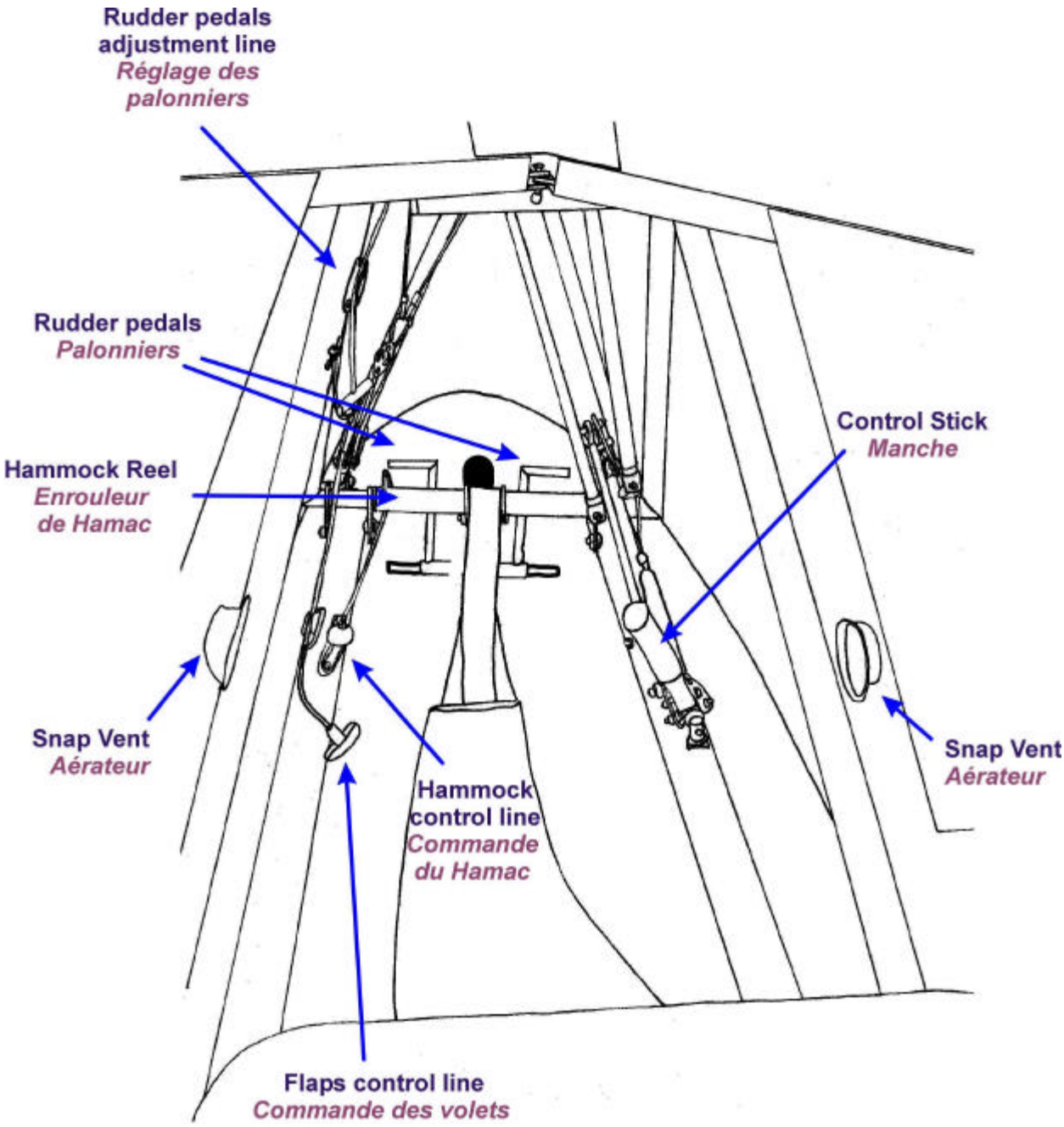
Speed at conversion	37 km/h 23 mph	74 km/h 46 mph	111 km/h 69 mph	148 km/h 92 mph
Load factor n (g)	1 g	4 g	**9 g**	**16 g**

c. Load factor when encountering a vertical gust

Flight speed	75 km/h or 46 mph	100 km/h or 62 mph	120 km/h or 74 mph
Load factor n (g) For vertical gust of 7,5 m/s or 1,500 ft/min	2,4 g	2,9 g	3,3 g
Load factor n (g) For vertical gust of 15 m/s or 3,000 ft/min	3,8 g	4,8 g	**5,6 g**

[1] Manoeuvring speed is the maximum speed at which application of full control will not overstress the aeroplane (see table b).

