
Tailplane retention

Classification:	Mandatory
Applicability:	All Europa Classic, XS and Motor-glider aircraft
Compliance:	Within 10 flying hours after the date of issue of this bulletin or before next Permit renewal, whichever is the sooner.

Introduction

The investigation into the accident with Europa G-HOFC revealed that tailplane flutter had occurred and both tailplane halves separated from the aircraft. A re-examination of the tailplane structure and attachment was subsequently carried out resulting in the identification of factors that would protect against the onset of tailplane flutter on the Europa. One important factor is to ensure that the tailplane halves must not be able to migrate outboard. The tailplanes are retained by a pip-pin that connects an internal sleeve, TP6, to the torque tube. Tailplane retention depends primarily on the integrity of the bond between the outboard sleeve TP6 and the tailplane outboard rib. Should this bond fail, tailplane retention would rely on the integrity of the recess in the tailplane which accommodates the pip-pin head. It appears, however, that many tailplanes have been built with recesses which are less effective in this respect than the recess as shown in the build manual.

It is possible for the TP6 sleeve to dis-bond from the tailplane if play develops between the torque tube and the tailplane drive plate TP12 due to wear in the TP14 pin holes. The movement between the torque tube and TP12 causes the pip-pin through TP6 to take the loads instead, which in turn transfers load into TP6.

Although the proper rigging procedure is described in the Operating Handbook and mis-rigging the tailplane of a Europa by someone familiar with the aircraft is unlikely, mis-rigging the tailplane tab drive or omission of the tailplane retention pip-pins could result in tailplane flutter.

This modification elongates the pip-pin holes in the torque tube, introduces an additional recess into the tailplane underside that will provide a structurally sound independent means of tailplane retention and improve the bond of the TP6 sleeve to the tailplane, and adds a permanent warning placard to each tailplane upper skin. No modification to the pip-pin recess in the upper surface will be necessary, irrespective of its compliance or not with the parameters described in PFA 247/FSB-006 issue 2.

The materials required for this modification are:

- SP Systems Ampreg 20 epoxy resin system (or approved alternative - see below)
- Interglass 92125 bi-directional glasscloth ('bid')
- Flox
- Styrofoam



These materials are available through Europa Aircraft, however, acceptable alternative structural epoxy resin systems may be used. Some suitable alternatives are West Systems 105/205 and Aeropoxy PR2032/PH3660. The use of materials other than those listed above will require approval from Europa Aircraft.

On pre-moulded tailplanes and standard tailplanes where Europa Club modification 10672 – ‘Improved TP5 and TP6 Retention’ has been incorporated during the tailplane build process, it is not necessary to install the additional recess as described below, however it is necessary to elongate the pip-pin holes in the torque tube per Step 1 and add a permanent modification status placard to each tailplane as described in Step 5 and shown at the end of this bulletin, and add a permanent warning placard to the upper skin of each tailplane as described in step 7.

Action

Step 1 – Pip pin hole in torque tube

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 in a circumferential direction only. See figure 1. This can be carried out by using a small round file.

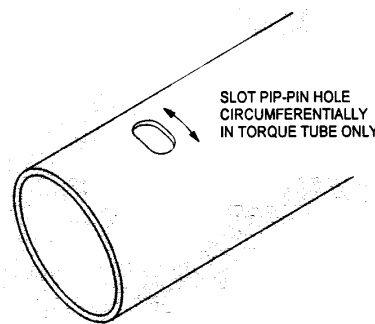


Fig. 1. Slotted pip pin hole in torque tube.

For tailplanes that are not pre-moulded, nor fitted with Standard Mod 10672

The following description assumes modification to a finished and painted tailplane, however incorporating it into the build process is straightforward whilst making the pip-pin recess in the tailplane’s upper surface. It is also assumed that the following work is to be carried out by the original builder or similarly experienced person. If you are unfamiliar with the techniques required to carry out the work, seek skilled help.

