Microlight Aircraft and Composite Engineering

Swift'Light

Flight Manual

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Warning

You are going to be a 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.

Contents

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

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**.

Pilot Training

It is ideal to follow a specific Swift training course but if this is not possible the pilot must have an adapted training. Good experience on sailplane and hand glider is the best base. The Swift Light is very easy to fly. A trained sailplane pilot knowing the swift's peculiarities would have no problem. However, a specific training is required to take off and landing on foot.

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.

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.

Pointers

Careful when adding equipment:

- **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.
- **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. Limits of use – Weight – Speeds – Load factor

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 (Manœuvring 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 manoeuvres.

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

Bank Φ	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

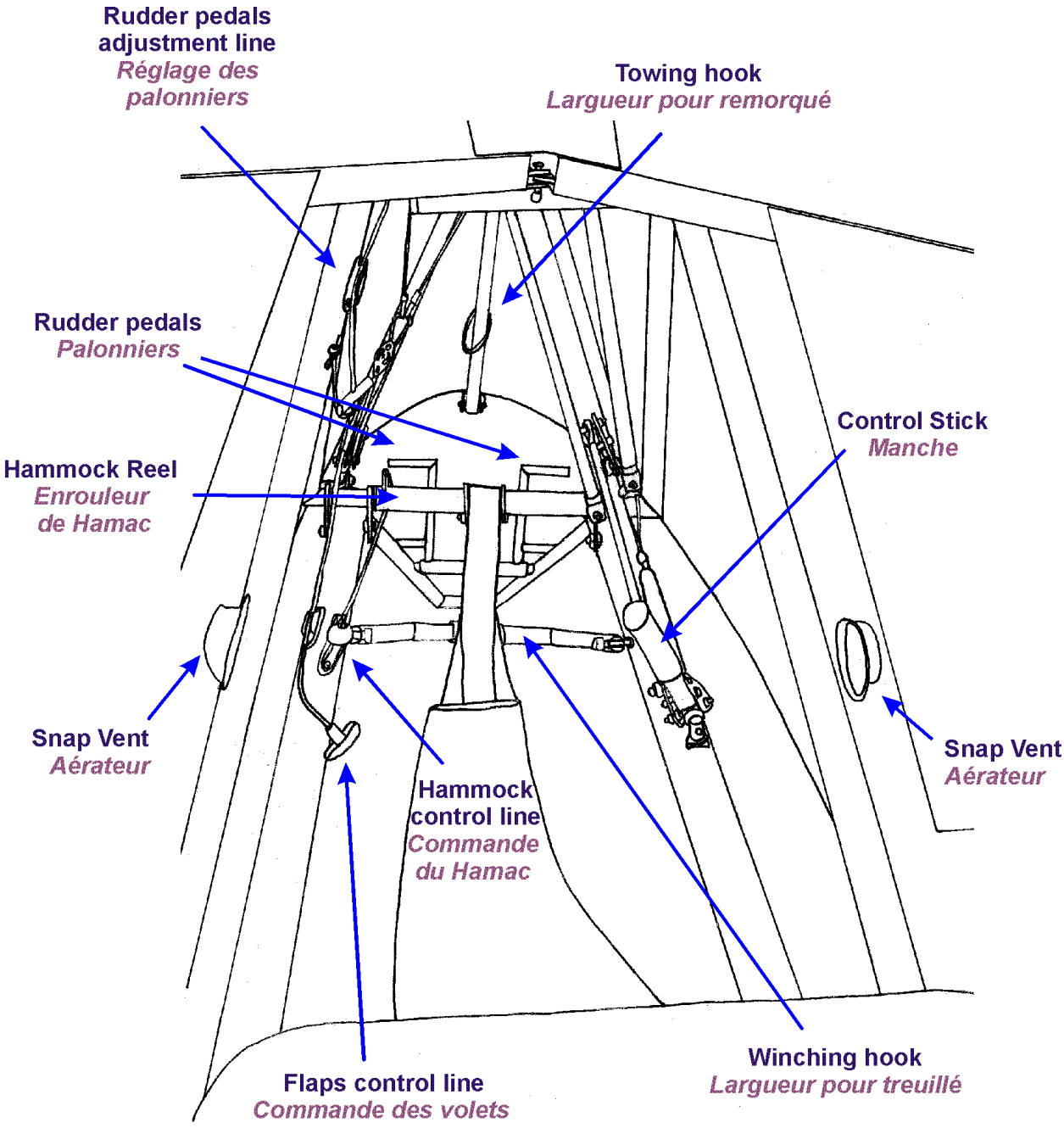
Speed at conversion	37 km/h 23 mph	74 km/h 46 mph	111 km/h 69 mph	148 km/h 92 mph
Load factor n (g)	1 g	4 g	**9 g**	**16 g**

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).

