

## **Pre-Paint>Fuselage>Empennage>Fit elevator**

### **Objectives of this task:**

To fit the elevator to the horizontal stabiliser, to fit the trim tabs to the elevator and the end caps to the elevator and the horizontal stabiliser.

This task is performed on trestles prior to the fitting of the horizontal stabiliser to the fuselage. The trim tabs and end caps may be fitted after the horizontal stabiliser and elevator have been fitted to the fuselage, although it is usually easier to fit them as part of this task.

### **Materials required:**

Card # 17JT “Elevator” for the hinges

Epoxy resin and flock

### **Prepare the horizontal stabiliser and the elevator**

Remove the peel cloth from the horizontal stabiliser and the elevator.

Mark the top and bottom of the horizontal stabiliser and the elevator: the horizontal stabiliser is pre-marked and the drive arm of the elevator must face downwards.

Lay the horizontal stabiliser and the elevator on the work surface in the finished position with a 1mm gap (use 2 equally spaced mixing sticks) between them. You will need to place a wedge under the rear of the elevator. Make sure that that the ends are aligned and then measure and mark a centreline on each surface. Lightly clamp or tape the horizontal stabiliser and the elevator in position.

### **Mark and drill the elevator hinges**

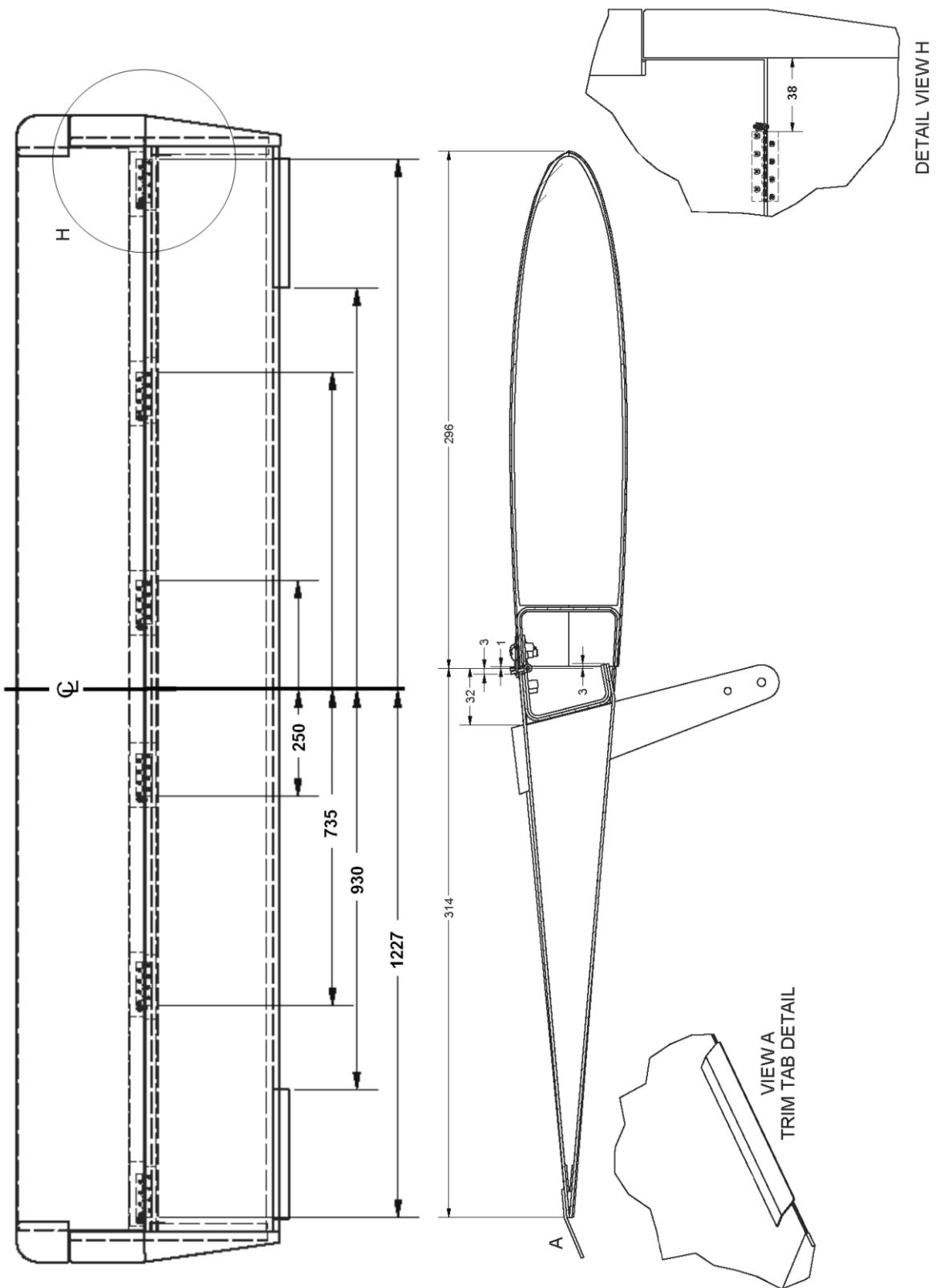
Mark out the hinge positions: mark the centreline of the tailplane and then use the drawing on the next page and mark the correct hinge locations, which will be the same on each side.