Step 2 - Recess cavity

Place the tailplane half on a work bench with the underside uppermost, suitably protecting the paintwork against scratching and supported to keep it from rocking. A drain hole should be present, centred on the pip-pin hole through the TP6 sleeve.

Using the pip-pin hole as a reference, mark its centre on the tailplane under surface with crossing lines, one parallel to the torque tube centre-line, the other at 90° to it. Now mark out the shape of the hole that will initially be cut onto the skin and down to the TP6 sleeve according to the drawing in figure 2. Cut the cavity, as marked, down to the TP6 sleeve, taking care not to disturb it when doing so. The cavity will be enlarged to its final size and shape in stages to minimise the chance of damage being done in the process, particularly to the adjacent outboard rib.

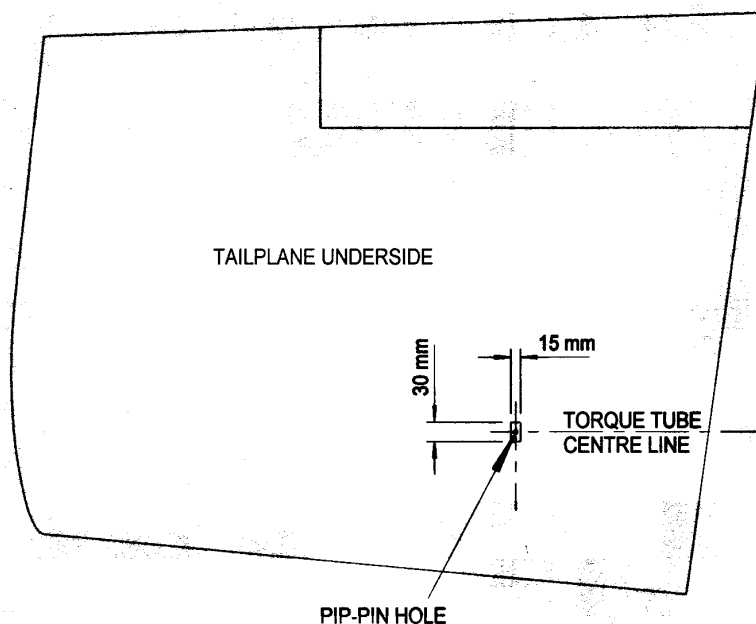


Fig 2. View of tailplane underside showing dimensions of initial size of cavity

Once the position of the outboard rib is established, the cavity will be enlarged inboard. Carefully enlarge the cavity span-wise only and outboard until you find the outboard rib. Remove traces of foam but *do not damage the rib lay-up*. Using a suitable sanding block or hand file would be preferable to a power tool for this. Mark the skin with a line that represents the inboard face of the outboard rib. This is the reference from which the span-wise dimension of the recess will be taken.

Next, enlarge the cavity inboard to reveal the inboard end of TP6, then, enlarge it for a further 10mm (3/8") as shown in figure 3. This will enable the recess lay-up to joggle down over the end of the sleeve and provide a mechanical stop to prevent the tailplane from moving outboard should the sleeve become dis-bonded.

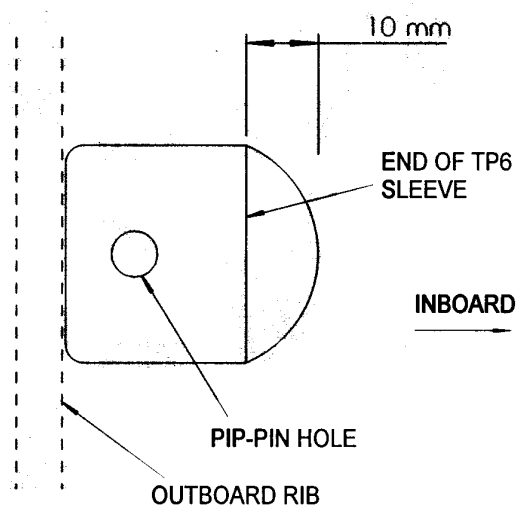


Fig. 3. Finding the inboard end of the TP6 sleeve.



