

Skyranger Wing Fold Installation Instructions

Issue 1.2

Contents

1. Door tops.....	2
2. Fuselage components	2
2.1. Fitting the wing support rods	2
Port wing rod.....	2
Starboard wing rod.....	3
2.2. Rollers	4
2.3. Locating blocks	5
2.4. Wing roller plates.....	7
3. Wing components	9
3.1. Wing removal.....	9
3.2. Fitting the wing roller assemblies	11
3.3. Lift strut plates	14
3.4. Leading and trailing edge tapered plugs	14
3.5. Refit the wings	15
4. Attach the lift strut plate bracing pieces	17
5. Complete the wing support rod fitting.....	18
6. Elevator trimmer cables	20
7. Fitting checks	21
8. List of amendments.....	22

1. Door tops

The tops of the doors should be trimmed level with the top of the lower wing root battens, to allow easy access to attach the wing support rod end stops.

Mark the doors and remove them to trim them.

Take care not to leave any sharp edges to catch your hands on.

Leave the doors off until the wing fold kit has been fitted.

Check that the wing tensioning vertical bars located in the wing roots are correctly orientated.

2. Fuselage components

2.1. Fitting the wing support rods



Figure 1; wing support rods.

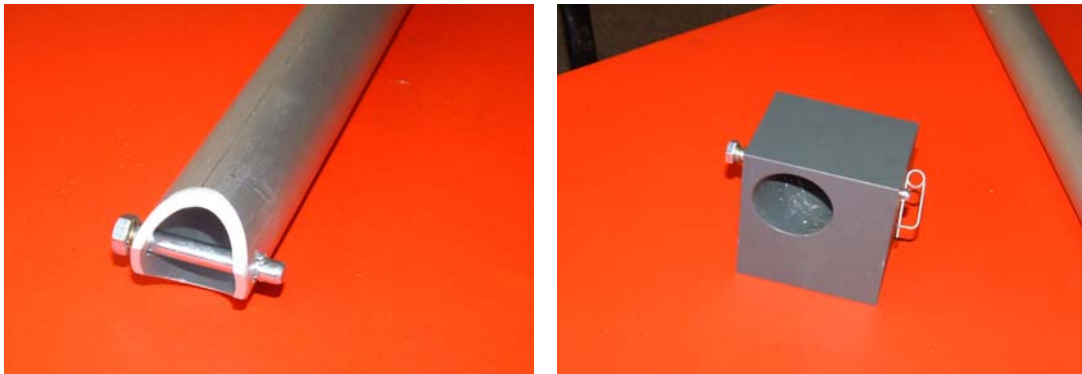


Figure 2; end pin and locating block.

Port wing rod

- 1) Prepare the port wing support rod.

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

Sit yourself down on the port seat.

Take care not to bash or stab anything with the rod!

Remove the outboard end pin, rotating counter-clockwise.

- 2) Install the wing support rod.

Move the elevator trim lever fully aft.

Put the inner end of the rod into the space behind the starboard door.



Figure 3; port rod inner end behind starboard door, then lift outer end up between cabin tubes.

Swing the outer end up between the upper cabin triangle tubes and slightly into the port wing root.

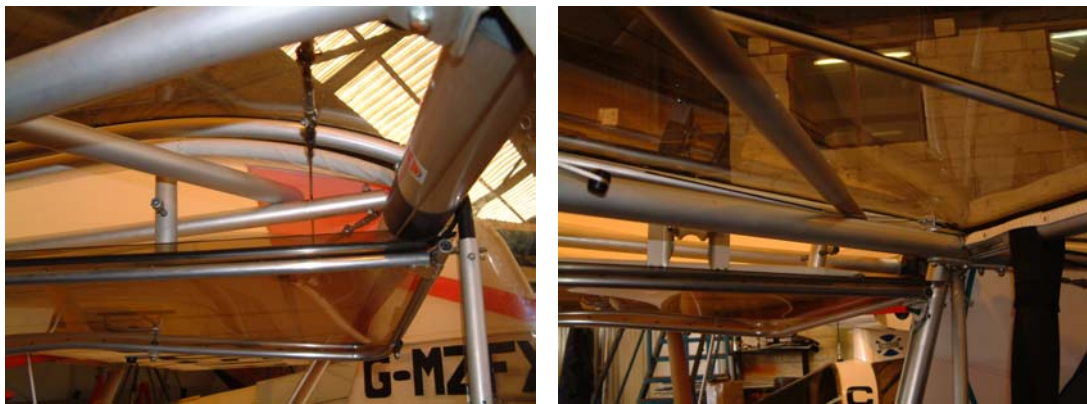


Figure 4; outer end of rod passes into port wing root while inner end is lifted above cabin tubes.

