Microlight Aircraft and Composite Engineering

Swift'Light :

Rigging manual

February 2003

Aériane s.a. Rue des Poiriers, 7 B-5030 Gembloux Belgium - Tel.+32 (0)81/60.05.95
e-mail : info@aeriane.com Internet : www.aeriane.com

Contents

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 manufacturers specifications. So, you must carry out to the letter the following procedure to avoid wasted energy and damage, notably on the skin of the wings.
If you follow the following sequence precisely:

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

The last point concerns particularly the wing fairings and cockpit fairings.

Transport

It is strongly recommended to transport the Swift Light in its XC container. It supports the wings in respect with the wings twist and with no pressure points. The walls are relatively insulated and reflect a good amount of sunlight, this protects the wings from UV and high temperature, to which composite materials are sensitive. The wings are well protected from mechanical injury. Caution: The Swift container is not watertight. If the rain wets the container, dry the wings and the container without delay.

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 reinforced.

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 wing. 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 as soon as possible.
If the wings are not stored in the XC container then wing supports must be wide and allow for the twist of the wings.

Caution

Be careful with added equipments:

- The Swift is very sensitive to the center of gravity position: do not add equipment that can change this CG position, for example parts weighting more than 1 lb in the nose or the tail cone of the cockpit fairing.
- Do not modify the airflow around the airfoil. For example, a remote control wire for camera, placed on the leading edge, the upper surface or the lower surface, will dangerously change the behavior of the Swift.

A. Rigging the cockpit

1. Put cockpit where you want to rig.

2. Assemble the median frame to the oblique tubes.

3. Fix these 2 parts with pushpins, with the head up and the wire to the washer going downward to avoid this interfering with the wing.

4. Slot the stick assembly rear pin into the eyebolt found on the right horizontal tube. To do this it is necessary to pivot the triangular part forward.

5. Then fasten the triangular framing to the front tube with a pushpin.

6. Take out the 2 parts of the tail cone.

7. To balance the cockpit in order to fit the wings you can use the tail cone. So, put the 2 parts together.

8. Attach the spar. The tips of the spar push against the inside of the wing and so the angled end of the spar faces forward. The bolts come from the back to the front. A plastic washer goes underneath the wing nut to avoid hanging on the threaded part of the bolt.

9. Stabilize the cockpit. You can use the tail cone or the support used to carry the cockpit underneath the XC container (optional equipment) or a stick supporting the spar. Don't let the cockpit sway side to side as this could damage the fairing.

Note: Do not lock the parachute support now.

10. Put a protection mat where the right wing tip will come.

B. Rigging the wings

The procedure below describes rigging the wings on your own. It is, however, easier to have help to slide the wings on the spar, especially if the wind is strong. (Then above all don't get helped!)

11. Put a protection mat underneath the container. Start by pushing the **right wing (Lower one)** by the rib in order to release the last elevon hinge.

12. Pull out 2/3 of the wing. Take the wing by the bottom surface at the balance point, one hand on the leading edge, and the other on the trailing edge. Take the wing right out of the container.

13. Put the wing tip on the ground so you can pivot it.

14. Put the wing tip on the ground so you can pivot it.

15. Put the tip on the protection mat and grab the wing root.

16. Put yourself in front of the spar on the opposite side of the wing and slide the wing onto the spar.

17. Line up the finger of the triangular frame with its reciprocal female location on the root rib and engage the wing completely home on to this. Pass the rudder control line through the shackle.

18. Line up the left wing.

19. Put the wing on the spar tip

20. Take hold of the wing tip and slide it onto the spar. **Be careful not to force the spar box**, it will slide on easily when it is properly lined up in all axes.

21. When the wing is completely on you may have wiggle the wing a tiny amount to get the finger of the triangular frame to go into its location in the rib.

22. Put in the front pin locking the 2 wings together then **IMMEDIATLY put in its ring**. Put the 2nd winglet / rudder cable in its guide.

