

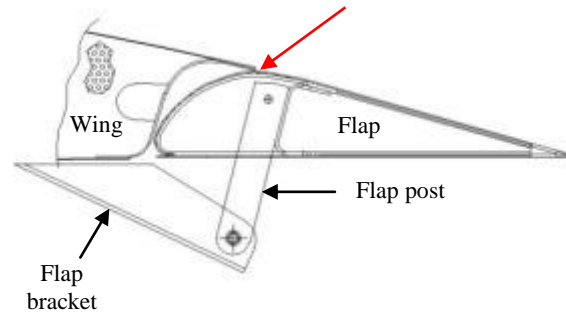
Pre-Paint>Wings>Mount flaps

Objectives of this task:

In this task the flap will be positioned and the flap brackets will be glassed onto the wing.

The flaps are designed to stow in the flap recess at the rear of the wing with the front upper surface of the flap fitting snugly against the lip at the top of the flap recess as shown **arrowed** in the drawing at right.

In order to achieve an aerodynamic fit the top rear of the wing must be carefully prepared before the flap can be positioned and the flap brackets glassed into place.



This is a critical issue that can affect the aerodynamic efficiency of the wing and considerable care must be taken with this task.

Materials required:

Card # 16T 'Electric Flaps'

Epoxy resin and flock

Prepare the wing

Turn the wing upside down and pack under the trailing edge so that the wing is stable.

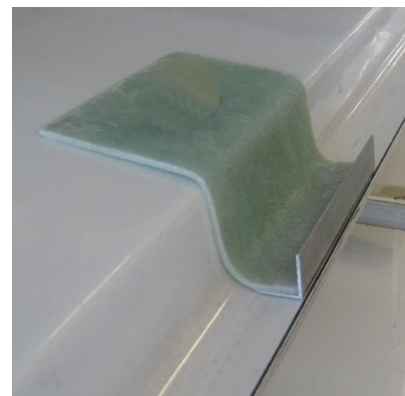


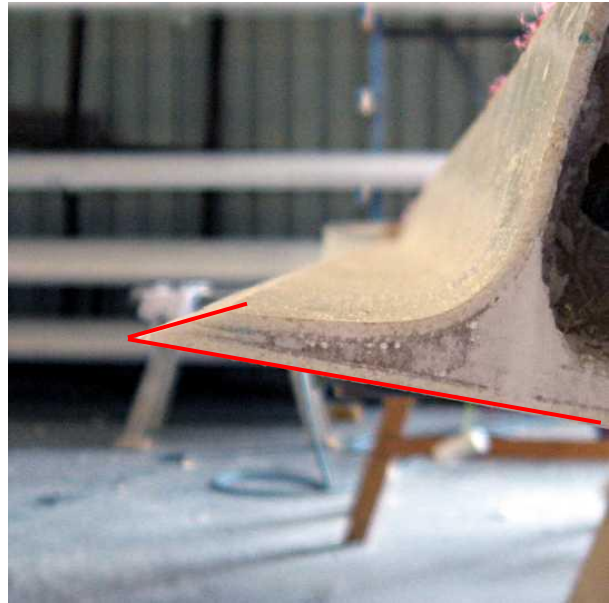
There are 4 squares of peel cloth under the gel coat at the trailing edge of the wing where the flap brackets will be located – carefully cut one corner then lift and remove the peel cloth from each area then lightly sand the area under the peel cloth.

The rear of the wing as supplied should be a uniform distance back from the rear of the flap recess. The photo at right shows the workshop tool that we use to check the depth and a line that has just been marked.

If your wings have a black line like this marked along the rear of the underside of the wing then you should trim carefully to that line before starting on the next step.

Note that the wing is upside down in all photos in this task.





Grind back the underside of the lip on the trailing edge of the wing from the wing root to the start of the aileron mount recess to at least 30 degrees as shown above (the angle has been emphasised with **red** lines in the photo) – this will allow the flap to retract and seat snugly under the lip with minimal gap.

Do not grind too far into the aileron area, which can be identified by the recess along the underside of the wing at the outboard end. If in doubt, hold an aileron level with the outer end of the wing to see where the inboard end comes to.

Finish off with a long sanding block to ensure an absolutely straight edge, both at the rear of the wing and along the angled section.



When the angle shaping is getting close to finished use a straightedge as a final check: the rear of the wing (left-hand photo above) and the angled section (right-hand photo above) should both be absolutely straight.

Use the long sanding block to correct any irregularities – the importance of having both the rear of the wing and the angled section absolutely straight cannot be overstated.

Position the flaps



Initial flap position: lay 2 lengths of aluminium angle on the wing surface between the outer peel cloth squares and secure with cloth tape on the forward end.

Place the front of the flap onto the lip at the rear of the wing and clip the trailing edge to the aluminium angle with spring clips (circled in yellow). At this stage the flap should be touching the aluminium angle at the front and the rear as shown above and the aluminium angle should be in contact with the wing over the full length.