2. Controls

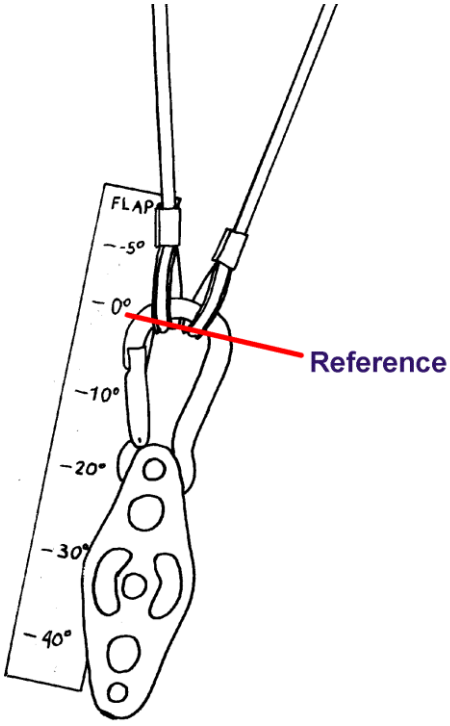


- The elevons

  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.

- The 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.

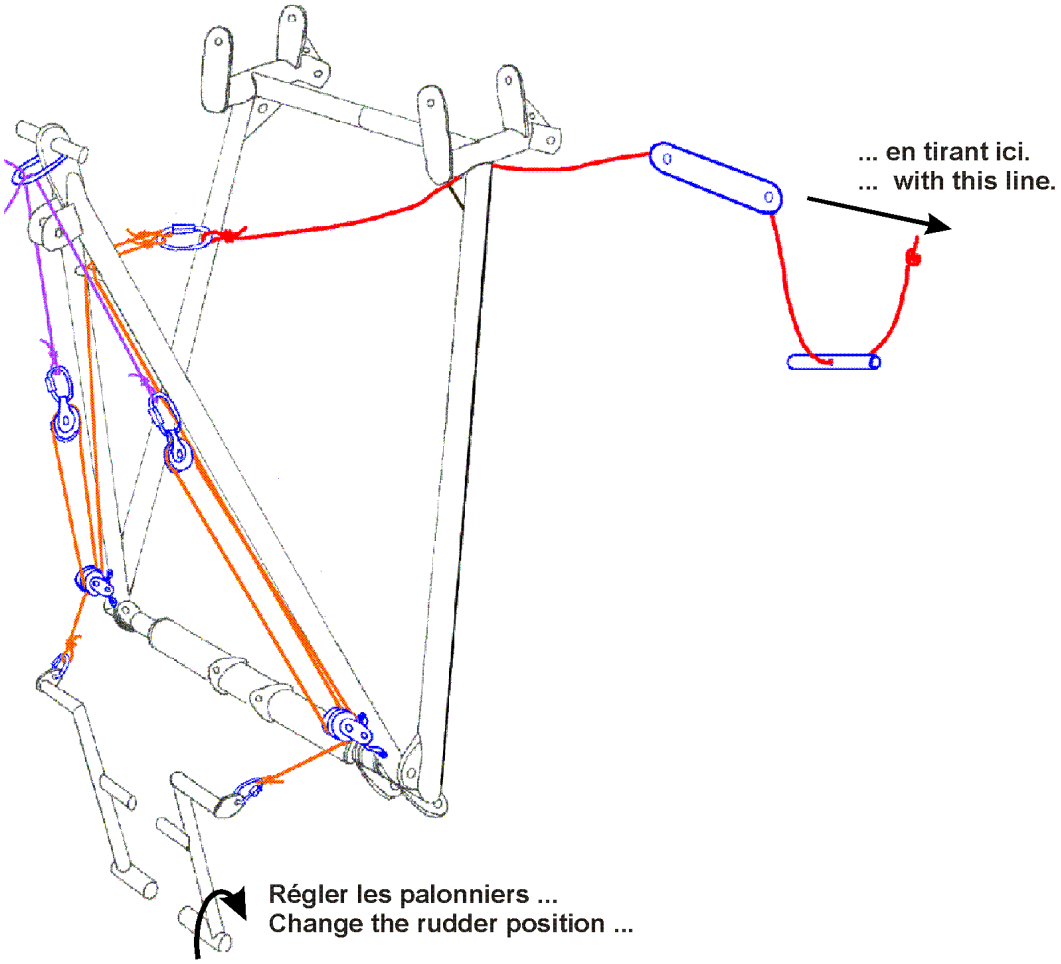


☝ Sudden release of the flaps can cause loss of altitude near the ground. You must check that the cord is well cleated before manoeuvring near the ground.
Experienced pilots keep their hand on this control to be able to adjust their glide angle.

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

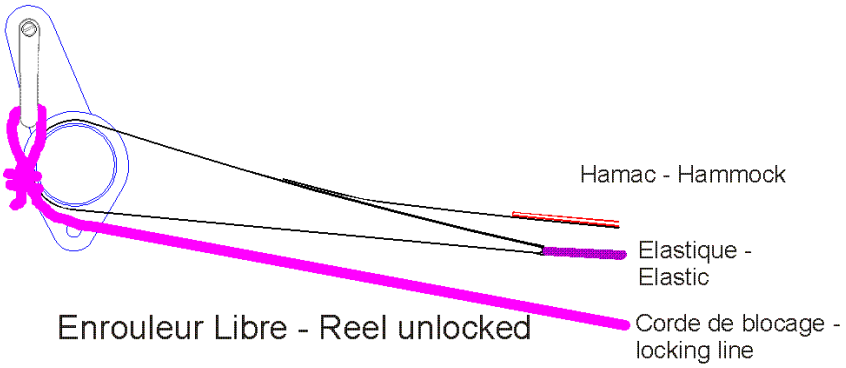
  The Swift is very sensitive to the CG position. The pilot can act on this easily and adopt several different positions. This allows you to trim the glider, and also optimize the performances in respect to the various flying configurations. Actually, flying with large control inputs increases drag and 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.



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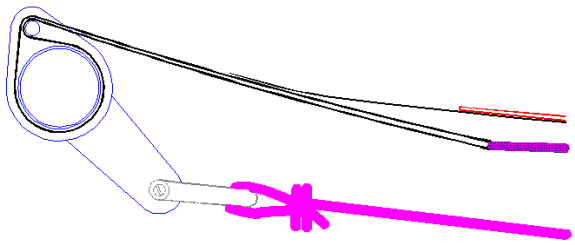

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3. Ground handling

If the Swift is not close to the take off one can move in 4 ways:

***Always support the wing with flat hands**, on the bottom surface and on the spar (the spar is in the thickest part of the airfoil) or at the wing tips.*

1. On **nice ground**, one can roll it. Put the flaps at 0°and push backwards by pushing on the nose. Slightly lifting the nose with flat hands on the under surface.

2. On bad ground (rocks and bushes etc), one can carry it on the shoulder as described in the relevant section

