

Europa Tailplane Drive

Alternative Method of securing T9 and TP12 to Torque Tube TP4

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Reason for Change

The TP14c and TP14D pins that secure the TP12 and TP9 drive arms to the torque tube TP4 rely solely on press fit to transmit the pitch drive forces to the tail planes. Eventually the pins will begin to fret and the holes in all mating components will enlarge. The factory solution is to ream out the holes and fit larger pins. This does not solve the problem, but merely delays the onset of renewed fretting. The only advantage of a larger diameter pin is that the contact area is larger and will therefore last longer before fretting begins - but it WILL eventually recur.

Solution

This arrangement replaces the four stainless TP14 pins with AN4-24 bolts with castellated nuts and split pins to clamp TP12 and TP9 to the torque tube TP4.

To prevent the torque tube distorting during clamping, four steel discs with an outside diameter equal to the inside diameter of TP4 and are inserted into the TP4 Torque Tube. To ensure that these can't become dislodged during bolt removal (for servicing) and to provide a conformal "gap filling" these are secured within TP4 using "bearing" grade anaerobic adhesive (Loctite) which is dropped in through the bolt holes in TP4. This then flows into a semi-circular channel running around the perimeter of the discs (see drawing below) and is distributed around the circumference by gently rotating the discs. To insert, locate and rotate these discs within TP4, an insertion tool is made from stock M6 studding (or suitably threaded M6 rod) of appropriate length, screwed into the tapped hole at the centre of each disc.

To provide a suitable clamping contact area and to avoid "line contact" under the bolt heads, eight "saddle blocks" sit under the bolt head and nut of each clamp. The inner edge is turned to match the outside diameter of TP9 and TP12.

Care needs to be taken to check the clearance between the bolt head and the rear bulkhead to avoid any interference preventing the free movement of the torque tube.

These components should be manufactured to a sufficiently close tolerance to prevent any possible distortion of the TP12 bushes that could result in them binding in the TP11 bronze bushes.

Note that unlike the factory build, all four bolts are the same length. Since TP10 is made of nylon, it is not possible to clamp through this and therefore slots are machined in the TP10 sleeves (two places each) to accept the saddle blocks, ensuring the latter clamp directly onto TP12.

The lateral end-float of TP4 (and the whole tail plane) is controlled by the two TP10 sleeves, so it is critical to machine the slots accurately in the correct place.

This mod is low cost, low weight, simple and can be retro-fitted to any Europa and is tolerant of worn drive-pin holes.

