

Skyranger Wing Fold Operators Manual

Issue 1.4

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1. Introduction

These instructions may look complicated, but like any skill folding the wings will become easy with practice! These instructions are quite detailed, but once some experience has been gained the quick reference guide included with the rigging checklist is usually all that is required.

Most of the wing fold equipment can be removed from the aircraft when not in use, leaving less than 1kg to be added to the aircraft's empty weight. All of the wing-fold equipment can be carried in the aircraft if required, totalling 4kg of baggage plus the 1kg installed weight.

The wing fold kit requires some fitting to the aircraft, detailed in the Installation Instructions, but does not require any modifications to the primary structure.

The wing fold kit is approved by MAAN 1745, which states "Instructions for how to fold the wing are to be kept with the aircraft manual. A placard stating "Not to be trailered without additional wing support" is to be mounted in a conspicuous place on each upper cabin tube, to be visible when the wing is pulled out."

Note that when the wings are disconnected and supported by the wing fold mechanism you must take great care not to drop them or allow them to catch on anything. You have enormous leverage from the wing tip, and can therefore damage the aircraft with little effort. Take Care!

2. Wing Support Rods

2.1. Fitting the Wing Support Rods

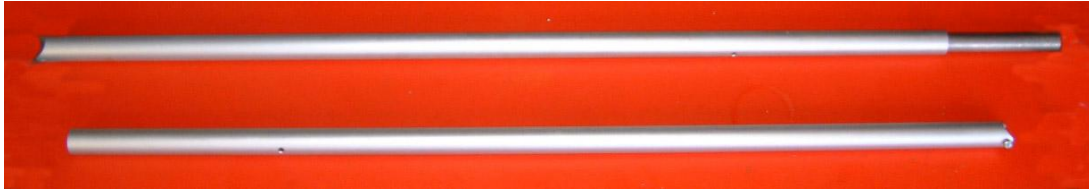


Figure 1; wing support rods. (Outboard end "mushrooms" not shown).

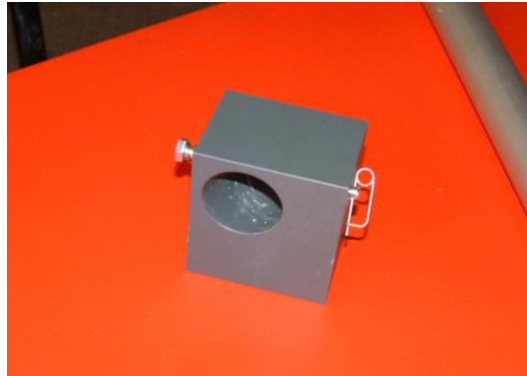


Figure 2; locating block.

Port Wing Rod

- 1) Prepare the port wing support rod.

Select the longer wing support rod, with the central joiner piece

Remove the safety clip and the pin securing the locating block.

Remove the locating block itself.

- 2) Install the wing support rod.

Open the zipped slot near the port wing leading edge jury strut.

Insert the wing support rod, with the thinner joiner tube end in first.

Slide the whole rod into the port wing, going above the compression tube and the cables, and leave it there for now.



Figure 3; insert the port support rod, joiner first, until it rests inside the wing.

Starboard Wing Rod

- 1) Prepare the starboard wing support rod.

Select the shorter wing support rod, without the central joiner piece

Remove the safety clip and the pin securing the locating block.

Remove the locating block itself.

- 2) Install the wing support rod.

Insert the rod via the zipped slot near the starboard wing leading edge jury strut.

Slide the whole rod into the starboard wing, going above the compression tube and the cables.

- 3) From inside the cabin pull both wing support rod ends a short distance through the rollers.

Ensure the ends of the rods are over the cables within the wing, not trapped beneath them.



Figure 4; wing support rods protruding from the wing rollers.

Locating Blocks

- 1) Place the starboard locating block onto top of the starboard upper cabin triangle tube.

Check the markings to orientate the block correctly.

Place the block between the elevator trimmer cables, taking care not to trap them under the block.