23. At the wing tip push it a little backwards to tighten the wings together …

24. … and to aide getting the pin in to fix the back of the wings together then IMMEDIATLY put in its ring.

25. *(From this point on it is strongly advised to continue the rigging alone).* Take out the elevon push rod that was pushed into the wing for transport.

26. Release the elevons rods at the wing root.

27. Connect up the elevon rods to the control stick rods with the pins, putting the rings on facing backwards to help the preflight check.

28. Be sure that the pin goes through the 2 rods!

29. Connect up the flap cables.

30. Pulling almost all flap you can release pressure on the flap push rods and so take the retaining pins out and releasing the rods from the inside of the wing.

31. Connect the elevons up with the pin and ring.. The elevons must be connected before the winglets are put on. Do not connect up the flaps yet.

32. Put the bracket on the rudder together with its elastic return. The knot of the elastic is facing up.

33. Fit the winglet and make sure that the spring pin is properly engaged.

34. Put the split pin through the rib and the rear winglet tube. The split pin must come out the other side of the rib. The split pin is twisted towards the wing and goes from the back to the front.

35. Pass the rudder line through the stainless steel bracket.

36. Offer up the tip fairing and position. Pass the rudder cable through the little window.

37. Rest the bottom surface on your knee. Line up the turbulator on the top surface with the corresponding mark on the fairing.

38. Press down to engage the Velcro from the line up point …

39. … towards the leading and trailing edges.

40. Do the same thing on the bottom surface, from the leading edge to the trailing edge one hand on each side of the tip rib.

41. Line up the exterior superior edge of the fairing with a Velcro just underneath the hinge of the rudder. In doing this you can tension that edge so that the fairing will marry up the exact form of the winglet.

42. Close up the rear horizontal part of the fairing making sure that the 2 skins line up perfectly with the elevon.

43. Close up the vertical part making sure that they line up with the rudder

44. Make sure that the fairing fits snugly to the winglet, you can adjust by playing with the rear Velcro's.

45. See that the rudder has full and free movement and does not touch the fairing

46. Connect up the rudder control. Make sure that the quick link is properly closed. Never put tension on the quick link until it is screwed shut.

47. Offer up the tiplet. First put in the rear screw a few turn and then put the front screw in and screw up all the way. Finally, screw up the rear one.

48. Put the vortillons on, **point facing forward**!

49. Connect up the cables to the pedals.
Do not put them round the wrong way !
The left wing line to the left pedal.

50. Put the ASI probe on.

51. Check that the rudders are working properly and put your instrumentation on before putting on your screens.

C. PUTTING THE FAIRINGS ON.

Be careful with the screens as they scratch easily when not in place. Only unpack them at the last moment.

52. Offer up the left part of the tail cone. Line up the bottom rear corner with the wheel fairing then press home the Velcro going forward.

53. With the slide latches open, insert the bushes into the opening.

54. From the rear angle, press the Velcro following the rear edge.

55. Close the latches.

56. Offer up the left side and follow the same procedure.

57. Put in the pins at the rear of the cone in the corresponding openings then put the 2 semi cones between the wheel fairing and the tail cone end.