3. Controls

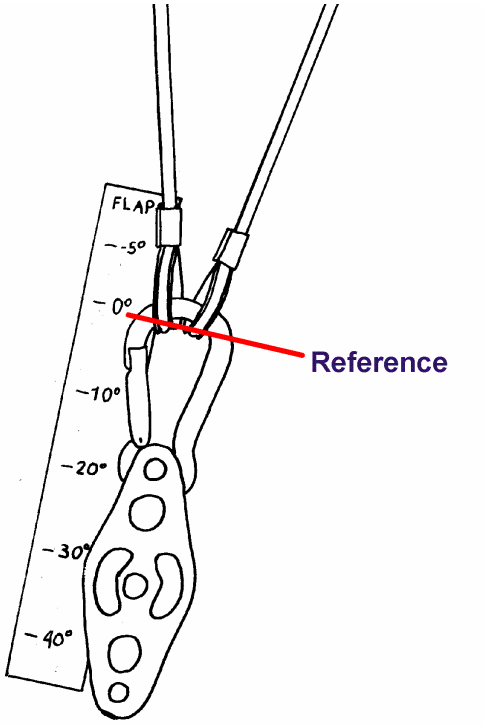


- Elevons

  The elevons act as ailerons and elevators. The joy stick, on the side, is connected by linkage together with a gearing mechanism which controls pitch and roll which makes the swift control as any other classical airplane. You can adjust the weight of controls and trim the speed with the joystick in neutral. An adjustable spring device balances the weight of the elevons. It can be use to adjust the stick free speed.

Flaps

The flaps are controlled with rope and clamcleat. Pulling the rope adds flaps deflection and slows the wing while pitching the nose up slightly. Thorough knowledge of all the flight characteristics of the Swift at various flap settings is necessary in order to fly the Swift safely. Modify the flaps setting allows you to change your glide angle and in effect the minimum speed. A mark on the control rope indicates 0° when lined up with the clamcleat end facing to the pilot. The angular value is shown on the front triangle sticker.