Place the hinges in those locations with the flat side of each hinge facing upwards and the hinge pin aligned in the centre of the gap between the horizontal stabiliser and the elevator.

Do not place the hinge flat side down – if you do then the holes will not line up correctly when you come to fit the hinge.



Use a 3/32" drill to make a pilot hole opposite the pin side of each rivet hole: this is to allow for the slight slope of the hinge at this point, then check that the hinge and hole positioning is correct and then carefully expand to 3/16" holes.



## Fit the elevator hinges



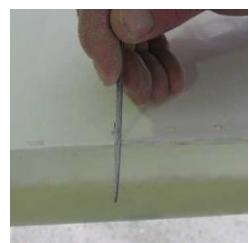
Test fit the hinges using 2 Clecoes per side and slide the hinge pin into place as shown above. Fit the 2 outer hinges first – this will hold the elevator in place while the inner hinges are fitted.

Each hinge pin is inserted from the inside towards the outside of each hinge. Mark the location of the end of each hinge pin (circled at above right). Check that the elevator can swing freely with no binding in the hinges: adjust the hinge mounting holes if required. Check that the horizontal stabiliser to elevator gap is even along the full length then remove the elevator and hinges. Leave the horizontal stabiliser clamped down.

Sand the flat side of each hinge and the locations where they will be fitted, then mix a small batch of resin and coat each area. Add flock to the remaining resin and apply a 2mm layer of flock to each hinge and flock into place using clean Clecoes in the outer holes as before.

Using a 120° countersink bit carefully countersink the 4 inner holes just enough so that a countersunk rivet head will sit flush with the surface when fitted and rivet the 4 inner holes with countersunk rivets. Now remove the Clecoes from the outside holes one at a time, countersink each hole and fit a countersunk rivet until each hinge has 8 countersunk rivets. Take care to keep flock away from the hinge pins during this step: clean the hinges while the flock is still wet and then separate both parts (horizontal stabiliser and elevator) and leave overnight to cure. Clean the Clecoes in acetone after use.

Next day use a rat tail file to make a slot into the horizontal stabiliser at each hinge pin mark (example circled at above right), fit the hinge pin and the hinge pin retainer, mark the retainer screw hole and drill a 3/32" hole. Pop rivet an anchor nut under each screw hole using 2 x 3/32" countersunk rivets.



