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		Compiled : P Tunney
		Approved :

## TITLE : Stabilator Torque Tube Clamp

APPLICABILITY : **All Europa Variants**  
Mod Type : **New Build & Retro-fit**

### 1. Introduction

This modification is a follow on and improvement to Bob Harrison's Torque Tube Clamp – mod no 10623. Early clamps are defined as Mk 1 clamps. Later clamps are defined as Mk 2. Mk 2 clamps are detailed in Rev J of the dimensional drawing. Mk 2 clamps are thicker in section and incorporate radius zones where there were previous acute zones which could act as a stress point on the clamp geometry.

The clamp has been developed to prevent wear and looseness occurring between the 4 clevis dowel pins that secure the TP12 drive plates and TP9 crank arm to the torque tube TP4. See attached sketch (11906-01/06).

The reason for wear can be put down to either of the following –

- 1 – Minimal pin contact area (1/16") on the sleeves of TP9 and TP12.
- 2 – Poor initial installation from drilling through the sleeves of TP12 and plastic spacer sleeve TP10 that result in a larger hole or holes in TP12.

The clamp works by locking on all 3 major diameters of the components TP12, 9 and 4 and trapping shortened dowel pins in position. The clamps are machined to provide a 0.002" or 0.05mm interference fit on all 3 major diameters, and also to provide a neat fit between the ends of TP12 and TP9.

The plastic sleeves TP10 have been replaced with machined nylon bushes that provide 0.020" float of the torque tube; they have also been machined to provide a 0.010" internal diametrical clearance and machined to be the same outside diameter of the bronze bearings TP11. The new TP10, s now act as a floating spacer bearing between the machined ends of the clamps and the bronze bearings.

EUROPA aircraft now as standard use 3/8" pins, however the contact area is still through the 1/16" wall thickness of TP12 and TP9. In my opinion the clamp is a neater and better-engineered solution, which can be retrofitted to in service aircraft or installed on new builds.

### 2. Parts List

Qty	Part No.	Description	Source
2	TTC11906.0	Split Alloy Clamp	Home manufactured
2	TTC11906.1	Nylon Sleeve	Home manufactured
16	TTC11906.2	5mm 316ss Cap head bolt	Buck and Hickman

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4	TTC11906.3	1/4" or 3/8" Dowel pins	EUROPA original clevis pins Machined down to size
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### List of related drawings and images

Drawing No.	Title / Description	Issue
11906-01/06	Existing torque tube design and detail	First
11906-02/06	Dimensional drawing of clamp / nylon sleeve / dowel pins and cap head bolts	Rev J
11906-03/06	Outboard end image plain bore Mk 1 & Mk 2 clamp versions	n/a
11906-04/06	Inboard end image Mk 1 & Mk 2 clamp versions	n/a
11906-05/06	General view plain bore Mk 2 clamp	n/a
11906-06/06	General view plain bore Mk 2 clamp	n/a
11906-07/06	General view Mk 1 clamp halves	n/a
11906-08/06	Clamp finished bore detail	n/a
11906-09/06	Half clamp installed looking aft	n/a
11906-10/06	Torque tube showing new short dowels	n/a
11906-11/06	Clamps installed viewed towards port side – Mk 1 Clamps	n/a
11906-12/06	Clamps installed viewed towards starboard side – Mk 1 Clamps	n/a

### 3. Action

**NOTE – There are two installation procedures, the first for new builds and the second for retrofits. On new builds it is better to set up the torque tube TP11 bronze bearings with the fuselage top secured in its fitted position, by screws or Cleco, s. This will prevent any distortion of the TP11 bronze bearings in the future when the fuselage top is bonded in to position.**

#### General Info

**3.01** If installing on new build assume aircraft is set up in a build stand. If retrofitting make sure aircraft is on level ground and that the fuselage is supported at the rear, “note” all work on retrofits is to be done through baggage bay bulkhead or through the tail access ports.

