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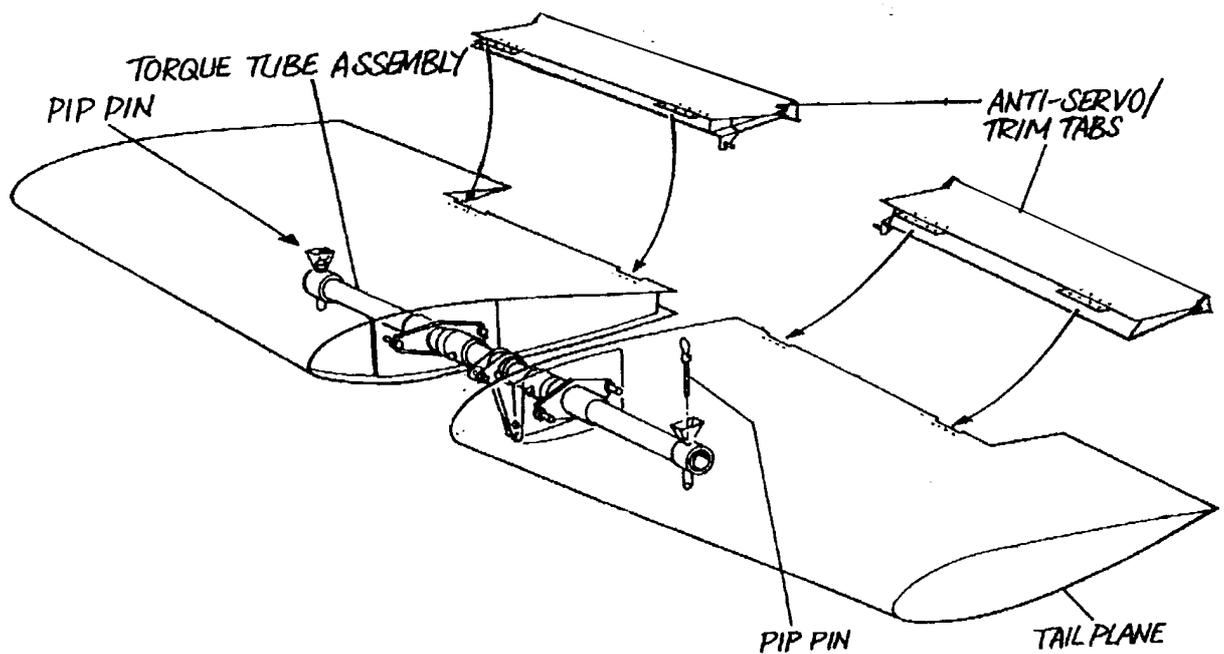
## 5. Tailplane assembly

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### Overview

This section covers the fitting of your completed tailplanes to the torque tube assembly. Included is the insertion of the TP13 bushes in the inboard rib and the fitting of the pip pins through the outboard support tube TP6 and TP4. A cut-away view of the tailplane assembly is shown below.

### TAIL PLANE RIGGING





## Step 1

Study figures 1 - 5 to get an idea of what's required, then make two torque tube support blocks 'A' (as per figure 1, exact sizes of wood not critical) and one level block 'B' as per figure 2.

**Note:** You will need to use block "B" again later.

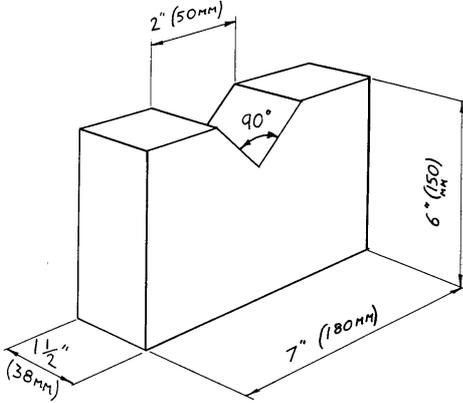


Fig 1. Torque tube support "A" (two reqd).