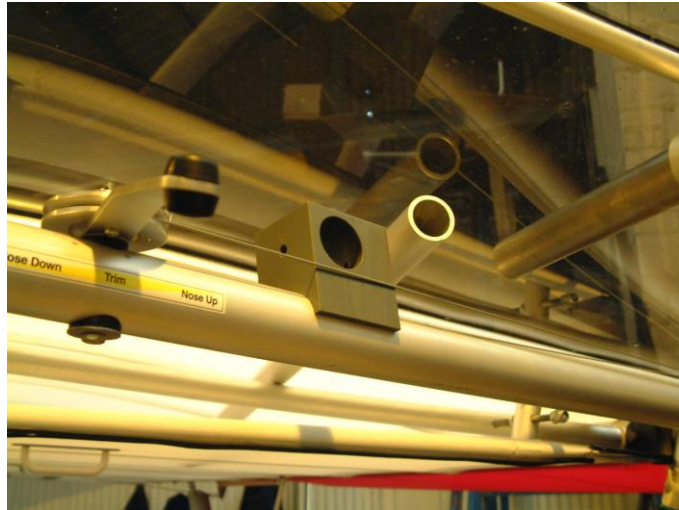


Figure 5; starboard locating block between trimmer cables.

- 2) Pull the wing support rod back through the locating block.

If it appears tight, slide the block up or down the upper cabin tube until the wing support rod slides easily.

Slide the inner end of the starboard rod as far as the centreline of the aircraft.

Do not twist the rod, keep the markings downwards.



Figure 6; pull the rod back through the locating block in position on the cabin tube.

- 3) Repeat with the port wing support rod and locating block.

Slide the joiner piece on the port rod all the way into the starboard rod.

- 4) Fit the securing pins.

Check the spring is on the pin.

Insert the pin from the front through the locating block and the wing support rod.

Twist the rod slightly if necessary to find the holes. The mushrooms on the ends of the support rods should have their flat faces towards the top and bottom.

Secure with a safety clip.



Figure 7; locating block with securing pin.

- 5) Secure both locating blocks individually to the upper cabin triangle tubes using the two short straps with a buckle at one end.

Start with the buckle hanging down on the forward outer side of the block.



Figure 8; lay the strap over the locating block.

Pass the strap up and over the block, diagonally towards the inner rear side.

Ensure the strap passes between the block and the trimmer cables, so that the cables are not trapped by the strap.

Pass the strap under the cabin triangle tube behind the wing support rod.

Pass the strap up and over the block, diagonally towards the forward inner side.

Pass the strap under the cabin triangle tube in front of the wing support rod to meet the buckle.



Figure 9; ready to pass end of strap through buckle.

Thread the strap end through the buckle.

Pass the loose end of the strap diagonally over the top of the locating block once more.

Take care to position the straps over the flat edges of the locating blocks rather than the corners.