**3.02** The clamps are machined to actual diameters and spacing measurements of the owners individual torque tubes. This is a requirement as the torque tube components supplied by EUROPA vary in size. Sizes as specified on the drawing 11906-02/06 must be obtained prior to final machining of clamp. The finished bore sizes of the clamps must be 0.002” or 0.05mm smaller than the diameter’s they will locate on to.

**3.03** Prior to assembly carry out a run out of assembled torque tube to determine any distortion. An additional check when retrofitting is also required, this is to ensure there is no play from loose clevis pins that may have occurred from vibration, wear or poor drilling prior to initial installation. If wear or severe distortion is present then components should be returned to EUROPA aircraft for evaluation and possible replacement or modification to incorporate MOD62 (Oversize 3/8” torque tube drive pins). If MOD62 is carried out then the

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clamp recessed spot faces will have to be made larger to accommodate the oversize pin or pins.

**3.04** Machine the clamps to the determined sizes by a suitable machine shop.

### **New Build**

**3.05** On a new build assemble the torque tube components (TP4, TP5s, and TP9 the nylon spacers TP10 and degreased bronze bearings TP11 in the aircraft position using the machined down clevis pins.

**3.06** Install both port and starboard new clamp halves on both sides of TP9 see images. Insert and tape in position a 0.010" feeler gauge between the TP11 bronze bearing and the TP10 nylon spacer.

**3.07** Set up torque tube to be level and equally spaced within the tail of the aircraft – Refer to set up stage in the EUROPA build manual. Ideally I have found that this part is now best done with the top secured in position with cleco's as it avoids distortion of the tail area.

**3.08** Once happy with the set up of the torque tube mix some Redux and on the outside of the bronze TP11 bearings tack them in position with at least 3 drops of Redux on each bearing.

**3.09** Allow the Redux to cure and then remove the torque tube components. Complete the bonding of the TP11 bronze bearings by applying a fillet of Redux around the circumference on each of the bearings and on both sides of the fuselage.

**3.10** Once cured clean of any excess Redux from the bearing machined faces and rebuild the torque tube components with a thin film of oil or grease. All bolts on the torque tube clamps should be degreased and installed using a drop of Loctite 243 or better. All bolts should be hand tightened and a feeler gauge should be used to check that both halves of the clamps are metal to metal. Finally using a black marker or paint to put an alignment mark on each of the bolt heads to the clamps, this will then serve as a quick visual check to see if any bolts are loosening of in service.

### **Retrofit**

**3.11** Remove the torque tube from the aircraft.

**3.12** Size up the torque tube as per step 3.02.

**3.13** Carry out the check in step 3.03 and action repairs / modifications if required.

**3.14** Machine the clamps up as per step 3.04.

**3.15** The nylon bushes TP10 are supplied oversize and will require machining to enable the correct end float on the torque tube. Re-assemble the torque tube back in the aircraft and temporarily fit the alloy clamps.

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**3.16** Measure the distance between the end of the alloy clamp and the end of the TP11 bronze bearings.

**3.17** Machine down new nylon TP10 sleeves to give an axial end float clearance of around 0.020" or 0.5mm.

**3.18** Remove torque tube and the components and then re-build as per 5.11.

**3.19** Check that the torque tube has a smooth operation and that there is sufficient end float.

**3.20** If retrofitting check neutral position of elevator mass balance and adjust if required.

#### **4. Weight and Balance**

	Weight (lb)	CG (in)	Moment (in)
Existing A/C			
+/- Weight Change	1.0	169.5 aft of datum	155.5
Post Mod A/C			

#### **5. Flight Test and Special Inspections**

**5.1** If the clamp is installed on a new build then flight testing is as per the build manual and PFA procedures. An initial check of the area should be performed after the initial test flight.

**5.2** If the clamp is installed as a retrofit then the area should be inspected again after an initial test flight and then at the annual permit renewal.