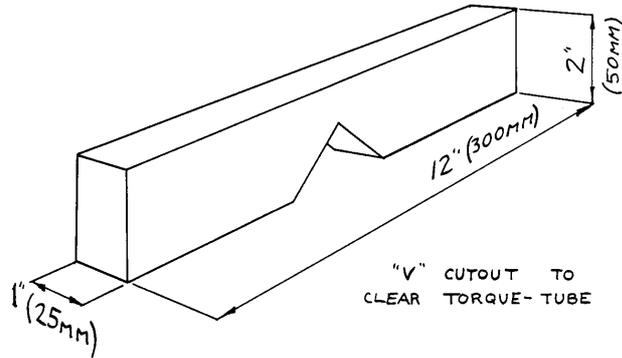


Fig 2. Level block "B" (one required).

Whilst you are on with the wood work make a tailplane incidence setting block. A full sized template is provided in figure 6. Simply glue this to a piece of wood and cut out the shape.

## Step 2

Find your torque tube assembly and then fix the support blocks 'A' to your bench with Bondo and, using a hot melt glue gun, attach the torque tube assembly to them as shown in figure 3, making sure that the pins of the angled plates are level by using block 'B' and a spirit level. Check also that the pins are parallel to the torque tube in both the vertical and horizontal planes.

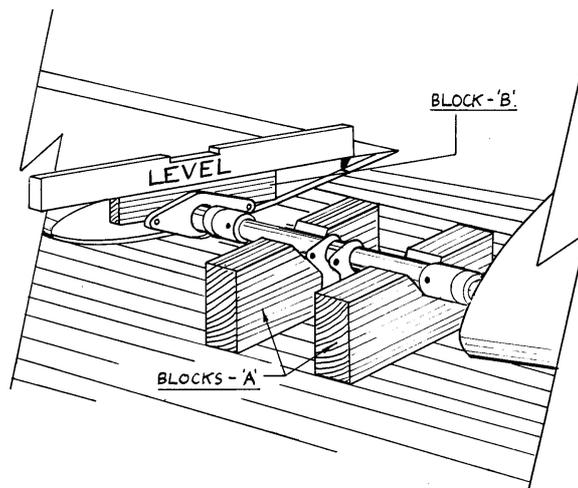


Fig 3. Setting tailplane assembly level on blocks.

### Step 3

Apply a little oil to the torque tube and carefully slide on both tailplanes for a trial fit. Use a spring clip to line up the tab's trailing edge with the tailplane's and to stop it from flapping about. See figure 4.

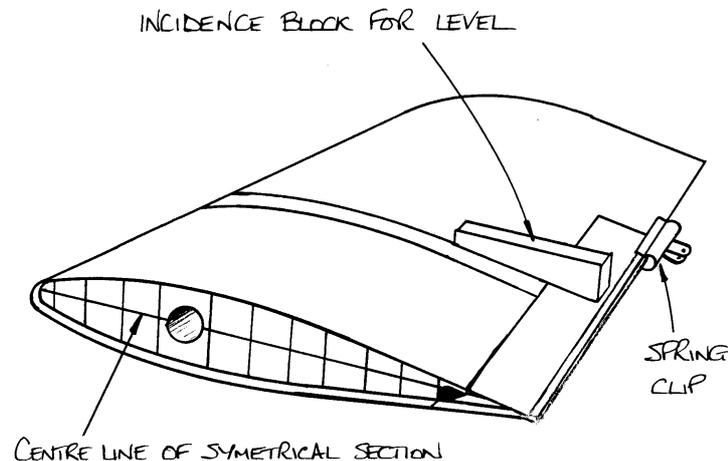


Fig 4. Position of incidence block on tailplane.

Check that the TP12 drive pins are parallel to the torque tube, and if necessary **very carefully** adjust their angle with a suitable 1/4" bore tube used as a lever. Slide the tailplanes onto the torque tube until the outboard TP6 support sleeves are just engaged. The pins will be a few millimetres from contacting the inboard ribs.

Level both tailplanes using the incidence block and spirit level and support them with foam wedges as required. Carefully slide the tailplanes further onto the torque tube until the pins contact the inboard rib. The pin positions need marking very carefully for drilling holes to accept the TP13 bushes. Once you have marked where the bushes will be located in the rib withdraw both tailplanes and carefully drill the four 10mm diameter holes through the inboard rib to accept the TP13 bushes. Drill the holes to be parallel to the torque tube. It is a good idea to dry fit the assembly and check that the bushes fit into the inboard ribs and that both tailplanes are still level. If not you will have to adjust the holes accordingly.