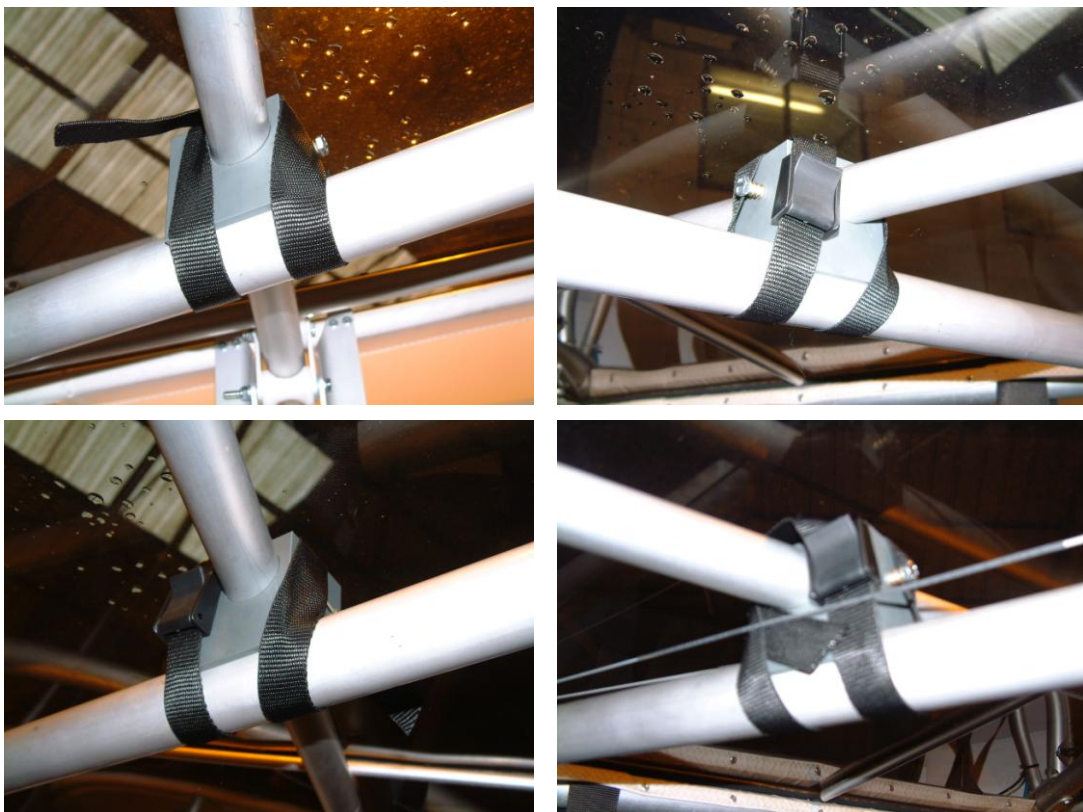


Figure 10; position straps flat against the locating block, without trapping the trimmer cables.

Pull the strap end down to tighten the strap.

Secure the buckle.

Tuck the end of the strap away neatly.

- 6) Fit the Velcro cable holders to the forward vertical tubes in the wing roots.



Figure 11; cable holder.

2.2. Removing the Wing Support Rods

- 1) Undo and remove the straps holding the locating blocks to the upper cabin triangle tubes.
- 2) Remove the safety clips and the pins through the locating blocks and the wing support rods.
- 3) Slide both wing support rods into the wings, and remove the locating blocks.
- 4) Slide the wing support rods out of the zipped slots by the leading edge jury struts.
- 5) Insert and secure the pins in the locating blocks and place all the components safely in their bags.

3. De-rigging

3.1. Prepare the Aircraft

- 1) Position the aircraft pointing directly into wind.
- 2) Ensure that no prop-wash will affect you whilst de-rigging.
- 3) Apply the brake and secure with a piece of bungee looped over the handle.
- 4) Fit the “Do Not Fly” tag to the choke handle.

Do not remove this again until the wing unfold check list has been completed.

- 5) Fit the wing-tip covers (NA if glassfibre wing tips are fitted)

The covers and pads are fitted first and removed last to provide a visual cue that the aircraft is not currently fit for flight.

The elastic piece passes between the wing and the aileron to hold the cover in place, and the aileron is protected by its own cover attached to the wing-tip cover.



Figure 12; rear edge of wing-tip cover.

Fit the pads to the top of the fuselage immediately rear of the parachute cover pieces,

- 6) Figure 21.

The padded top should sit on the fuselage top tubes with the flap hanging down the fuselage side (Skyranger and Swift).

Hold them in place with the Velcro tabs slipped under the parachute covers and with the strap passed beneath the fuselage (Skyranger and Swift)

For Ninja the straps pass under the trailing edge spar U brackets..

- 7) Fit the pads to the tailplane trailing edges where the bracing cables attach.

They should be pushed back against the bracing cables, with a single wrap of the inboard strap around the cable to hold them in position, before connecting the straps to the front of the pad.

3.2. Disconnect the Controls

- 1) Disconnect the flap pushrods where they attach to the flaps.

Allow the flaps to droop.

Replace the pin in the end of the flap pushrod for safekeeping.



Figure 13; drooping ailerons and flaps.

- 2) Disconnect the aileron cables from the horn beneath the dashboard, or the shackles behind the leading edge spars if the Mk2 type of aileron cables are fitted..
- 3) Unthread the aileron cables from the pulleys in the middle of the cabin (N/A for Mk2 cables).

Take a note of which cable goes on which pulley so that you can put it back the same way when you rig the wings again.

Remove the keeper pin above the pulleys to allow the cables to slip out between the keeper plate and the nearby structure.

- 4) Disconnect the aileron joiner cable above the front of the cabin.

Allow the ailerons to droop.

- 5) Tuck the aileron cables into the wings and secure them with the Velcro straps.

Note that with the correct pulley to side plate spacing, checked when the wing fold kit was installed, the cables cannot fall off the pulleys in the wings.



Figure 14; Velcro cable holders.

3.3. Disconnecting the Wings

- 1) Assemble the wing-tip prop.

The fixed length strap at the top should run over the ends of the tubes and then be flat. Turn the tubes around until this is so.

Start with the prop set to its lowest position.



Figure 15; arrangement of straps on wing tip prop, and fitment to wing-tip.

- 2) Fit the wing-tip prop around 6" from the wing-tip.

The buckle should be at the leading edge.

The upper strap should pass up between the trailing edge and the aileron, up over the top of the wing, to the buckle at the leading edge.

Pull the upper strap just tight enough to position the ends of the prop against the leading and trailing edges of the wing. It does not need to be very tight.