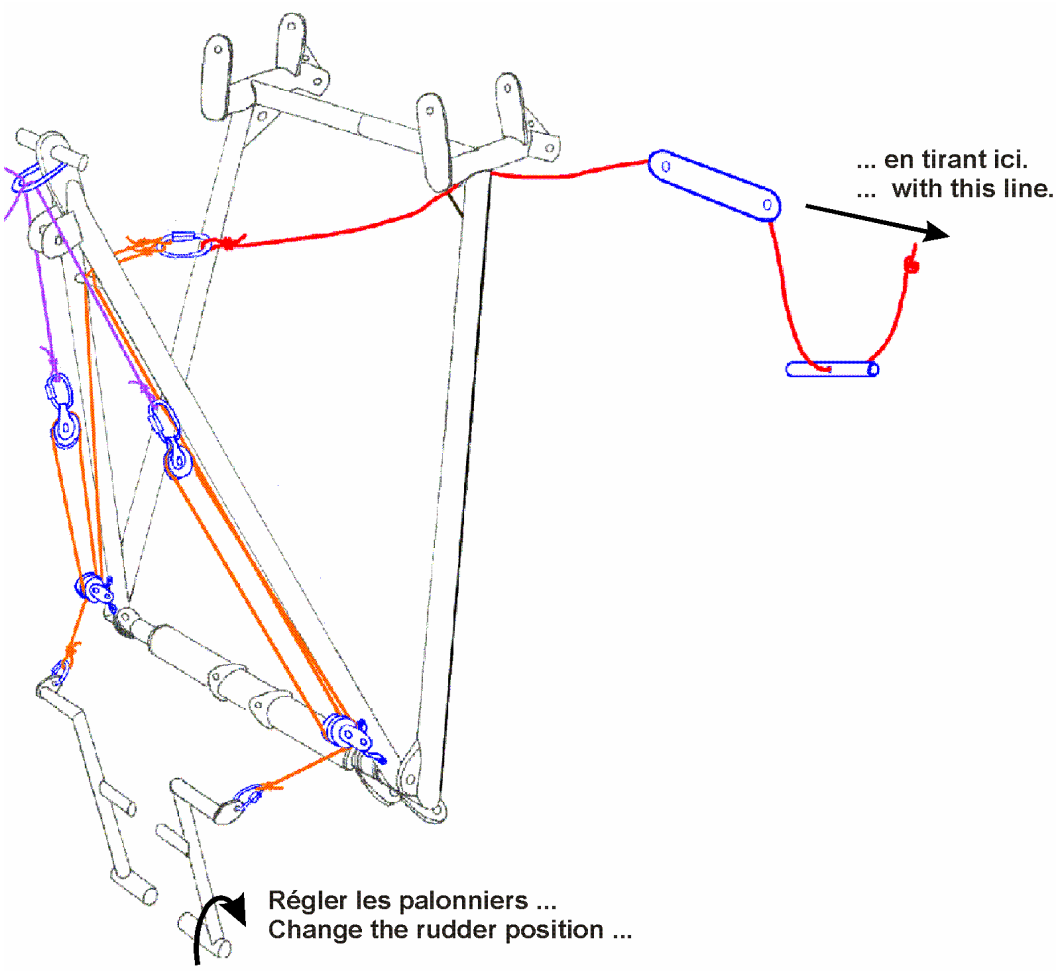


Sudden release of the flaps can cause loss of altitude near the ground. You must check that the cord is well cleated before manoeuvring near the ground. Experienced pilots keep their hand on this control to be able to adjust their glide angle.

You can control the 0° value of the flaps lining up the elevons and the flaps with the tip fairings (winglets).

Rudders

The rudder pedals move the winglet flaps. Rudder pedals are usually used to control the yaw. By opening the 2 winglet flaps together, rudder pedals acts also as air brakes. A rope that you find on the left diagonal tube can adjust the foot pedals. This adjustment allows you to adjust the position of the foot pedals for different pilots, changing your position in flight, and also to put both rudders out to increase drag for landing on foot. To get maximum rudder movement to use as brakes the pilot must adjust the foot pedals as high as possible.
It is possible that the rudder control lines in Kevlar, which pass inside the wing, stretch in the first few flights. You must then shorten them to keep the full adjustment range.



✍ Pilot's position

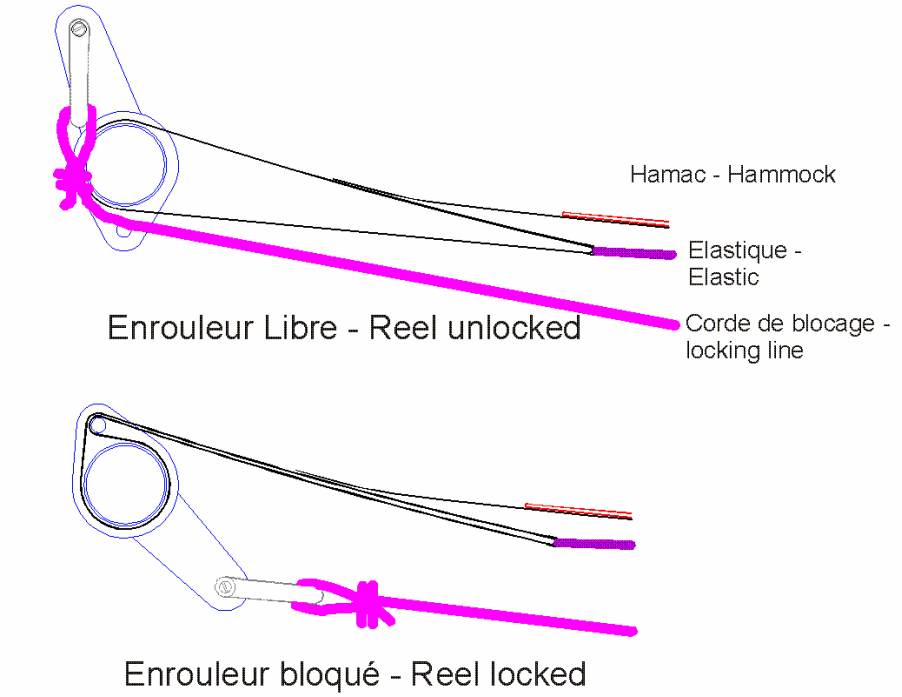
The Swift is very sensitive to the CG position. The pilot can act on this easily and adopt several different positions. This allows you to trim the glider, and also optimize the performances in respect to the various flying configurations. Actually, flying with large control inputs increases drag and the pilot can limit the degree of control surface used by adopting the right position within the cockpit. The pilot can move forward to increase speed or bring his/her feet backwards to slow down.

✍ Hammock mechanism

The harness can be adjusted and locked in various positions with the roller system.(the rope with the coloured end). The system is cleated to lock.

- When the cord is released the roller system the hammock is in slack position so that the pilot can stand up. An elastic recoil system brings the hammock to the required height. This is adjustable on the ground.
- When the pilot tensions the hammock cord, the roller system tightens and locks the hammock for flight position. To do this easily it is best to lift ones weight out of the hammock by pushing the elbows / shoulders on the horizontal cockpit tubes together with ones feet, then tension the cord.