Also enlarge the cavity chord-wise to extend 20mm each side of the TP6 sleeve's centre-line. The final shape of the inboard end of the cavity is shown in figure 4. Once the cavity is made, radius the edge of the skin all around the periphery sufficiently to enable 'bid' cloth to go over it without the risk of air bubbles forming during lay-up. Clean off all the foam and as much adhesive from the TP6 sleeve as practical.

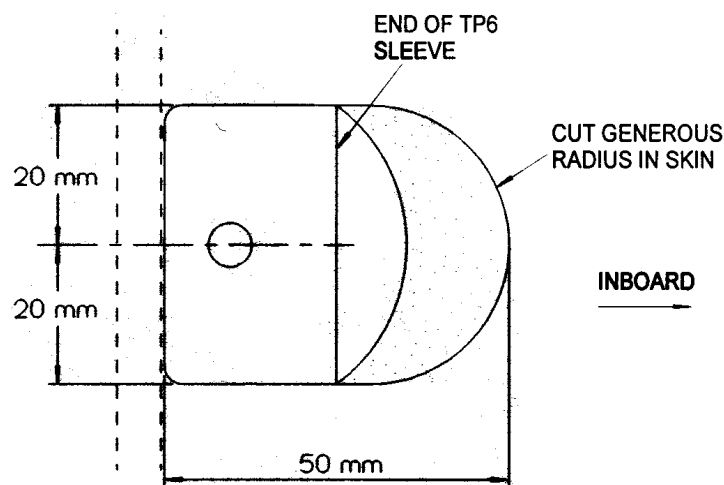


Fig. 4. Final size of cavity.

The recess lay-up will extend onto the skin surface to provide a reliable and effective shear connection, so remove paint and surface filler from the skin for approximately 25mm (1") around the cavity using 40 grit abrasive paper to provide the appropriate surface preparation for bonding. Take care not to sand excessively into the skin, which is only 2 plies thick – about 0.6mm (0.025"). You might expect to see lines of filler remaining between the individual strands of glass fibre; this is acceptable and preferable to sanding too far into the skin.

Step 3 – Recess preparation for lay-up

For the lay-up, you will need two pieces of 'bid' cloth (92125) cut at $\pm 45^\circ$ and approximately 20cm x 20cm (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, upside down and on the opposite side of the aircraft.

The end of the torque tube should engage into the TP6 sleeve although it is likely that the pins in the drive plate will not match perfectly the bushes in the tailplane root rib preventing full insertion.

If this is the case, don't try and force it on, but support the tailplane to minimise loads on the sleeves and to stop it rotating.

As an added precaution against resin leaking through the pip-pin hole and causing problems later, stick a piece of masking tape, no larger than 10mm (3/8") diameter, over the pip-pin hole of the TP6 sleeve.

Step 4 – Recess lay-up

Before commencing lay-up, ensure that the ambient conditions will be suitable during lay-up and cure.

A section through the finished recess lay-up is shown in figure 5.