- 3) Adjust the wing-tip prop to its usual setting.

A good starting point is 2 stops beyond the point at which it contacts the ground.

Take a note of what setting works best for you, for future reference and particularly for unfolding the wings.



Figure 16; adjusting the height of the wing-tip prop.

- 4) Remove the safety clip from the leading edge securing pin.
- 5) Remove the safety clip from the trailing edge securing pin.
- 6) Remove the safety clip, nut and washer from the lift strut attachment bolt at the fuselage.
- 7) Undo the Pitot tube connection at the fuselage end of the lift strut if applicable.
- 8) Remove the lift strut bolt.

If the lift strut bolt is tight, adjust the tip-prop height until the bolt can be removed, then note the setting on the tip-prop.

- 9) Remove the leading edge pin.
- 10) Close the door, rotating the trailing edge pin as it does so to get the handle outside the door.
- 11) Remove the trailing edge pin.
- 12) Loosen the upper strap on the wing-tip prop, and get it clear of the tip.

This is to allow the prop to fall clear when the wing is removed, but if the surface is smooth it may be left in place and slid inwards towards the fuselage.

- 13) Slide the wing out and lay the wing tip on the ground.

Take hold of the wing-tip and lift it slightly, allowing the tip-prop to fall to the ground.

Pull the wing smoothly outwards holding the wing tip at the same height, being ready to support the leading edge of the wing as it clears its mount.

Pull the wing out until it contacts the stop at the end of the wing support rod.

Whilst continuing to apply a gentle outward pull, lay the wing-tip on the ground about 6" rearwards of the straight position. This reduces the twisting which occurs when the fuselage is tilted tail-down.

If glassfibre wing tips are fitted used a pillow/ foam rubber to lay the tip on.



Figure 17; removing the wing.

- 14) Fit the cover to the end of the lift strut.
- 15) Drop the pins into the holes in the wing rods just inboard of the rollers, to prevent the wings moving inwards.

These have holes for safety pins if the aircraft is to be trailered, but otherwise no safety pins are required nor supplied.



Figure 18; lift strut end cover.

- 16) Repeat for the other wing.

3.4. Folding the Wings Back

- 1) Prepare a tie-down or weight to hold the tail of the aircraft on the ground.
- 2) Lower the tail of the aircraft to the ground. Secure the tail in this position.

With Swift 2 and Nynja take care that the rudder does not contact the ground. A small block of wood under the finpost, or making a stop (maybe with a castor) that fits into the finpost may be useful

- 3) Prepare the two medium length straps, one each side, by threading them around the vertical fin beneath the bracing cables.



Figure 19; strap threaded between fin and rudder below cable bracing attachment.

- 4) Whilst applying a gentle outwards pull, pick up the wing-tip and lift it to its normal height when rigged.
- 5) Rotate the wing leading-edge downwards.



Figure 20; leading edge rotated downwards.

- 6) Now pull the wing outwards against the end stop bolt and walk the tip back to the tail of the aircraft ensuring that the lift struts pass up over the fuselage.



Figure 21; walk the tip back to the tailplane with the lift struts above the fuselage. Lower picture Nynja – pad for lift struts to rest on.

- 7) Place the leading edge on the pad on the tailplane.



Figure 22; leading edge on tailplane pad.

- 8) Secure the wing with one of the straps around the vertical fin, passing it around the trailing edge lift strut attachment.

The strap should not be too tight, just remove the slack. It is there to prevent the wing from being blown off the tail.

- 9) Check that the tailplane pad is positioned correctly between the leading edge of the wing and the trailing edge of the tailplane.

The weight of the wing should bear only on the trailing edge of the horizontal stabiliser, close to where the bracing cable attaches.

The flaps and ailerons should be drooping inwards.

- 10) Repeat for the other wing.
- 11) Release the tail or remove the weight, and release the brake.
- 12) To move the aircraft, have a good look where you intend to go, then stand between a wing and the fuselage forward of the tailplane and pick it up close to the root of the tailplane. Take care not to turn into anything, as visibility is limited by the wings on both sides.



Figure 23; moving the aircraft, wings folded, to fit neatly out of the way.

4. Rigging

4.1. Unfolding the Wings

- 1) Position the aircraft pointing directly into wind.
- 2) Ensure that no prop-wash will affect you whilst rigging.
- 3) Apply the brake and secure with a piece of bungee looped over the handle.
- 4) Lower the tail of the aircraft to the ground, and secure it with a tie-down or a weight.
- 5) Remove any additional straps securing the wings to the fuselage, leaving the standard ones to the vertical stabiliser.
- 6) Remove the strap securing the port wing and pick up the wing-tip.