- **In flight**, one can adjust the hammock height.
  Small adjustment can be made moving the locking rope.
  For more adjustment: release the locking rope and modify the height of the hammock
  - To tighten the hammock, lift ones weight and let the hammock achieved the required height, then pull the locking rope and cleat it.
  - To slacken the hammock, push it down with ones bum, then pull the locking rope and cleat it.



4. Engine controls

On the right oblique tube:

- Fuel tap: to be close after each flights or in case of fire! To be open before engine starting.
- Primer bulb: to prime the fuel line and to flood the airfileter to start the engine when it is cold

On the left, on the fuselage main tube, the engine command block with:

- The left Switch for the battery and electric starter relay. The electric starter will run only if theis switch is ON.
- The right Switch is for ignition
  These 2 Switches are ON when push forward.
- The push button is for the electric starter.
- The throttle lever, full throttle forward
- A choke lever (on some version), full choke when pushing forward.

5. Ground maneuvers

*Careful of **the big leverage effect** owing to the great span of the wing when pushing on a winglet to move the glider, this twists the cockpit, as this can bend the structure. Lift the front wheel to rotate the full aircraft.*

A careful pre-flight check has to be done before each flight!

a. How to get in

1. Put on the harness. Set the flaps to 40° then from behind put one foot on the hammock (possibly covered with a protection).

2. Stand up on the Hammock using the trailing edge to balance.

Swift'Light-PAS : It is allowed to step on the fairing but do not step on the parachute opening.

3. Slide down into position, firstly using the trailing edge for balance then…

4. …using the horizontal tubes inside the cockpit.

- Put on the shoulder straps and hook in your harness to the side loop of the parachute line with the carabineer.
- Shut the windows (firstly the zips then the little flaps on the trailing edge of the wing).

b. Engine start

o On the ground, cold engine :
The pilot has to be inside the Swift to avoid any hazards!

Because there is no choke, the air filter has to be flooded by the gas before starting. During this maneuver, it is important that the excess of gas runs into the air filter, and not into the engine. If the gas comes into the engine, it will flood the spark plug => no more ignition, and the engine will not start!

- Place the Swift into the wind in such a way than the left wing tip stays on the ground (= air filter side).
- Open the fuel tap.
- Throttle to 0 (or very few!).
    - ✍ Check if the fuel line is primed – if necessary, action the primer bulb to fill the fuel line.
    - ✍ Put the left wing tip on the ground to tilt the engine side air filter.
    - ✍ Carefully press the primer bulb until some fuel drops comes from the air filter.
- Switch on the 2 electric switches (to the front).
- Push the electric starter push button.
- When the engine starts, put more throttle to drive the engine above the low RPM vibration mode (3.000 – 4.000 RPM).
- After +/- 1 minute warm up, check the full range of speed. Do not stay full throttle more than few second on the ground.

In general, do not let the engine runs at RPM giving the more vibrations – vibrations can cause a lot of damage on the whole Swift'Light PAS!

o In flight, cold engine:
The engine cooled very fast in flight!
    - Tip the Swift on left with a side slip (stick left, foot right) – the efficiency of this maneuver can be check using the 2 fuel level windows on the fuel tank !
    - Press carefully the primer bulb, but not too much to avoid flooding the engine.

    Push the electric starter push button, still pressing the primer bulb, until the engine starts.

o Warm engine:
Do not use the primer bulb
Push the electric starter push button, throttle to 0. If the engine doesn't start immediately, put progressively more throttle.

To avoid brutal propeller opening, that can damage the blades, it is better to follow this procedure:
o Put the electric starter switch (left one) ON, but keep the ignition swift (right one) OFF.
o Push the electric starter push buttons (this will open the propeller) 2 seconds, then, keeping the electric starter running, switch the ignition ON.
So, the propeller blades will be open before the first engine ignition.

After the engine is started, warm it for 1 minute at middle RPM.
Above all, do not stay at idle for a long time: at idle, the engine makes more vibrations. These vibrations can damage the whole aircraft and mainly the propeller (axis of the foldable blades).
Before taking off, check full throttle if maximum RPM is OK (above 6.000 RPM).

c. Taxi

To simplify and keep the weight as low as possible the engine kit, the front wheel is steered by direct action on the front fork (like a trike), but the rudder pedals works in the ""aircraft way". To avoid any confusion, have a good taxi training before the first flight. Follow this rule (at least at the beginning):

- During taxi, steer the Swift'Light on the ground using the steerable front wheel and drive the Swift to the take off strip. Stop when perfectly aligned for taking off.
- For the take off run, mentally lock the front fork straight, and move only the rudder pedals.

Using both front fork and rudder pedals during take off running wheel will lead to mistakes!