Slide the inner end into the starboard wing.

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

Starboard wing rod

- 1) Prepare the starboard wing support rod.

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

Sit yourself down on the starboard seat.

Take care not to bash or stab anything with the rod!

Remove the outboard end pin.

- 2) Install the wing support rod.

Put the inner end of the wing support rod into the front of the cabin.



Figure 5; inner end of starboard wing support rod.

Swing the outer end into the cabin behind the starboard door, as per the port wing rod.

Swing the inner end up between the upper cabin triangle tubes and in towards the port wing root.

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

2.2. Rollers

- 1) Prepare both the wing roller assemblies.

Remove the outermost side plates by removing the long bolt, then slip the bolt back into place.

Tighten the short bolt, but not so much that it crushes the spacer tube within the roller, which would prevent it rotating.

- 2) Slip the roller assemblies over the end of the wing support rods as you slide them out of the wing roots towards the aircraft centreline.

Position the rollers between the wing root batten and the windscreen roof support tube.

The bolts should point rearwards.



Figure 6; rollers loosely positioned.

2.3. Locating blocks

- 1) Try the locating blocks on the upper cabin tube.

Arrange them to get the large holes aligned across the cabin to allow the wing support rods to pass through.

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

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



Figure 7; starboard locating block between trimmer cables.

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

If it appears tight, ensure that the rod is aligned with the locating block so that it slides easily.

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

Do not twist the rod, otherwise you may end up with unsightly markings on the rod.



Figure 8; pull the rod back through the locating block in position on the cabin tube.

- 4) 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.

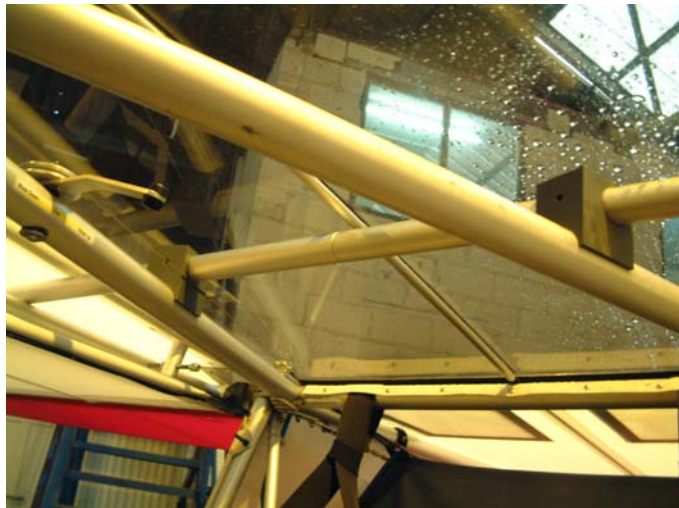


Figure 9; wing support rods assembled in cabin.

- 5) Slide the whole wing support rod assembly forwards and backwards to find the best place for it.

If too far forwards the compression tubes in the wings will lift the wing support rods and the locating blocks off the cabin tubes.

If too far aft the wing support rods will contact the underside of the upper wing root battens.

The best position is somewhere between these extremes, with about equal clearance between the wing support rods and the compression tubes and the upper wing root battens.

This position should turn out to be around 42cm \pm 4cm from the front edge of the fuselage tube between the trailing edge spars to the centre of the wing support rods.

- 6) Mark the location and orientation of the locating blocks.

Put small marks on the upper cabin tubes at the front of the locating blocks.

Mark the locating blocks "P" and "S", for port and starboard, and "F" and "R" for front and rear.

- 7) Temporarily secure the locating blocks in position using tape.

2.4. Wing roller plates

- 1) Offer up a wing roller assembly side plate to the wing rollers.



Figure 10; side plate measured to cut to length.

- 2) Cut the top off the side plate to match the slope of the upper wing root batten.