**5.3** Interim inspection of the area is at the discretion of the owner / operator.

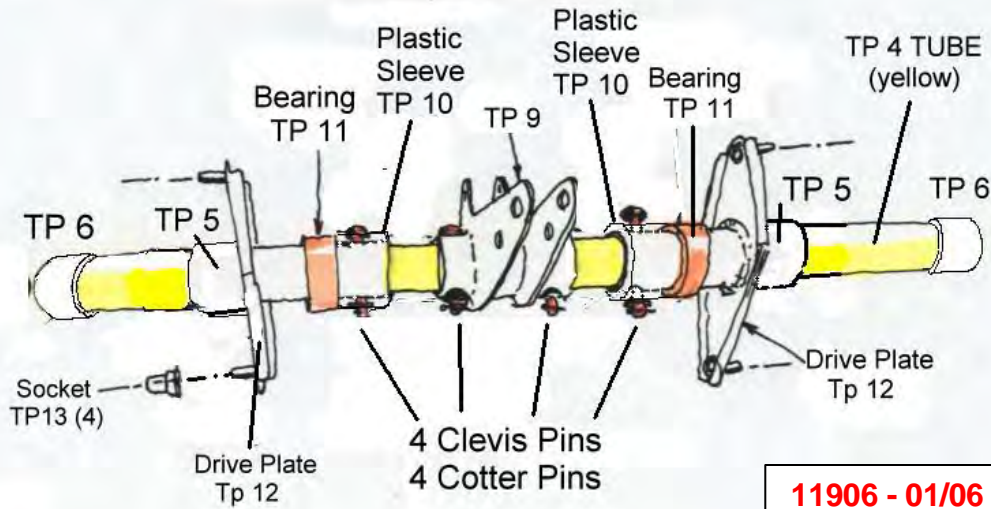
#### **6. Certification**

**6.1** Have your build Inspector witness the completed mod and have him sign off modification as per procedure. He must also ensure that compliance with Service Bulletin 247/FSB 006 is achieved paying particular attention to sections 1 and 3 of the bulletin. Any movement will deem the clamps not fit for use. For already flying aircraft the aircrafts weight and balance report should be amended.

**6.2** Where the mod is fitted to an already permitted aircraft the inspector must enter the date of the mod and reference the mod no SM11906 in to the aircraft log book and sign a PMR (Permit Maintenance Release).