Once you are satisfied, clean everything up for bonding, mix a small quantity of wettish floc and bond in the bushes taking care not to get any onto the pins as you re-assemble everything. Make sure that the flanges of the four TP13 bushes are in contact with the ribs. The gap behind the flanges should be filled with floc.

Check both tailplanes for incidence and double check, by sighting down the leading and trailing edges, that they are in line. Once you are happy leave everything to **fully** cure taking your pet alligator out of the workshop with you.



## Step 4

### Pip pin recess

In this step you are going to cut through the top skin and rib flange and then, with the tailplanes in place drill a 1/4" diameter hole through the TP6 sleeves and torque tube to take the pip pins. The pip pins are fitted adjacent to the *outboard* rib.

Refer to figure 5 and mark out the area of the top skin and rib flange to be cut through. Using a drill with a rotary file bit or a hacksaw blade, cut through the top skin and dig away the foam to reveal the TP6 sleeve.

For the lay-up, you will need two pieces of 'bid' cloth (92125) cut at  $\pm 45^\circ$  and approximately 20cmx20cm (8" x 8") and two pieces approximately 25mm (1") square. A small stippling brush (1/2" max) will be necessary to ensure that the cloth is properly laid into the bottom corners of the cavity. With a drill bit of around 6mm(1/4") diameter, drill three or four dimples into the exposed part of the TP6 sleeve to provide a key for the recess lay-up, taking care neither to disturb the sleeve nor to drill through it. Clean out swarf and other debris from the cavity and inside the tailplane. Lubricate the end of the torque tube with a thin film of light grease and install the tailplane half onto it.

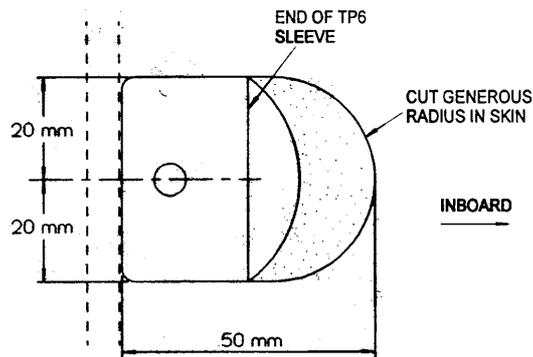


Fig 5. Recess viewed from above.

### Recess lay-up

A section through the finished recess lay-up is shown in figure 6

Mix a small quantity of epoxy and use some of it to make a stiff floc mix. Apply floc into the bottom corners of the cavity to form a small radius to prevent air bubbles forming behind the lay-up.

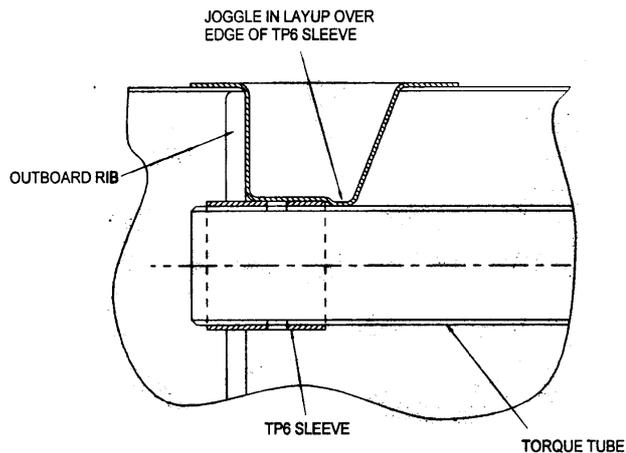


Fig 6. Section of completed recess.

Taking care not to disturb the masking tape over the pip-pin hole, apply a skim of slightly wetter floc to the exposed foam and TP6 sleeve, with a thicker quantity placed over the end of TP6 onto the torque tube.

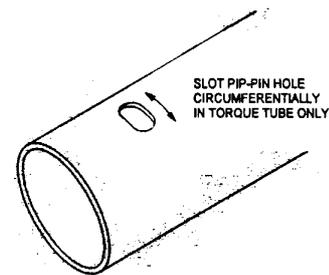
Paint over the entire cavity sides and base with mixed epoxy, then wet out two 25mm(1") squares of 'bid' and carefully lay them in to the base of the cavity. These will provide additional hole reinforcement.