Offer the side plate up to the batten, and mark the angle of the batten.

Do not cut off more than is necessary at this point.

- 3) Cut the top off the side plate to align the hole with the roller assembly.

Remove the lower, long bolt from the roller assembly.

Gently press the side plate against the underside of the windscreen.

Slip a plastic washer between the side plate and the roller assembly to get the correct position.

Hold the side plate against the roller assembly, and arrange the side plate to be vertical.

Measure the distance between the hole in the side plate and the hole in the roller assembly.

Cut slightly less than this amount of the top of the side plate, then finish to fit nicely.

The side plate should not touch the windscreen, but should be within 1-2mm of it.

- 4) Cut off the bottom edge of the side plate to match the bottom of the lower wing root batten.

Slip the bolt into the side plate and roller assembly.

Ensure the side plate is vertical.

Mark the side plate level with the lower edge of the lower wing root batten.

Cut off the end of the side plate and finish to fit.

- 5) Repeat this for each of the four side plates.

Remember to keep the plates vertical, and to use the correct plastic washers to get the position right.

Cut each plate to size to match the wing root battens, without touching the windscreen or hanging below the lower wing surface.

- 6) Assemble the side plates onto the wing rollers.

The bolts point rearwards, with a plastic washer between each side plate and the roller plates. Use two metal washers at the nut end to take up the slack.

Tighten the nuts gently, to the point at which there is no slack at all between the side plates and the roller plates, even a little stiff, but do not crush the spacer tube inside the rollers. The rollers must still turn freely.

- 7) Press the wing roller assemblies against the wing root and mark their positions.

Mark both the side plates and the fabric on the upper and lower wing root battens where the side plates touch, so that the side plates can be repositioned accurately when the wings have been removed.

Take care not to disturb the wing support rod positions between marking one side and the other.

- 8) Remove the wing support rods from the aircraft.

Undo the tape securing the wing support rods.

Slide the wing support rods back into the wings.

Remove the locating blocks and the wing roller assemblies. Inconspicuously mark the roller assemblies port and starboard, front and rear.

Remove the wing support rods in the reverse sequence from installation, see the main Wing Fold Instructions manual for a detailed description.

3. Wing components

3.1. Wing removal

- 1) Fit the wing-tip covers.

They are part of the wing fold kit, so you may as well make use of them now to protect your wing tips.

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 11; rear edge of wing-tip cover.

- 2) 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 12; drooping ailerons and flaps.

- 3) Disconnect the aileron cables from the horn beneath the dashboard.

- 4) Unthread the aileron cables from the pulleys in the middle of the cabin.

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.

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

Allow the ailerons to droop.

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

These are supplied in the wing fold kit, and are simply wrapped around the forward vertical tubes in the wing roots.



Figure 13; Velcro cable holders.

- 3) Remove the nut and any washers or clips from the leading edge securing pins.
- 4) Remove the nut and any washers or clips from the trailing edge securing pins.
- 5) Remove the nut and any washers or clips from the lift strut attachment bolts at the fuselage.
- 6) Undo the Pitot tube connection at the fuselage end of the appropriate lift strut.
- 7) Temporarily wrap some protective cloth or similar around the undercarriage legs to avoid scratching them.

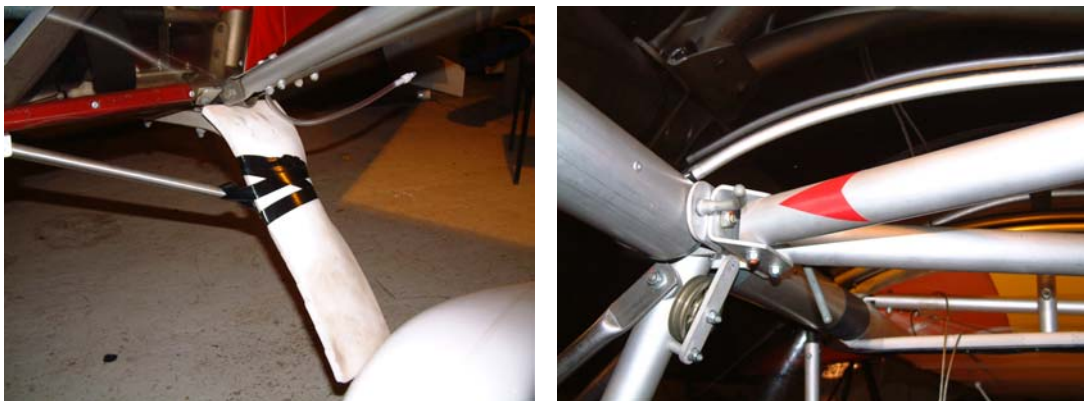


Figure 14; temporary protective padding, and thin protective tape (to remain in place).