Use your left hand under the leading edge.

- 7) Walk the tip forwards to its normal position in line with the wing support rods whilst pulling gently outwards to ensure that the wing pivot remains against the stop at the end of the wing support rod.
- 8) Whilst applying a gentle outwards pull, rotate the wing to its normal attitude and lay it flat on the ground.

Lay it about 6" forwards of the straight position, to allow for the movement caused as the tail is lifted later.

- 9) Repeat for the starboard wing.

Use your right hand under the leading edge.

- 10) Undo the tie-down or remove the weight and allow the tail to rise.
- 11) Remove the covers from the ends of the lift struts.
- 12) Remove the pins from the holes in the wing rods just inboard of the rollers.



Figure 24; remove the lift strut end cover.

4.2. Fitting the Wings

- 1) Adjust the wing-tip prop to its correct setting.

This should be the same as was used for de-rigging.

If this is not known, start at the lowest setting.

- 2) Fit the wing-tip prop around 6" from the wing-tip.

Lie it beneath the wing with the feet towards the fuselage and the buckle at the leading edge.

Pass the upper strap between the trailing edge and the aileron and secure to the buckle at the leading edge.



Figure 25; wing-tip prop positioned beneath wing, slid into place as the tip is lifted.

- 3) Take hold of the wing-tip and lift it, being careful to keep some outwards pull as you do so.
- 4) Allow the tip-prop to slide into place beneath the tip.
- 5) If the leading edge is clearly lower than the trailing edge, extend the front leg of the wing-tip prop by a couple of positions to prevent it resting too heavily on the door when it is fitted.
- 6) Gently slide the wing into place on the fuselage.

Ensure that the leading edge passes over the top of the door.

- 7) When the wing cannot be moved further, approach the fuselage and guide the lift-strut end into place whilst pushing the leading edge into place.

If the lift strut end requires more than a gentle pull to lift it onto the attachment point, then the wing-tip prop should be adjusted higher.



Figure 26; push the leading edge into place whilst guiding the lift strut ends.

- 8) Fit the leading edge securing pin.

If the leading edge appears too far forwards, move the tip forwards and vice-versa.

Once the leading edge is in its bracket, if the hole needs to be moved inwards then the tip should be lifted by adjusting the wing-tip prop.

Ensure the lift strut end remains in place.

Open the door and insert the pin from the rear.

- 9) Fit the trailing edge securing pin.

If the trailing edge hole needs to be moved inwards, move the tip rearwards.

If the trailing edge needs to be lifted, stand under the trailing edge and lift it as you insert the pin.

Ensure the lift strut end remains in place.

Close the door and insert the pin from the front.

Rotate the pin past the door as you open the door again.

- 10) Fit the lift strut attachment bolt.

If the lift struts need to be moved inwards, then adjust the wing-tip prop downwards and vice-versa.

Align the holes using the smooth "podger" from the rear, then as you withdraw it insert the bolt from the front.

- 11) Reconnect the Pitot tube at the lift strut base, if applicable.

- 12) Replace the safety clip, nut and washer on the lift strut bolt.

- 13) Replace the safety clip on the leading edge securing pin.

- 14) Replace the safety clip on the trailing edge securing pin.

- 15) Repeat for the other wing.

4.3. Connect the Controls

- 1) Connect the flap pushrods where they attach to the flaps.
- 2) Connect the aileron joiner cable above the front of the cabin.
- 3) Pass the aileron cables around the pulleys in the middle of the cabin.

Use the same pulleys they originally came off.

- 4) Connect the starboard aileron cable to the starboard side of the horn beneath the dashboard.
- 5) Connect the port aileron cable to the port side of the horn beneath the dashboard.

Sit side-saddle in the port seat and reach under the dashboard.

Hold the port aileron cable in your right hand and attach it to the port side of the aileron horn beneath the dashboard using the shackle and pin held in your left hand.

- 6) Ensure that the aileron cables cross each other above the dashboard.

4.4. Final Checks

- 1) Remove the wing-tip covers.
- 2) Remove the pads from the lift struts.
- 3) Remove the pads from the tailplane halves.
- 4) Pack the pads back into the bag.
- 5) Pack the tip-prop back into the bag.
- 6) Remove the wing support rods if desired.
- 7) **Perform the rigging checklist.**

5. List of Amendments

[illegible]