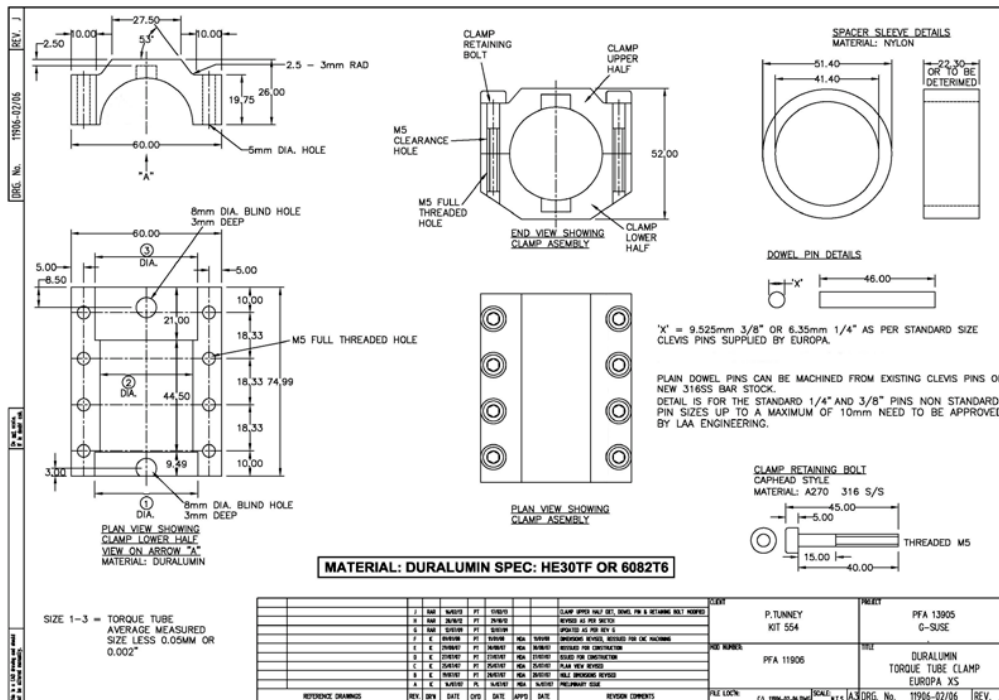
**Drawings and Images**

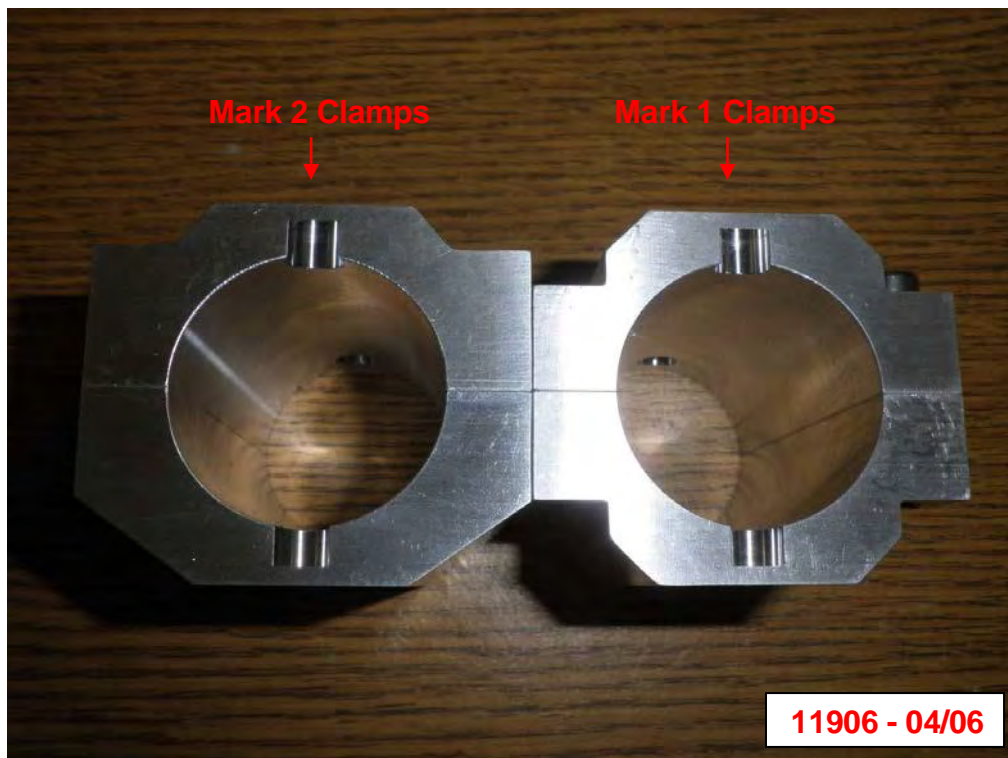
# Stabilator Torque Tube Drive Assembly



**11906 - 01/06**

**11906-02/06**