- 8) Fit small patches of thin protective tape to the cabin top tubes where the leading edge pins contact them on removal.
- 9) **Get one or preferably two helpers, one to support the wing tip and one to help support the wing root.**
- 10) Prepare a space to put the wing upside down, with the wing tip on the ground and the wing root propped up on a chair or similar.
- 11) The wings can be removed and worked on together, or one at a time.

The aircraft will stand with only one wing in place, although take care on steep slopes or on windy days.

Leave the lift struts and jury struts attached to the wings and each other.

- 12) Remove the lift strut bolt, get the wing tip helper to lift the tip, then replace the bolt in the lift strut ends.

This prevents the lift struts from moving and straining the jury struts.

- 13) Remove the leading and trailing edge pins.

- 14) Slide the wing out, rotate it upside down, and lay it carefully on the ground and the chair.

Take care not to strain the control surfaces or let them bang about.



Figure 15; lay the wing down, propped up at the root on a chair or similar.

3.2. Fitting the wing roller assemblies

- 1) Locate the correct roller assembly for each wing, and determine which way round it should be.

Remember the wings are upside down!

- 2) Hold the roller assembly against the wing root and align it with your marks.



Figure 16; position the roller assembly on the wing root.

- 3) Check that the marks accurately represent the centrelines of the wing root battens.
If they do not, position the roller assembly using the existing marks, and then remark the actual centreline positions of the lower wing root batten on the roller assembly side plates (the upper most, easily accessible ones with the wings this way up).
- 4) Remove the roller assembly and place it on top of a ruler. Use this to draw lines across the side plates so as to position the rivets on the centreline marks from the lower wing root batten.
- 5) Drill 4mm holes through the side plates for the rivets.
Mark the holes on the lines at 6mm and 18mm from the outside edges.
Centre-punch at the marks, then drill with a 4mm drill.
Make sure no swarf or other bits of material are left around the holes. Spinning a bigger drill bit against the holes by hand is a quick and easy way to achieve this.
- 6) Drill a single 4mm hole in the wing root batten.
Ensure that the wing is held securely, as you will need to push against it during the drilling process.
Hold the wing roller assembly against the wing root once again.
Ensure there is no slack in the assembly which could cause misalignment.
Mark the covering through one of the outer holes.
Remove the assembly and drill a 4mm hole in the wing root batten at the mark.
Remove any swarf etc.
- 7) Check the alignment.
Position the roller assembly using a 4mm x 10mm steel rivet through the side plate and the hole in the wing root batten.
Check the alignment of the assembly against the alignment marks.
If necessary, file the hole in the wing root batten to achieve the correct position.
- 8) Holding the assembly in the correct position, rivet it in place.

- 9) Check the alignment once again, then drill directly through the furthest hole from the rivet.
- 10) Clear any swarf and rivet in position.
- 11) Drill and rivet the remaining two holes.
- 12) Mark the positions for the rivets on the upper (currently lowest) wing root batten.

Hold a ruler across the side plates at the centreline of upper wing root batten and mark the centreline on the side plates.

Mark the hole centres at 6mm and 18mm from the outside edges of the side plates.

Centre-punch all 4 holes.



Figure 17; mark the rivet hole positions on the upper wing root batten (the wing is upside down).

- 13) Drill directly through each hole, fitting each rivet before drilling the next hole.



Figure 18; fully fitted wing roller assembly.

- 14) Repeat for the other wing.

3.3. Lift strut plates

- 1) Remove the 4 bolts holding the end pieces into the inboard ends of the lift struts
- 2) Fit the lift strut plate to the top of the lift struts.

Use the 4 slightly longer bolts supplied.

Note that the plates are handed, and should be fitted with the straight edge towards the front, the edge with the gentle corner in it towards the rear, and the bent edge pointing upwards.