To keep the Swift'Light –PAS fuselage airtight, a seam rubs on the wheel. To limit the seam wear:

- Avoid long taxi
- Taxi at low speed

Avoid bad condition airfield – Avoid stony field and high grass that will damage the propeller.

6. Take-off

- Check the rudder pedals adjustment – **Set the pedals with enough backlash (= low enough) to avoid antagonistic action if the pilot move the front wheel fork!**
- Flaps set from 10 to 15°, keep the joystick slightly forward. The machine takes off very quickly.
- For the take off run, mentally lock the front fork straight, and move only the rudder pedals.
- Before taking off, check full throttle if maximum RPM is OK (above 6.000 RPM). Use full throttle to take off. *However, do not keep the engine full throttle for a long time (especially with the tuned exhaust pipe version). Full throttle, the engine can overheat, and wears more quickly* => after taking off, slightly reduce throttle.
- The Swift'Light-PAS takes-off automatically around 45 km/h.Do not pull the stick during the running: when the stick is pulled back, theelevons are lifted and this action decreases the wing lift!
- Just after taking-off, swing a little bit the front fork to lock it.
  Avoid to take-off, and if possible to fly into the rain. Rain drops on the wing airfoil will greatly affect the airflow around the wing skin and decrease the perfrormances. In these conditions, stall speed increase and glide angle decrease.

7. In Flight

In general, use the engine to climb, then stop it, even if the pilot will have to start it again later. When the engine is running, pilot's sensation are decreased, it is difficult to find the lifts, comfort is less good and concentration is difficult.
The Swift is easy to fly, and gives very good control authority.

✍ Beware of the speed: the Swift has very little drag and can rapidly go very fast. And the fairings do not allow a pilot use to other forms of free flight to realize the speed.

✍ Consequence: always fly with a good air speed indicator[i]!

The Swift has very little inertia in pitch but much softer roll and yaw characteristics. There is a tendency for inexperienced pilot to pitch oscillate and over control. This is not dangerous**.**
In general avoid 'piloting' too much the machine. The Swift flies very well on its own. It flies in a straight and in a stable manner. All control actions decrease the performance of the machine.

Adapt the flap setting and the speed to the situation:

- ✍ Take off: flaps 15° (10° in strong wind)
- ✍ In lift: flaps 10°, speed + / - 43km/h or 27 mph (min. sink)
- ✍ Best glide: flaps 0°, speed 65 to 75 km/h (40 to 47 mph*) in no wind conditions*.
- ✍ High speed: negative flap
- ✍ Never Excedd Speed (Vne): 120km/h or 74 mph
- ✍ Maximum speed in Rough Air (Vra): 100km/h or 62 mph

To optimize performance (and comfort) the pilot can move his/her weight back or forward; in lift brings your feet onto the hammock roller to slow down. For full speed bring your weight progressively forward. Adjust your trim by weight shift not only reduce the stick pressure but also optimize performance because this reduce the control surfaces deflections.

Pointer: The swift light flies very well without the rudders therefore allowing you to move your legs for pitch balance.

Turning can be initiated either with elevons and rudders or each individually. With the joystick controlling roll the yaw is induced if the initial roll movement is progressive. On foot the pilot controls yaw and the roll is induced. The fact to combine these actions increase control authority and allows better co-ordination especially as they become more radical. At low speed, and even more with flap, the stick controlled turning becomes less sensitive (plus increase adverse yaw) and the use of rudder control increase the pilot's authority.

Spin
The Swift'Light is very difficult to spin. Recovery is automatic in less than one revolution if the stick is released. To recover immediately push the joy stick forward and give opposite rudder.

Stall

Slow decrease in speed will get a very progressive stall. With the stick on the back stoppers the Swift slowly pitch oscillates without great height loss and stays controllable with the elevons whatever the position of the flaps.

In fact the wing stalls toward the root in front of the center of gravity. The tips have wash out (decrease angle of attack at the tips) and this means they are still flying.

It is possible to do a true stall starting with speed and pulling back more abruptly with the joystick.

- Despite the safe characteristics avoid flying too slow close to the ground because of the risk of stall/spin following turbulence.
- The engine controls on the left main fuselage tube can be in the way of the flaps control line. It is advisable, when the engine is shut off, to rotate the engine control unit, this will make the flaps control easier.

Avoid flying a long time with very little throttle (for example in slight slope). In this condition, the engine turns quite high RPM (4.000 or 5.000 RPM), but because the lubrication is done by the oil in the gas mixture, the engine is badly lubricated. This can lead to engine seize without overheating!
During long stabilized flight at medium speed, it is advised to give sometimes full throttle for few seconds.