3. With 2 people, each one at can carry it a bit further than the level of the vortillons with flat hands. Support and carry the wing at the wing spar (the thickest part of the wing). If the wing pitches back then go further out towards the tip until a balance point is reached.

4. With 3 people: one at the nose and the other 2 at the wing tips (leading **edge side**).

***Attention:** due to the large span of the wing, **large lever forces** can be applied which will damage the Swift. So do not move the Swift by using just one tip / winglet as this generates large forces on the cockpit.*

4. Foot launch

!!Pre flight check before each flight!!

a. How to get the Swift on ones shoulders

1. Make sure the hammock is in slack position. With the aid of the little strap found on the left hand side of the tail cone, grab this handle by by pulling the lower strand. *If you pull it out holding top and bottom strand it may not retract automatically*.

2. With the **left hand** pulling the strap, lift the tail of the Swift up with the right tiplet[i] pivoting on the ground.

3. Put the **right hand** inside the trap doors, pass **over** the hammock and grab the right longitudinal tube.

4. Release the lifting handle, which should automatically retract. Put your head, shoulders and left arm insides the trap doors. Put the shoulder straps over your shoulders.

5. Ease the trap doors apart so that they fit comfortably around the legs.

6. Pass the right leg over the hammock.

7. Tighten the shoulder straps to maximum.

8. Clip together the little clips between the shoulder straps and then adjust it. *The glider should be well balanced and requires very little effort*.