Some persuasion and manipulation of the struts may be necessary to fit all four bolts. If necessary, the holes in the plate may be slotted slightly to fit.

Remember the wings are upside down, so fit them to the lowest side!

If desired the plates may be fitted when the wings are refitted, and supported by the tip-prop. In this case, ensure that the main lift strut attachment bolts are done up first to position the lift struts properly.



Figure 19; ready to fit lift strut plates, and fitted plate.

3.4. Leading and trailing edge tapered plugs

- 1) Insert the tapered plastic plugs into the leading and trailing edge tubes.

If the plugs are too tight, use abrasive paper to remove some material.

If they are too loose, so that they will not stay in position when the wings are removed, wrap some thin tape around them until they are a tight fit again.

The leading edge plugs have a cut-out to clear the bolt head to the rear of the leading edge attachment bracket.

- 2) Drill holes through the leading edge tapered plug for the securing pin.

The soft plastic drills easily compared to the harder aluminium tube.

Take care not to enlarge the holes in the aluminium leading edge tube.

Carefully ensure that the holes through the plastic are nice and big, especially the rear one, otherwise the leading edge pin will not fit easily. Tilting the drill works well.

- 3) Drill holes through the trailing edge tapered plug for the securing pin.

Remove the flap first.

Drill the rear hole from the rear.

Again from the rear, drill the front hole using a smaller (say 6mm) drill, aligning the hole as best you can by eye.

Examine the position of the small hole, and correct the position when drilling out to the full 8mm.

The soft plastic will allow the drill to find its way through the aluminium tube front hole.

Refit the flap.

- 4) Replace the leading and trailing edge securing pins/bolts with the smooth stainless steel ones supplied.

3.5. Refit the wings

- 1) **Get one or preferably two helpers, one to support the wing tip and one to help support the wing root.**

- 2) Pick up the wing.

Have a helper at the tip, and yourself at the root. If you have another helper, get him to hold the root end of the trailing edge while you hold the root end of the leading edge.

- 3) Fit the leading edge into its bracket on the fuselage.

It may be necessary to guide the trailing edge into place and to lift the lower end of the lift struts into place.

- 4) Insert the leading edge 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 slightly.

Ensure the lift strut end remains in place.

Open the door and insert the pin from the rear.

5) Insert the trailing edge 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.

Insert the pin from the front.

6) Fit the lift strut attachment bolt.

If the lift struts need to be moved inwards, then lower the wing tip slightly. If outwards, lift the wing tip slightly.

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

The aircraft will stand with only one wing in place, although take care on steep slopes or on windy days.

7) Repeat for the other wing.

4. Attach the lift strut plate bracing pieces

- 1) Discard any plastic washers which may have been previously put between the lift strut inboard ends and the main cross-beam, as these will prove tricky to use when unfolding the wings.
- 2) Mark and drill the small aluminium brackets.

Position the small L-bracket centrally beneath the plate on the ends of the lift struts.

The flat of the bracket should rest against the end of the main undercarriage cross-beam.

Mark through the holes in the plate.

Check to see if the holes are central on the bracket, if not then try again.

When satisfied, centre-punch and drill the holes to a loose 4mm diameter.

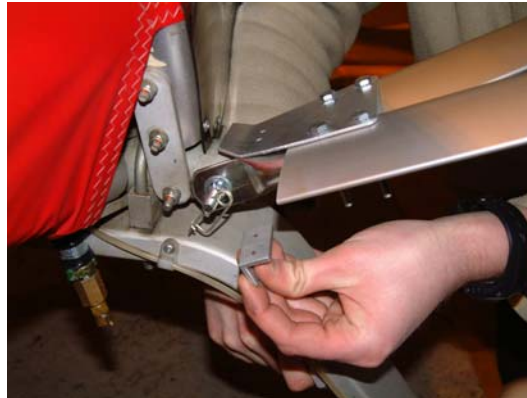


Figure 20; lift strut supporting bracket.

- 3) Rivet the brackets in place beneath the lift strut plates.
Use 4mm steel rivets.
Put a cloth or similar between the riveter and the door panel to prevent scratches.
- 4) These parts act to position the lift struts on the main cross-beam, but note that they are not capable of supporting the entire weight of the wing whilst trying to align the holes.