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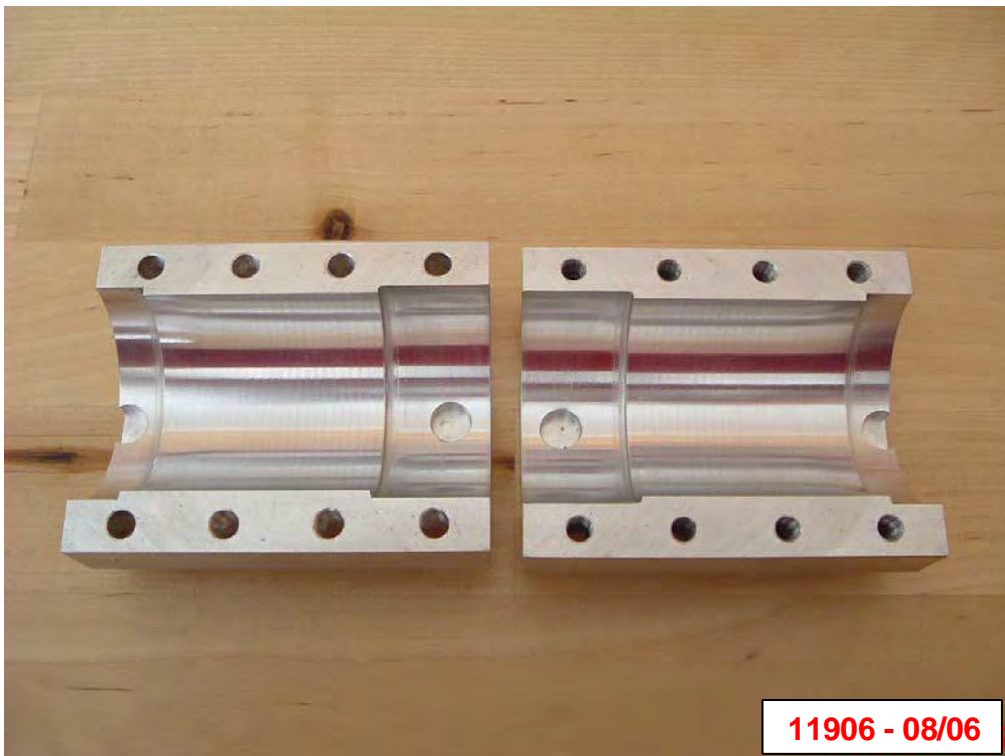
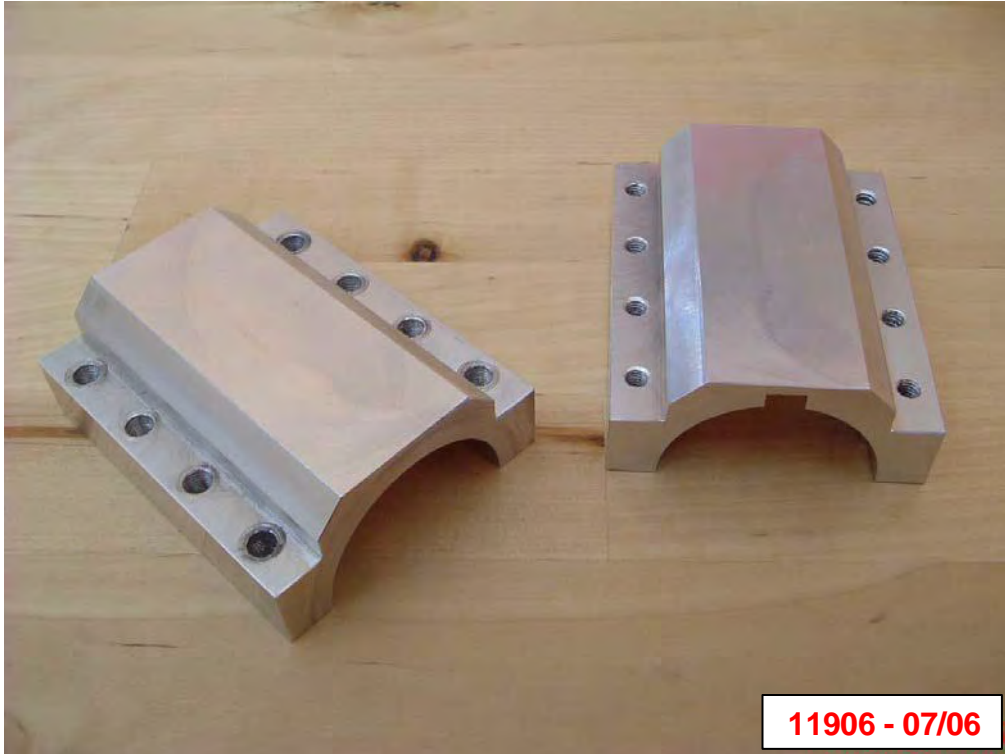
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