58. Put the corner reinforcement on the top part.

59. Finish joining the 2 semi cones together on the top junction.

60. Put the parachute window in place (it is placed in the head rest during transport). Lock the parachute support.

61. Offer up the right window lining up the rear top corner with its line up mark on the tail cone.

62. Follow down the vertical recess of the tail cone.

63. Then follow along the oblique tube.

64. Do the same thing to the other side window then close up the zip between them.

65. Put the flaps of the windows on the trailing edge of the wings so that the widows line up with the top surface.

66. Offer up the side window starting with the bottom forward corner following the side tube down.

67. Follow the vertical edge engaging the Velcro.

68. Then follow along the bottom fairing.

69. Make sure that the Velcro is properly in by squeezing tightly.

70. Tighten up the Velcro on the oblique tube as well. Then fit the left side widow in the same manner.

71. Offer up the wind screen

72. Clip the pipe clip on at about 2/3 up the front tube then slide it up. Attach the bottom pipe clip.

73. Position the point of the windscreen before engaging the Velcro.

74. Tension the windscreen and engage the Velcro from the front to the back.

75. Go up the upright tube pressing the Velcro firmly in.

76. Go back over the fairing pressing the Velcro firmly home.

77. Offer up the windscreen fairing symmetrically.

78. Velcro progressively starting from the front, lining up with the windscreen Velcro.

79. Connect up the flap push rods. (The flap control should be set at 0 to 15 degrees to make the connection easy.)

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

D. Derigging

In general follow the rigging instruction starting at the end and working back wards. Take care with the windows as these scratch easily. It is best to keep them very clean and only clean them with a damp rag – never dry. Store the windows in their protective bags as soon as you have take them off, making sure that there is no dust in them.

Before taking off the wings make sure that you have disconnected all the control cables.
Make sure:

- The flap push rods are pinned to the wing (do to before disconnecting the flap control inside the cockpit.)
- The elevon push rods are pushed inside the wing both at the elevon and cockpit ends.
- The flap cables are hidden inside the wing.

Before pushing the wings inside the container make sure that there are not any stones or other things that could scratch the wing.

1. In the bag:
   a.1 tiplet with the 4 screws.
   b. The second tiplet comes in the first one.
   c. 2 rudder brackets and 2 vortillons

2. Start with the **left** wing (top wing in the container) After having taken out the fixing pins take the wing by its balance point in front of the leading edge. With 2 people: one at the tip and one at the root cord, leading edge side.