9. Attach the harness to the parachute bridle find on the right longitudinal tube. Unlock the safety mechanism of the parachute. Adjust the flaps for foot launch (15-20°). Turn on your instruments.

10. When you are ready for take off and the conditions are right, lean forward a bit and take hold of the longitudinal tubes. Bend your knees.

11. Pivot the Swift around your shoulders.

12. Find the pitch balance point **with the control stick in neutral** by pivoting the glider around your shoulders. Then you can control the wing with the control stick.

b. Foot launch

The ideal take off is a progressive slop that is not too steep. Get to the take off area and put the Swift nose down with one of the tiplets on the ground. **The wind must be straight on** as the Swift has a strong tendency to yaw into the wind.

When the conditions are right pivot the glider around your shoulder and get the glider into take off attitude. Perfectly balance the Swift on your shoulders with the control stick in neutral**. Flaps must be between 15 and 20°.**
Keep the nose relatively low; roughly the horizontal tubes should be parallel to the slope.

Accelerate slowly **pushing the control stick slightly forward**.
The machine starts to lift off the pilots shoulders. Continue to accelerate keeping the nose down with the control stick to prevent an early take off. Let the wing take off on its own, do not try and take off by pulling back on the control stick. After take off keep accelerating to obtain a safe flying speed.
The glider is very sensitive in pitch so small movements in pitch are all you need.

Don't get into the hammock until you are far from the ground.
To get into the hammock, swing your feet onto the hammock roller, lift up your bum so that you can tension the hammock freely. Cleat off the hammock tensioning rope to suit. Then get comfortable by slackening off the shoulder straps a bit *– however, avoid to sit up too high to not hit the upper window –*. Pass your hand between the trap doors to close them properly

When the pilot is flying in a standing position, the CG position is aft. That is why during T.O. and until the pilot is supine one must keep a bit of forward pressure on the control stick. This peculiarity is a great help during the take off because the elevons facing down together with the flaps increases the lift produce by the wing.
It is, however very dangerous to release the control stick at this point as you can stall or spin the wing!!

5. Take off on wheels (winch or air tow)

a. How to get into the cockpit.

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. **Do not lean on the fairing.**

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).
- Adjust the flaps to the required take off settings.

In principle the Swift should be orientated correctly for take off before getting in, but if it is necessary to make any adjustments then a helper may do so by lifting up the nose by putting flat hands on the bottom surface.

d. Take off

1. In general

- Towing and aero towing should have good radio communication.
- Do not over control; the Swift tends to auto correct deviations due to turbulence in part.
- Do not keep the controls in extreme positions (too much back stick, flaps at 30 or 40 degrees) this will decrease the efficiency of the wing

2. Aero towing

Hook in the tow cable to the tow hook **on the front tube**. Being connected here gives great towed stability. Ideal towing speed is 70km/h (= 43 mph), but you can tow between 70 and 90 km/h (56 mph). A weak link is essential.

- Flaps 10 to 15 degrees, keep the joystick slightly forward. The machine takes off very quickly.
- Quickly climb slightly above the tow machine, to get out of its turbulence.
- Trim with the flaps to reduce joystick pressure.
- The pilot can also trim using his/her body i.e.: bring his/her feet on to the hammock roller. In general the pilot does not need rudders for towing because of the good natural directional stability.
- In turbulence if the tow cable slackens you can put both rudders out to generate some drag.
- When the tow plane turns do not cut the turn keep on the same trajectory.

Aerotow release safety notes:

- Use a proper steel ring into the hook (not a loop in the line!): diameter +/- 30 mm or 1 1/8 ''
- Check that the hook can move freely when it is release, and that the hook can swivel freely.
- Adjust correctly the windshield the keep the slot centred to the hook. If the slot is not properly centred, trim a little bit the windshield.

3. Winch

Connect the cable to the tow release on the pivoting device found between the two horizontal tubes of the cockpit, found in the winch release option. This device brings the axis of the towline closer to the center of gravity of the Swift.

⇒ Limit the tow force to 75daN (75kgf or 165 lbf)

- Flaps set from 10 to 15°, keep the joystick slightly forward. The machine takes off very quickly.
- Make sure you have adequate speed in respect to height close to the ground in case of a cable break.
- Make sure you know where the winch is because the visibility to the winch is very bad.
- Trim with flaps do not go over 15 degrees.
- Keep the speed between 60 – 80 km/h (or 37 – 50 mph).
- Do not release under tension.