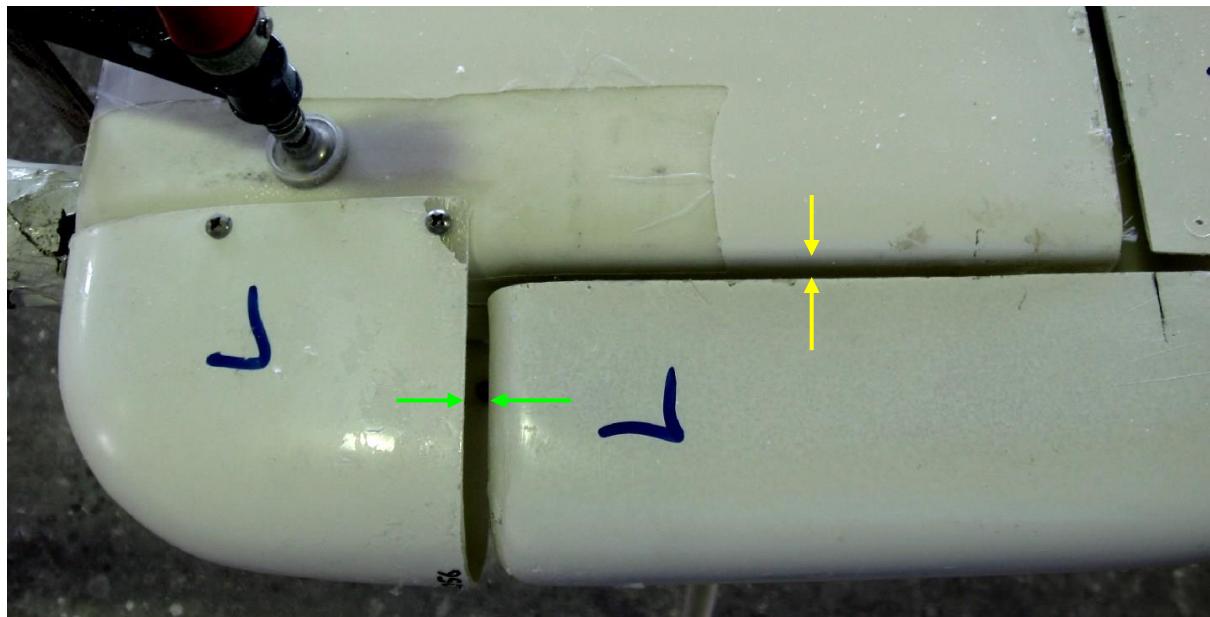
## Fit the trim tabs

Mark the trim tab locations on the elevator from the dimensions given on the drawing on the previous page. Note that the trim tabs fit onto the top of the elevator and face downwards. Clamp the trim tabs in position using spring clamps and drill the 3 holes as shown. Lightly sand the surfaces to be joined, then mix a small batch of resin and coat the surfaces to be joined. Add flock to the resin and stir in thoroughly, then apply a 2mm layer of flock to each trim tab and fit into place with 3 self-tapping screws.

Clean away any excess flock with the mixing stick, leaving a smooth radius around the entire join, and leave overnight to cure. Next day remove the self-tapping screws.

## Fit the elevator end caps

Assemble the horizontal stabiliser and the elevator by inserting all of the hinge pins and set the elevator to a level position.



Use a knife to trim out some of the foam in the end of the elevator and then test fit each end cap. Ideally you want a gap between the end of the horizontal stabiliser and the elevator end cap (yellow arrows above) the thickness of 2 mixing sticks. When this gap has been achieved, align the rear of the end cap with the rear of the elevator and fit with self-tapping screws. Check that the elevator can swing freely: if there is any binding or rubbing between the end cap and the horizontal stabiliser locate the source and fix it, either by moving the end cap position slightly or by sanding away part of the inside of the end cap.

Remove the end cap and sand all surfaces to be joined, then mix a batch of resin and coat those surfaces. Add flock to the remaining resin and apply a 2mm layer to the end cap stub then fit the end cap to the elevator and fix in place with the self-tapping screws. Smooth away any excess flock with a mixing stick, recheck the alignment and leave overnight to cure. Next day remove the self-tapping screws.