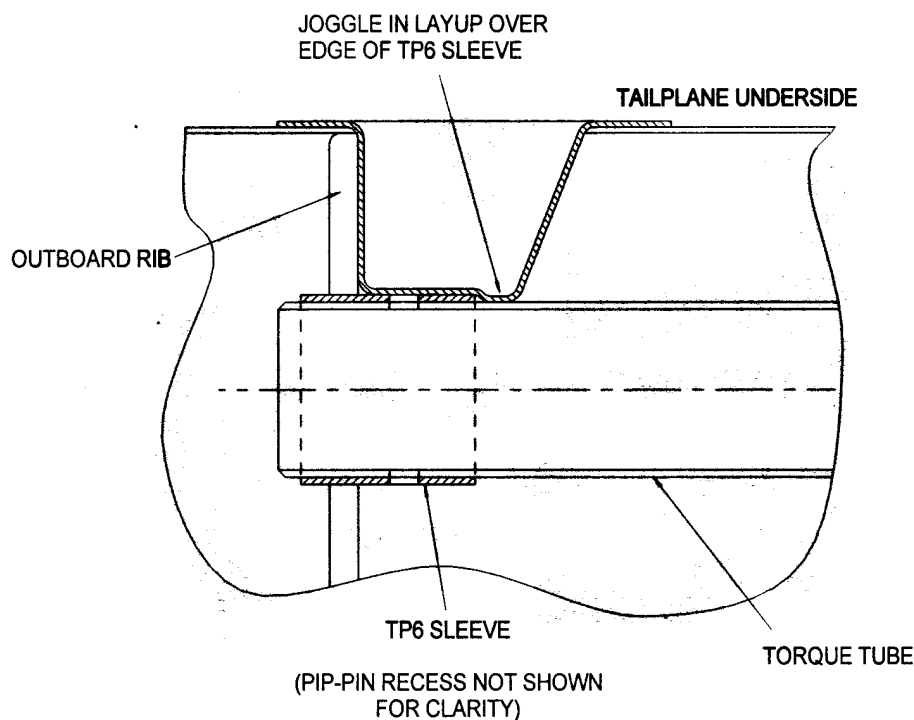


Fig. 5. Sectional view through new recess.

Mix a small quantity of epoxy and use some of it to make a stiff flox mix. Apply flox into the bottom corners of the cavity to form a small radius to prevent air bubbles forming behind the lay-up. Taking care not to disturb the masking tape over the pip-pin hole, apply a skim of slightly wetter flox 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, centred on the pip-pin hole. 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.

Remove the peel-ply and drill open the pip-pin hole by carefully running a 1/4" drill through from the top. Rig the tailplane onto the correct side of the torque tube to verify correct assembly and that the pip-pin can be inserted and that the balls engage properly. If the plunger of the pip-pin does not spring back to its neutral position after being pressed down, it is probably too short and will need to be substituted with a longer pip-pin. Do not remove glass fibre around the pip-pin hole in the base of the new recess.

Step 5 – First inspection

The tailplane structural modification is now complete and must be inspected at this stage. An appropriate inspector (PFA in the UK) must check the work done and, if satisfied, an appropriate entry must be made in the aircraft logbook. In addition one of the paper placards at the end of this bulletin, signed and dated by the inspector, must be placed on the tailplane root rib after final inspection and then covered with a single ply of glassfibre with clear resin so that it remains visible.

Step 6 – Finishing

The recess may be permanently covered. One suggestion is to shape a piece of Styrofoam to fit then bond it in place; rapid epoxy will suffice for this. Firstly, though, cut a drain hole of at least 12mm (1/2") diameter through the foam, centred on the pin hole, using a sharp ended tube as a punch. After cure, sand the foam level with the skin surface and apply 2 plies of 'bid' over it, lapping onto the new recess's flange. Apply peel-ply and remove this after cure, then, having opened up the drain hole, bond into it a sleeve to protect the exposed foam.

Apply filler and paint to repair the surface finish according to the Finishing chapter of the Europa Build Manual. If re-painting a large area is required, remove all the previously applied paint to minimise any weight increase.

After finishing the tailplanes, check for correct mass balance. The tailplane balance may be checked with the tailplane halves fitted to the fuselage in the normal manner. Check that the control columns are not obstructed by the harness or other cockpit items. Then, standing at one tailplane tip, check that the tailplane does not tend to balance either trailing edge up or trailing edge down, but remains in any position it is placed in. Then check that deflections of the tailplane in the trailing edge up and trailing edge down direction from the neutral position require equal forces i.e. there is no bias in either direction. If adjustment of the mass balance weight is needed to achieve this condition, refer to build manual.