The Swift'Light-PAS is equipped with a 2-stroke engine with carburetor: it is advisable to handle the throttle lever progressively (full throttle brutally can lead to engine making an hole in the acceleration). It is also advisable to avoid long sink with the engine at idle ; in this condition, the engine makes a lot of vibrations and when the pilot will give more throttle, the engine can stops. Also, the lubricating is not good at low throttle. If lont time at low throttle is necessary, give sometimes more throttle to feed the engine.

8. Atterrissage

Always stop the engine BEFORE landing. *In case of hard landing, this wills highly decrease the damage. Also, even at idle, the engine is still "pushing" and gives a smaller landing slope, making difficult a precise landing.*
In general, it is also advisable to ***make the approach engine shut off*** *: the landing slope will be steeper(and so the approach easier).*

✍ Do an approach at the right speed: **classic error is to come in too fast**. In this condition, the Swift is very long to land, the aircraft can fly all the field without landing or otherwise very violently. On the final approach, **no faster than 50 km/h or 31 mph** (depending of course of the weather conditions – estimated wind gradient, wind speed, turbulences).

✍ **Use the brakes,** meaning the rudders together. To get maximum effect, it is necessary to use full brake deflection: before landing, **set the rudder pedals as high as possible**[ii].

✍ **The more flaps you have on, the slower you fly, and consequently the more adverse yaw.** The control response decrease at low speed. Avoid high bank turn near the ground on approach.

It is best to do a classic glider approach (not **an S-turn approach** as in paragliders or hang gliders)

- Down wind leg, flaps 0 to 20°
- Base leg, flaps 20°
- Final, flaps at 20° with a speed between 45 and 50 km/h (28 and 31 mph).

You can adjust the glide angle by the amount of brakes, (with the brake handle or both feet together on the rudder pedals).

To adjust the right rudder setting, it is easier to find the right rudder flap position with the rudder pedal, and then to pull the brake handle to lock the pedal on its stops.

If you find that you are still overshooting than you can increase the amount of flap to as much as 40°, the more flap the steeper the glide angle. It is recommended to put them back (gradually) to 20° for landing (30° if landing on feet), to do a good flare – attention: if the pilot stands up it is no longer possible to adjust the flaps or brakes.
If you are caught short of the landing on finals with front wind, set gradually the flaps to 0° and slightly increase the speed will increase the glide angle.
For experienced pilots, **sideslip is a good way to lose height**.
The flair should be done as progressively as possible. If the pilot pulls back too hard on the stick the elevons point upward, the wing generates less lift and the glider comes down hard.
It is possible **to land cross wind** (in this case the touch down speed increases). **Land keeping the Swift horizontal**, if a tip touches the ground too early then it can pivot round this point quickly.

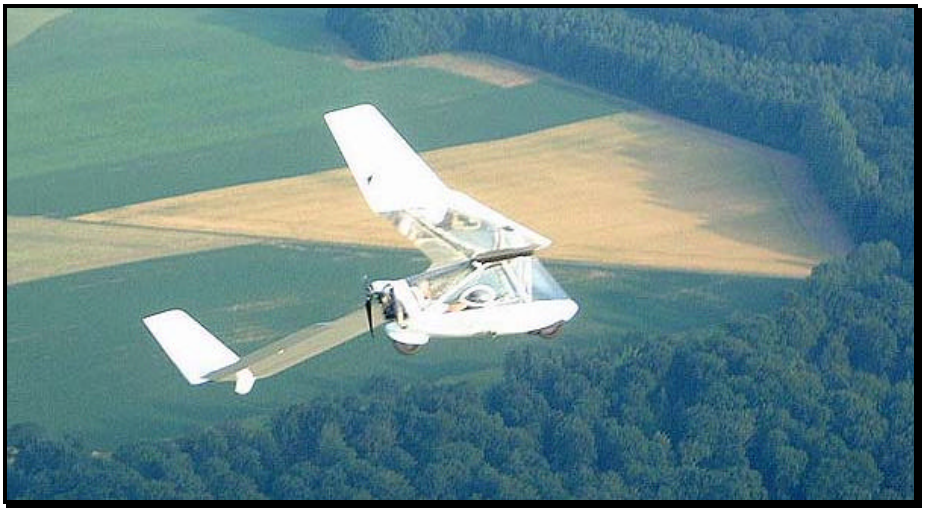
The rudder pedals are adjustable in flight by adjusting the brake handle. This adjustment allows different pilot sizes to adapt to the Swift or change position during flight or as mentioned above to lock the brakes on when you want to land standing. To use full rudder flaps deflection, the rudder pedals must be locked on theirs stops. During the first few flights you may find that the rudder cables (Kevlar or Dyneema) stretch. It will then be necessary to shorten them to allow rudder pedals to be locked on their stops.