6. In Flight

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[ii]!

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 20° (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 bring 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.

7. Landing

- 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**[iii].

- **The more flap 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.

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.

a. Landing on the wheels

It is possible to wind cross wind (in this case the touch down speed increases). For safety reasons it is better to keep your feet above the hammock roller, you can still control the rudders from here. Land keeping the Swift horizontal, if a tip touches the ground too early then it can pivot round this point quickly.

b. Foot landing

Foot landing demands more skill from the pilot. Only to be carried out by experienced Swift pilots. The 1st foot landings should be done without fairings, except the front part. Mostly it is easier to land on the wheels.

For foot landing you must land into wind.
Before standing upright set your flap and brake settings. Standing, it is very difficult to adjust these settings.
Set the flaps to 30°.

Release the hammock and stand up with sufficient height!

Once standing the pilots body increases drag therefore decreasing glide angle.
This also moves the C of G rearward. The pilot must stand as forward as possible and **keep forward pressure on the control stick** (in this configuration the elevons are facing down, the section produces more lift, the minimum speed decreases ⇒ this makes landing easier).
Flair slowly, sliding backwards in the hammock keeping the stick forward. Adjust the flair with the stick (this keeps the section as lifty as possible). Keep moving forward, the glider slowly sinking onto the shoulders.

☝ The front fairing reduces forward visibility at this point.

The best way to land on feet is to reduce speed while maintaining a lifty wing, elevons facing down = stick forward. Control pitch by weight shift rather than the stick.

8. First flights

It is ideal to follow a specific Swift training course.

If this is not possible the pilot must have an adapted training. Good experience on sailplane and hang glider is the best base.

Even if you will be foot launching, it is best to winch tow/aero-tow to start with before the training slope.

Towed
Choose a runway that is flat and grassy that is as long as possible and straight into wind. If the runway is hard than put a mini wheel on the nose fairing (optional equipment). Spend about ½ an hour in the piloting position getting used to all the controls and hammock adjustments. If you are straight into wind you can in fact fly the Swift feeling the control and feedback.

The first flights must be done without fairings thus giving much more drag and you not able to get as much speed which makes it much easier to land (keep only the forward fairing, the plastic section in white).
The microlight tug must fly as smoothly as possible at 70 to 75 km/h (43 to 47 mph).

In the 1st few flights, explore the speed range and the controls and feedback. Visualise the various glide slopes at various combinations of flap and brake.

After a few flights, pilots who will be foot launching and landing can practice getting into the upright position to familiarize with the hammock mechanism and the influence of that position in flight.

Training slope
Choose a grassy slope not to steep with a little breeze face on. Try some flights without the fairings (with only the front portion). It is advised to take the parachute out.

> *To take the parachute out undo the two lateral screws (the screws that allow the parachute to pivot on its axis) and undo the screw that retains the parachute deployment handle from the shoulder strap*.

Before starting to run feel the reaction of the controls in the wind, for as long as you can handle it, like doing inflations with a paraglider.

Run picking up speed progressively and feel how to keep the machine on your shoulders whilst running without the glider pushing down or lifting off. Do not take off until you have reached a good speed.
It is important to find the initial angle before starting to run.
Roughly speaking the horizontal tubes of the cockpit should be parallel to the slope.
The nose too high the Swift stalls before flying. Nose too low and the machine pushes down too hard and you cannot run fast enough.

To land, flair very progressively: too early & too much, the glider climbs too high. Too late, the glider crushes down on the pilot.

9. Technical data and speeds

Empty	48 kg / 106 lbs without fairing
Maximum take off weight	158 kg / 347 lbs (version without motor)
Span	12,8 m / 42 ft
Surface area	12,5 m² / 136 ft²
Aspect ratio	12,9
Sweep (at 25% of the cord)	20°
Recommended pilot weight	55 à 100 kg (120 à 220 lbs)

Vne (Never Exceed Speed) :	**120 km/h or 74 mph**
Vra (Maximum Rough Air Speed)	100 km/h or 62 mph
Va (Manœuvre 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	37 km/h or 23 mph
Minimum Speed, flap sets to 20° at maximum take-off weight	32 km/h or 20 mph
Best Glide	27 : 1 @ 70 km/h / 43 mph
Minimum Sink	0,6 m/s @ 43 km/h / 27 mph

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

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.

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.

10. 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[iv].
- 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[v].
- 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.

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

Translation by Dave Wardsmith.