For all tailplanes

Step 7 – Warning placard installation

A clearly legible placard with the wording shown in figure 6 must be permanently installed onto each tailplane in the location and orientation indicated in figure 7. Self adhesive placards are available from Europa Aircraft on request.

**WARNING – BEFORE FLIGHT
ENSURE FULL ENGAGEMENT OF
TAB DRIVE PIN INTO CROSS-TUBE
AND PIP-PIN INTO TAILPLANE**

Fig 6. Wording required on placards

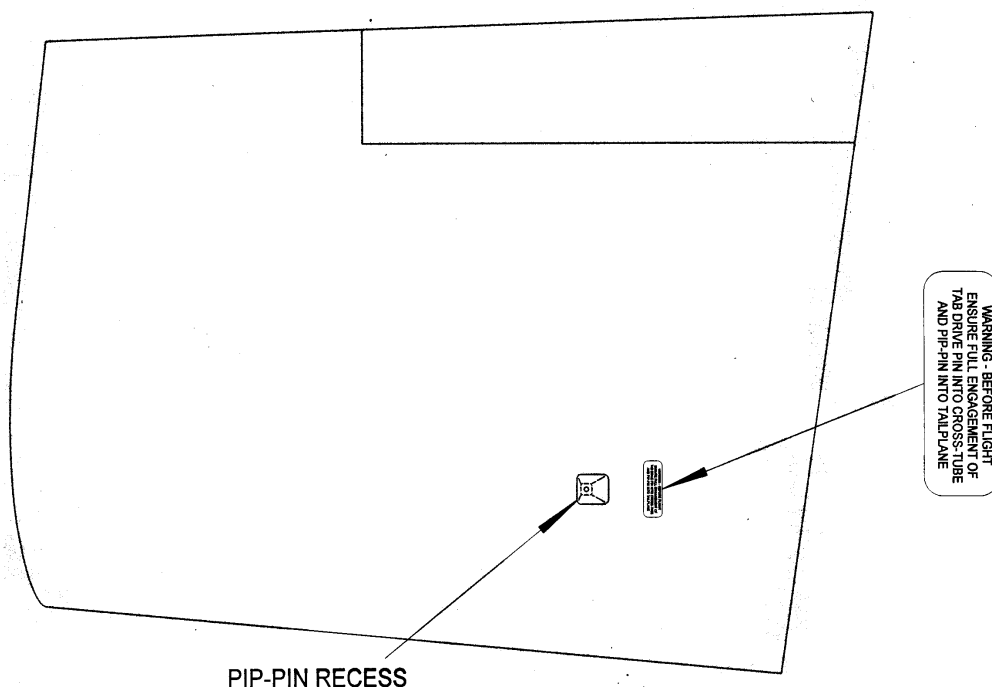


Fig 7. Tailplane placard positioning



Step 8– Final inspection

Before the modified aircraft may fly, an appropriate inspector must check the work done, tailplane balance, elongation of the pip pin hole in the torque tube and installation of the paper inspection placard on the root rib and the warning placard on the upper skin and, if satisfied, an appropriate entry must be made in the aircraft logbook and a Permit Maintenance Release (PMR) signed and issued by the inspector. The placard must finally be covered with a single ply of glassfibre and clear resin.

EUROPA MOD 73 INSTALLED	
1st. DATE:	INSP No:
SIGNATURE:	
2nd. DATE:	INSP No:
SIGNATURE:	

EUROPA MOD 73 INSTALLED	
1st. DATE:	INSP No:
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2nd. DATE:	INSP No:
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Note: The placards below are only to be fitted if the Europa Club mod 10672 is installed during build. This mod is not suitable for retro-fit.

PFA STD MOD 10672 INSTALLED	
DATE:	INSP No:
SIGNATURE:	

PFA STD MOD 10672 INSTALLED	
DATE:	INSP No:
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