Now the flap is positioned laterally. The intention is to position the flap so that the distance from the centreline of the wing mounting bolt hole to the first rib of the flap will be 8mm.

In the factory we use a method that entails measuring the distance from the centre of the wing mounting bolt hole to the outside of the wing mounting lug, then adding 8mm to that distance, which gives us the distance that the first rib of the flap must be from a ruler or straightedge held against the wing mounting lugs.

Move the flap gently until you are satisfied that the distance from the centreline of the wing mounting bolt hole to the first rib of the flap is exactly 8mm.

When that position is correct mark the wing and the flap with a line from front to back (use a marker pen) so that you can easily see if the alignment changes for any reason, such as someone bumping the flap accidentally.



Place some thin spacers (paint thickness or about 0.2mm) between the top of the flap and the lip at the rear of the flap recess (arrowed in yellow above left).

Flap to wing spacing: tape 6 pairs of mixing sticks together. Place 2 pairs into the gap between the flap and the wing and 1 pair under the aluminium angle each side of the flap to wing gap to create the required curve to the underside of the wing as shown above right.

Prepare to flock the flap brackets



Remove the peel cloth from the outside and the inside of the flap brackets. Lightly sand the inside and outside of each bracket.

Using regular brown packing tape, tape over the gap between the flap and the wing to prevent flock from entering the gap:

Place a bush in each flap post and carefully sand off the sharp edges from the rounded end of each flap post (circled at right).



Cut the glass fibre cloth from the bag marked 'Hollow Wing' as marked – cut slightly outside the marked area.

There will be 3 pieces of glass fibre cloth for each flap bracket. Place them on the wing in front of each flap bracket position.



Fit the flap brackets

In this step the flap brackets will be flocked into place and then covered with 3 layers of glass fibre cloth. This all needs to be completed in the one continuous operation. In our factory this step takes over an hour with an experienced person, so allow perhaps 2 hours or slightly more.



Mix a batch of resin and coat the inside of the flap brackets and the wing surface where the flap brackets will be attached. Mix a small separate firm batch of flock and fill the inside of the angled end of the flap brackets as shown above right (note that there will only be 3 brackets on a J160 due to the shorter wing and flap length).



Place each bracket: holding the bracket clear of the wing, insert the bolt through the bracket and the bush, then let the bracket rotate down to the wing. Do this for each bracket.

At this point recheck the marker pen mark across the wing and flap to be sure that nothing has moved.

Once all four brackets have been placed apply a gentle downward pressure to seat each one and then round off any excess flock around the base of each bracket to an even contour with the rounded end of a mixing stick. This rounded contour will help to avoid air bubbles when you apply the glass fibre cloth in the next step.



Working on one bracket at a time, wet an area around each bracket that is slightly wider than a piece of the glass fibre cloth that you cut out in the “*Prepare to flock the flap brackets*” step above, then place a piece of glass fibre cloth onto the bracket and brush it on, working down the sides of the bracket and onto the wing, taking care to brush out any air bubbles and paying particular attention to the curved flock joint between the bracket and the wing. Repeat this process for each of the 3 layers. Note that the first layer should be slightly ‘wetter’ than the following 2 layers.

The photos above show the second layer being applied.

There will be some excess cloth that will cover the brown packing tape – this will be cut off after the resin has cured.

Leave overnight to cure.



Next day heat the excess cloth along the wing-to-flap gap and cut it away carefully with a sharp knife.

Remove the brown packing tape and clean away any excess fibre and flock.

Remove the flap from the wing, taking care to save the pivot bushes and bolts, and store for later painting.

Check the slot size

At this point you have mounted the flap to the wing with the flap upper surface correctly aligned in relation to the trailing edge of the wing. Now the slot size – the gap between the trailing edge of the wing and the leading edge of the flap – must be checked.

The slot size is very important – when the flap is extended the airflow through the slot provides control of the airflow velocity over the flap, and thus the slot or gap size must be identical along the width of the flap or there could be a rolling moment when the flaps are extended.

To check this, turn the wing right side up and fit the flap, taking care to fit the bush before each bolt.

Deflect each flap to as close to full flap deflection as you can and hold the flap in that position at each end with cloth tape.

Now measure the slot size at each flap post as shown in the drawing at right: the slot size should be as shown, but the critical measurement is that the slot size should be the *same* across the full width of the flap and the slot size should be the same for both wings at the same flap deflection.

If you have been careful in the initial flap alignment the slot size should fall within the acceptable tolerance range, but if you need to make adjustments then they should only be minor and these adjustments should be made with a long straight sanding block, starting by *slightly* altering the angled under-face of the trailing edge of the wing and *only if necessary* then altering the trailing edge of the wing itself.

Final adjustments will be made in the *Testing>Flight testing* task.

This completes the *Pre-Paint>Wings>Mount flaps* task.