Next, lay in dry the first large ply of 'bid' carefully pressing it into the cavity. Don't be in a rush to form the lay-up into the cavity but manipulate the cloth to cover the entire cavity sides and base without wrinkles or cutting the cloth. Using the small brush, stipple the cloth into the corners to ensure good contact with the sides and base and the elimination of air bubbles. Ensure that the cloth joggles down past the edge of TP6 and onto the torque tube.

Trim the cloth to be approximately 50mm (2") beyond where it protrudes from the cavity. Paint epoxy onto the skin surrounding the hole then stipple the cloth down onto it, final trimming the flange to be 20 – 25mm(3/4" – 1") wide all around. Now lay in the second full ply in a similar way to the first. Trim the flanges to the same width as the first ply. After a final check that no air bubbles have formed, lay peel-ply onto the flanges and leave to cure.

Following full cure, remove the tailplane from the torque tube. Despite the release agent applied to the torque tube, some resistance to removal may be encountered, so take your time and use gentle pressure rather than brute force to encourage separation. Once this layup has cured, remove the peel ply and carefully centre pop the TP6 sleeve at its highest point and, making sure that the tailplanes are pushed hard home against the TP13 bushes, drill with a **brand new** 5mm or 3/16" bit, as vertically as possible, through the TP6 and TP4 torque tube to make a pilot hole then open out with a 1/4" drill to accept the pip pin. Get a friend to help you sight the drill for vertical in each direction. If the hole is slightly off-centre it doesn't matter provided that the pip-pin engages correctly.

To ensure that TP6 is not subjected to unintentional loading, the pip-pin hole **through the torque tube only** must be slotted approximately 1mm (0.040") each way, top and bottom, in a circumferential direction only. This can be carried out by using a small round file. See figure 7.



Once this has been done, drill all the way through the tailplane and through the bottom skin for a drain hole. This can then be drilled from the bottom carefully with a larger sized drill.

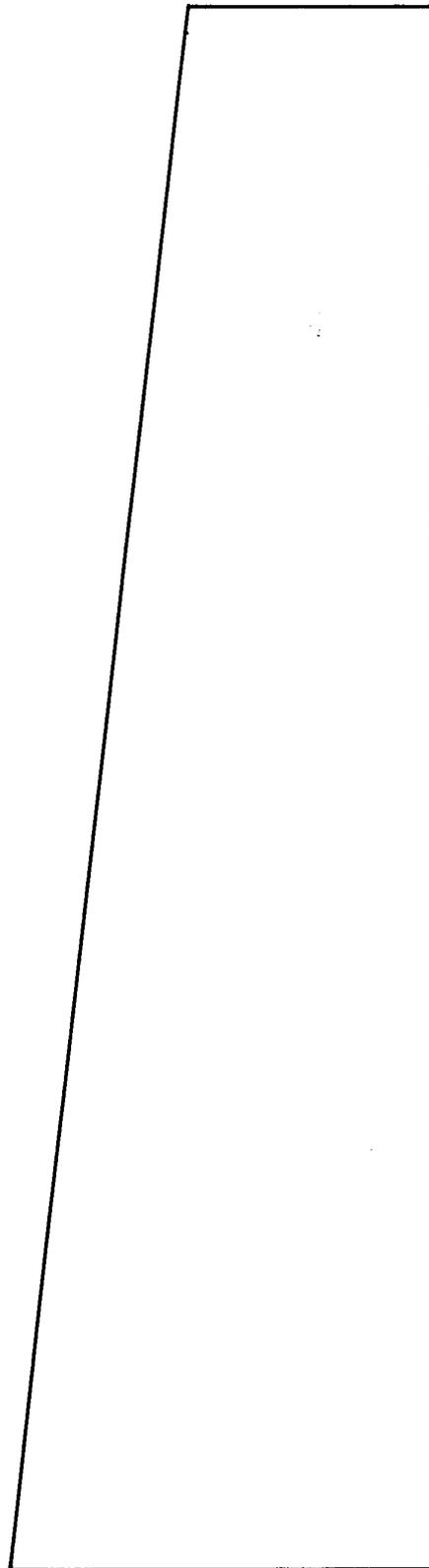
Fig 7. Detail of pip pin hole.

Bond into place any small piece of plastic tubing the internal diameter of which is greater than the pip pin with the two balls extended.

This completes your tailplane assembly ready for fitting into your fuselage.



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*Incidence template shown full size. Make one.*



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