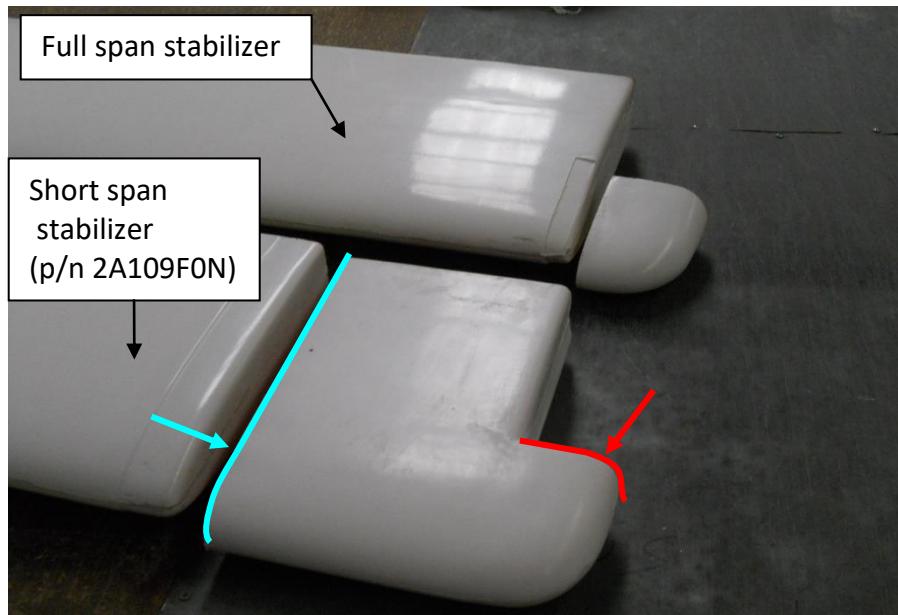
## Fit the horizontal stabiliser end caps

With the horizontal stabiliser and the elevator still assembled, test fit the horizontal stabiliser end caps: the gap between the elevator end cap and the horizontal stabiliser end cap should also be the thickness of 2 mixing sticks (green arrows above). When this is correct fit the end cap with 3 self-tapping screws: 1 at each back corner and 1 at the leading edge. Check for freedom of movement then remove the end cap and prepare the surfaces and flock the end caps into place and fix with the self-tapping screws. Smooth away any excess flock with a mixing stick, recheck the alignment and leave overnight to cure. Next day remove the self-tapping screws.

## Fit end caps for Short span horizontal stabiliser

These additional instructions are provided for the end caps specific to the special short span horizontal stabilizer. If your horizontal stabilizer is part number **2A109F0N** this additional guidance is helpful for end caps.

The photograph below illustrates the difference between the short span and full span horizontal stabilizers and their respective end caps. For the Short span stabilizer the end cap is across the entire chord (not just the front half). As such the joggle on the short stab is full chord to accommodate bonding this large end cap.



One important difference when fitting the elevator cap is that you should first fit the stabilizer endcap. Remove all peel cloth on the stabilizer and end cap and push the end cap onto the stabilizer over the joggle. Check the trailing edge of the end cap is aligned with the trailing edge of the stabilizer. Most likely the end cap will exceed past the stabilizer, to correct this mark and trim and sand to be flush. Now you can pre-fit the elevator cap as previously detailed. If the gap (indicated by yellow) on the previous photo is too small you can remove the stabilizer end cap and lightly sand the edge as indicated by Cyan above and then refit it, until this gap is sufficiently large. If the gap (indicated by green) on the previous photo is too small then you can lightly sand the edge of the end cap indicated by red until the gap is sufficient.

Remove the pre-fitted elevator endcap and bond the stabilizer endcap in place. Bonding the short span horizontal stabilizer end cap is the same as previously detailed for that of the full span. The only difference is that it is recommended that you use 5 self tapping screws instead of 3 since the bonding area is larger and additional fixed points will enable a better bond. Now you can bond elevator endcap as previously described. Check the alignment and leave to dry overnight, next day remove the self tapping screws.

This completes the *Pre-Paint>Fuselage>Empennage>Fit elevator* task.