9. After landing and engine switch off

If the landing field is OK, restart the engine to come back in taxiing.
Before switch off the engine, let it runs around 3.000 RPM few seconds, then shut off the engine in moving the 2 switches off.
Turn off the fuel tap.
Do not park the Swift'Light PAS with front wind (it can be turn upside down if a strong gust) or with back wind (the controls surfaces will be moved by the wind. Place the Swift obliquely with the wind.

10. First flights

It is ideal to follow a specific Swift training course in 'Swift' school..
If this is not possible the pilot must have an adapted training. Good experience on sailplane and 3-axis ultralight is the best base.
Choose a runway that is flat and grassy that is as long as possible and straight into wind. Straight wind will avoid the confusion between wheel steering and rudder pedal control – a grassy strip is easier because less sensitive to mistakes in ground steering.



11. Technical data, speeds, weights, CG position

Empty weight	74 kg	163 lbs
(basic version without parachute and fairing)		
Maximum empty weight	100 kg	220 lbs
Reference empty weight	95 kg	209 lbs
(With fairing, parachute and duel)		
Maximum Take off weight MTOW	**191 kg**	**420 lbs**
Recommended pilot weight	55 à 100 kg (120 à 220 lbs)	

Span	12,8 m
Wing area	12,5 m²
Aspect ratio	13
Sweep (at 25% of the cord)	20°

Vne (Never Exceed Speed)	**120 km/h or 74 mph**
Vra (Maximum rought air speed)	100 km/h or 62 mph
Va (Maneuver speed)	85 km/h or 53 mph
Vfe (Maximum speed with flaps set to 20° or more)	80 km/h or 50 mph
Vs (Stall Speed, flap sets to 0°) at maximum take-off weight	39 km/h or 25 mph
Minimum Speed, flap sets to 20° at maximum take-off weight	35 km/h or 22 mph
Best Glide	26 : 1 at 70 km/h / 43 mph
Minimum sink	0,65 m/s at 45 km/h / 28 mph

Take off
- Advisable speed: The take off comes without action on the stick around 45 km/h (or 28 mph)
- Best climbing speed around 50 km/h
- Distance for take off: On hard surface, less than 80 metres.
- Maximum crosswind velocity 25 km/h.

Landing
- Advisable landing speed
  45 km/h, to be increased in crosswind condition or if a wind gradient is expected.

Load Factor: + 5,3 g/- 2,65 g (with 1.5 safety coefficient).

Centre of Gravity
- Limits 1.200 =>1.160 mm
- Empty (with fairing and parachute) +/-1.300 mm

Center of Gravity position from the wing nose, on horizontal ground, on 2 scales.
See procedure in the Adaptation/Rigging/Engine Manual.

The CG position has a low range and must be respected. The flying wing's performance and behavior is very sensitive to this.
- C of G too far back makes the machine dangerous, stalls are more difficult to recover and, above all, the wing's tendency to spin increases.
- C of G too far forward noticeably decreases performance: minimum speed increases glide angle decreases and sink rate degrades.

Do not modify the machine. Do not carry any heavy loads. Do not carry loads far from the C of G. The pilot is a little in front of the center of lift therefore a heavy pilot will notice that his/her machine centers a little more nose down than a lighter pilot.

Engine
- Type :Solo 210
- Monocylinder 2-stoke
- Digital ignition with variable timing
- Displacement 210 cc
- Cylindre en alliage traité au Nikasil.
- Compression 9,3 : 1
- Maximum power
  - 12 HP@ 6200 RPM with silencer
  - 18 HP @ 6400 RPM with tuned exhaust pipe + silencer.
- Maximum engine speed 6500 RPM
- Fuel : mixture with 2,5 % Synthetic 2-stroke oil (= 1 : 40).
- Electric starter
- Charging coil + regulator 12 V

Reduction gear
- PolyV belt, ratio 1 : 2.5

Propeller
- Arplast foldable
- Type 113 GAF or 113 GAF+ (For Solo with tuned exhaust pipe)
- Three blades, diam 1.15 m
- Maximupm rotational speed: 2.600 RPM

Wings made in composite materials:
The skin is in a sandwich of aramide/Carbon / epoxy / PVC foam
The spar is mainly carbon/epoxy

The cockpit frame is made in Cromoly (steel 4130), aeronautic quality, TIG welded, and aluminum tubes in Zicral alloy.

12. Pre Flight checks

Cockpit

- Fairing and windows assembly.
- 3 pushpins + safety washers.
- Joy stick and connections to the wing – full and free movement in all directions – no interference.
- Flap wires connection.
- Rudder connections to pedals – **make sure right goes to right and left goes to left!**
- Tow release.
- Rear tyre – inflated?
- Instruments – No interference with the controls – speed probe.
- **Security pin off in the parachute deployment handle.**

Go around the glider, beginning by the nose of the right wing.