5. Complete the wing support rod fitting

- 1) With both wings back in position on the aircraft, refit the wing support rods into the aircraft.

Follow the procedure used earlier to install the wing support rods into the wing rollers and the wing support rod locating blocks.

- 2) Position the wing support rods with the join between them on the aircraft centreline.
- 3) Rotate the rods until the end pins are horizontal.

Ensure the pins point rearwards, with the locating groove on the rear of the wing support rod.

- 4) Using a thin pencil or similar, mark the hole positions on the wing support rods through the holes on the locating blocks.



Figure 21; mark the holes with a slim pencil.

- 5) If not already done, discretely mark the locating blocks and wing support rods port and starboard and front and rear.
- 6) Remove the locating blocks and wing support rods and the from the aircraft.
- 7) Drill the holes through the wing support rods.

Match the correct blocks and rods, and check their orientation.

Gently clamp the locating block in a vice, and position the rod within it to align the marks with the holes.

Clamping the vice tighter will now hold the tube in place.

Use a new 6mm drill bit, take care to stay aligned and not to wander through the plastic block.

When one side has been drilled, insert a bolt into the hole to maintain the alignment and flip the assembly over and clamp in the vice again, then drill the other side.

Finally remove the alignment bolt and run the drill right through the locating block and wing support rod assembly and check the fit of the 6mm pins.



Figure 22; clamp tube and block in vice.

- 8) Carefully remove any swarf or burrs around the holes.
- 9) Reinstall the wing support rods and the locating blocks in the aircraft.
- 10) Insert the 6mm diameter securing pins through the locating blocks and wing support rods.

Insert these from the front.

Check the anti-rattle spring is in place.

Secure with nappy pins or split rings.

If the pins will not fit, check the positioning of the blocks and rods.

If necessary, open the holes out just a little in the wing support rods.

Check the fit of the blocks, ideally fitting snugly on the cabin tubes.

A small gap is acceptable, to be taken up by strapping the blocks to the cabin tubes, but a large gap will make wing fitting difficult.

6. Elevator trimmer cables

- 1) Loosen the tension adjusters in the elevator trimmer cables above the rear of the cabin.

Note the approximate positions and tension in the cables.

- 2) Remove the cables from the trimmer handle pulley wheel by undoing the solderless nipple.

Note how the cables are wrapped around the wheel in opposite directions.

Note which cable goes to which side of the wheel.

- 3) Slip a 25cm length of heat shrink over each cable.
- 4) Refit the cables to the pulley and secure with the solderless nipple.

Take care not to unravel the ends of the cables.

It is easier if the pulley is removed from the cabin tube first. If you do this, check the friction in the handle for setting again later.

- 5) Retension the cables to a similar setting to before.
- 6) If the pulley was removed, tighten its friction nut to the same setting as before.
The trim lever should not move when attempting to move the trim tab by hand.
- 7) Heat shrink the heat shrink tubing into place.

Centre the trimmer handle.

Centre the heat shrink on the locating block.

7. Fitting checks

- 1) Check the correct pulley keeper plate spacing.

These are the plates either side of the aileron control pulleys in the cabin and at the forward lift strut to wing junctions.

There should be a maximum gap of 1mm from the edge of pulley to the keeper plates to ensure cables cannot fall off and jam.

- 2) Ensure that the aileron cable ends and turnbuckle are free from oil or grease, as these will be tucked into the wings when de-rigged.
- 3) If not already done, cover the crimps on the aileron cable ends with clear heat shrink tubing to protect your hands from sharp wires.
- 4) Install the aileron cable end modification to reduce the risk of miss-rigging the ailerons.

Detailed in Service Bulletin 002, included with the wing-fold kit.

- 5) Remove any sharp edges around the lift strut inboard fixings, and fit nut caps if desired to protect your hands when fitting and removing the securing bolt.
- 6) If the wing support rods are to be left in place, the twist-to-release end pins which prevent the wings from falling off the ends of the rods should be replaced with the 6mm bolts and Nyloc nut and washer provided.

Use the spring washer under the head, and the half-nut at the other end.

- 7) Either remove the wing support rod to its protective bag, or complete the fitting of the wing fold following the normal instructions, particularly strapping the wing support rods to the cabin tubes.