1. Carry the wing vertically

2. Put the tip on the ground on a protection mat and take hold of the root cord.

3. Rotate the wing to horizontal and work your way to the balance point

4. Once you have found the balance point put the wing on the top level in the container.

5. Before collapsing the cockpit, stow the tail semi cones under the hammock

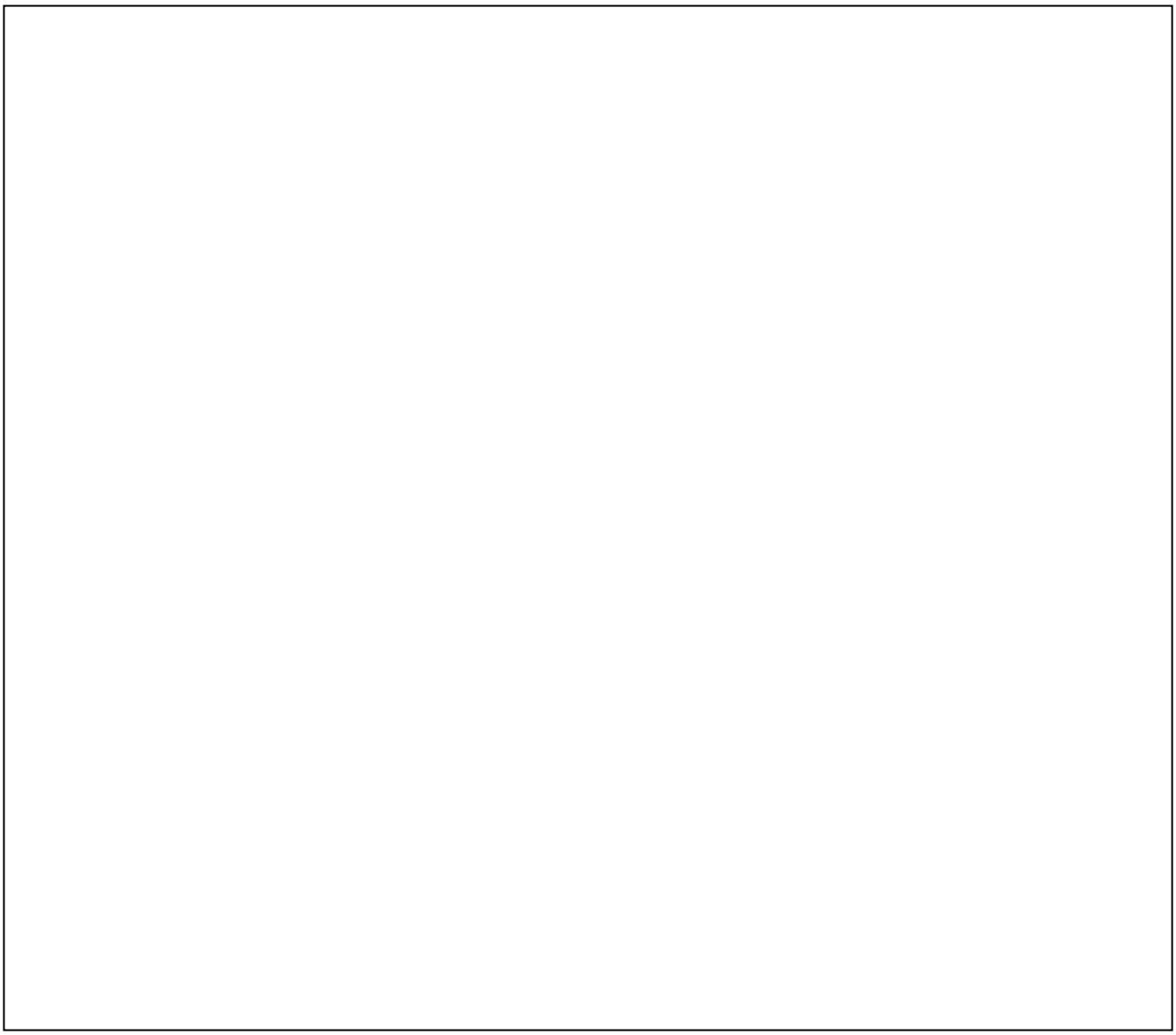
6. Put the semi cones in 1 by 1 putting a protection clothe them.

7. After removing the push pin fold the front tube down back wards. Swing the triangular frame forwards a bit to disengage the control column then bring the control stick against the thick side tube and fold down the triangular tube.

8. Before folding down the side frames get the flap pulleys out of the way so that they don't get squashed when you fold the side tubes down.

9. Fold the side frames down before the rear tubes and then the parachute stay / head rest.

- Rudder control lines



To take the wings away, only remove the quick links ‘1’. To fold down the cage, the adjustment rope has to be removing from the cleat.

Ground handling

There is different ways to move the Swift on the ground (from the set up area to the launch area, for example):

Always support the wing with flat hands *on the lower surface, level with the spar (the thickest part of the wing) or at either end of the wing. Avoid putting pressure on the upper surface, as it is not reinforced.*

1. On smooth ground, the Swift can roll on its rear wheel. Set the flaps to 0°, then push on the nose **backwards**. Lift up slightly the nose, with flat hands on the lower surface.

2. On rough ground, it is easier to carry the Swift on the shoulder (see foot launch section).

3. With 2 people: symmetrically, leading edge side, a little after the vortillons, flat hands level with the spar.
   If the wing is 'tail' heavy, the 'carriers' move a little bit to the winglets.

4. With 3 people: one to the nose, one at each tip, leading edge side.

*Careful of the **big leverage effect** owing to the great span of the wing: **do not move the glider pushing on one winglet**. This put a big torsional stress on the fuselage frame.*

- Reinforced skin area

The following areas are reinforced regarding handling stresses:

- Lower skin:
    1. Between the leading edge and the spar (thickest airfoil zone).
    2. Around the tip rib (winglet support).
    3. Around the root rib.
- **The upper skin is not reinforced. Do not grab the airfoil!**

The wing is not reinforced behind the main spar (the thickest part of the wing section) => only handle the wing following the procedure!