- Connection between the wings: 2 clevis pins + safety rings.
- State/condition of the right leading edge.
- Right vortillon, forward facing!
- Tiplet secure.
- Wing tip fairing secure.
- Rudder does not touch tip fairing – condition of control cable – attachment to rudder lever.
- Play in the wingtip[iii].
- Condition of the right elevon – tape connection.
- Inspection of elevon's actuator – safety ring on the clevis pin – free movement – positif control of the elevon cinematic[iv].
- Condition of the right flap.
- Flap actuator – safety ring on the clevis pin – fork tighten on its thread.

Continue onto the left wing

- Inter-wing fairing – ¼ turn screws.
- Condition of the left flap – same level as the right flap.
- Flap control – safety ring on the clevis pin – fork tighten on its thread.
- Inspection of elevon's actuator – safety ring on the clevis pin – free movement – positif control of the elevon cinematic
- Condition of the right elevon – tape connection.
- Rudder does not touch tip fairing – condition of control cable – attachment to rudder lever.
- Wing tip fairing secure.
- Tiplet secure.
- Left vortillon, forward facing!
- State/condition of the right leading edge.

Engine unit

- Fuel line – tank – **fuel tap OPEN**
- **Backlash in the blades axis** – blades opening/closing
- Throttle Line – Right position – little backlash on the line before pulling the throttle lever.
- Nothing close to the exhaust pipes (electric wire, fuel line, …)
- Check the position of the fuel line, electric wire, throttle line – to avoid wear by vibration on edges.
- PolyV beld condition
- Carburetor mounting
- All bolts, screws, nuts tightened
- Aifilter condition
- Exhaust system condition – parts – welding – springs
- Rubber mounting blocks condition.

Maintenance

This is a summary of the maintenance manual, placed here for regulations reasons. Use also the Adaptation/Rigging/Engine manual, and also the spare parts manual.

The Swift'Light-PAS must be stored in the **dry**, out of direct sunlight and avoid extreme temperatures.

1. Wings
   Keep the wings clean, and so wash it often:
   - To avoid chemical attacks by dirt
   - To make easier the visual inspection of the wing skin

   Use water with soap – no solvent except isopropilyc alcohol in 50% water solution.
   Keep the wings dry.
   Inspect often the condition of the wing skin and the control surfaces mechanism.
   The Kevlar Rudder lines going to the winglet through the wings have to be replaced often.

2. Fuselage
   The fuselage and the fuselage frame has to be stored clean, and so to be clean often :
   - To avoid corrosion
   - To make easier the visual inspection.

   Inspect often the frame condition (welding) and the mechanism (stick, clam cleat, …).
   The sticky back clear plastic protection used as stops under the stick and protection when folding the fuselage have to be replace time to time.
   When old, replace all the elastic chords.
   Check often the tire for wear and air pressure.

3. Engine and propeller
   Before each flight, check the blade backlash and adjust if necessary!
   Check the fuel line condition – if weared or hardened, change it.
   Check frequently condition of all the bolts, nuts, screws and if tighted.
   Check frequently condition and tension of the PoyV Belt
   Check frequently the condition of the carburetor line – a light backlash is necessary in the throttle line.
   Check the electric wires – vibrations – Rubbing on edges.

First check (after 10 hours)

In addition to all previous points, check specially the following points:

- Clean the fuel filter on the fuel line – for Tillotson carburetor, clean also the inner fuel filter.
- Check the blade backlash and if the propeller is tightened on its support.

Every 25 hours or 3 months

In addition to all previous point:

- Change the spark plug
- Clean the airfilter

Yearly

In addition to all previous points:

- Clean the engine – Decarbonization – clean the inner decompressor hole.
- Change the fuel filter
- If necessary, change the carburetor membranes
- Change the PolyV belt
- If necessary, change tire and inner tube
- Change the sticky back foam use as a stop on the firewall.
- Change the fuel line if the hose are hardened
- Change all the rubbermouns, engine and exhaust system

Check after long time non use

- Use fresh fuel mixture – if necessary, empty the fuel tank from old fuel.
- Make few engine rotation by hand
- Clean the spark plug
- Check the tire and pressure
- During lont time non use, keep the battery at full charge.

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[i] The speed probe must be put on the rod supplied for this reason.
[ii] Do not exceed maximum opening of brakes: the flaps must be lined up on the trailing edge.
[iii] Pull up on one tip with the other on the ground: play of several cm is OK – take note of any change in time.
[iv] Move the elevon up and down and check if the stick is moving in both way.