TITLE : Tailplane Torque Tube Clamps

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

1. Introduction

This modification is a lighter weight variation to Bob Harrison's Torque Tube Clamp – Mod no. 10623.

The light alloy clamps used with this modification have been developed to prevent wear and looseness occurring between the four pins that secure the TP12 tailplane drive plates and TP09 torque tube bellcrank 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 TP09 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 clamps work by locking on all 3 major diameters of the components TP12, TP09 and TP04 and trapping shortened dowel pins in position. The clamps are machined to provide a 0.002" (0.05mm) interference fit on all 3 major diameters, and also to provide a neat fit between the ends of TP12 and TP09.

The plastic sleeves TP10 have been replaced with machined nylon bushes that provide 0.020" side 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 phosphor bronze bearings TP11. The new TP10s now act as a floating spacer bearing between the machined ends of the clamps and the phosphor bronze bearings.

Europa aircraft now use 3/8" pins as standard, however the contact area is still through the 1/16" wall thickness of TP12 and TP09. The clamping method to secure the torque tube parts together provides a reliable solution that avoids the need to use Loctite between the components as required by Europa Service Bulletin 16, and 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	P Tunney
2	TTC11906.1	Nylon Sleeve	P Tunney
16	TTC11906.2	5mm 316 SS Cap head bolt	Buck and Hickman
4	TTC11906.3	¼" Dowel pins	Original Europa TP14 pins machined down to size.

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 G
11906-03/06	Clamp half image	n/a
11906-04/06	Clamp half image	n/a
11906-05/06	Clamp half image	n/a
11906-06/06	Half clamp installed looking aft	n/a
11906-07/06	Torque tube showing new short dowels	n/a
11906-08/06	Clamps installed looking towards port side	n/a
11906-09/06	Clamps installed looking towards starboard side	n/a
11906-10/06	Clamps installed looking aft	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's TP11 phosphor bronze bearings with the fuselage top secured in its fitted position, by screws or Clecos. This will prevent any misalignment of the TP11 bearings in the future when the fuselage top is bonded in to position.

General Info

3.01 If installing the clamps during the build, assume the aircraft is set up in a build stand. If retrofitting make sure the aircraft is on level ground and that the fuselage is supported properly at the rear. Note: all work on retrofits is to be done through the 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 tube. This is a requirement as the torque tube components supplied by Europa Aircraft vary in size depending on the drawing issue. Sizes as specified on the drawing 11906-02/06 must be obtained prior to final machining of the clamps. The finished bore sizes of the clamps must be 0.002" (0.05mm) smaller than the diameters they will locate on to.

3.03 Prior to assembly, carry out a run-out check of the 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 Mod 62 (Oversize 3/8" torque tube pins). If Mod 62 has been carried out then the clamp recessed spot faces will have to be made larger to accommodate the larger 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 (TP04, TP12s, TP09 and 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 TP09. See images. Insert and tape in position a 0.010" feeler gauge between the TP11 phosphor bronze bearing and the TP10 nylon spacer.

3.07 Set up the torque tube assembly to be level and equally spaced within the tail of the aircraft – Refer to set up stage in chapter 18 of the Europa build manual. Ideally this stage 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 Araldite 420 mixed with flox and, on the outside of the TP11 phosphor bronze bearings, tack them in position with at least 3 drops of the adhesive on each bearing.

3.09 Allow the adhesive to cure and then remove the torque tube components. Complete the bonding of the TP11 phosphor bronze bearings by applying a fillet of Araldite 420/flox mix around the circumference on each of the bearings and on both sides of the fuselage.

3.10 Once cured clean of any excess Araldite 420 from the bearing machined faces and rebuild the torque tube components with a thin film of oil of grease. All bolts on the torque tube clamps should be degreased and installed using a drop of Loctite 243 or equivalent. 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 visual check to see if any bolts are loosening off 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 over lenght 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.

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" (0.5mm).

3.18 Remove the 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	+0.9	169.5 aft of datum	155.5
Post Mod A/C			

Amend the aircraft weight and balance report as required.

5. Flight Test and Special Inspections

5.1 If the clamp is installed during the build then inspection and flight testing is as per the build manual and LAA procedures. An inspection of the installation should be performed after the first flight then again after the final flight test.

5.2 If the clamp is installed as a retrofit then the torque tube assembly must be inspected after an initial test flight and then at each annual permit renewal inspection.

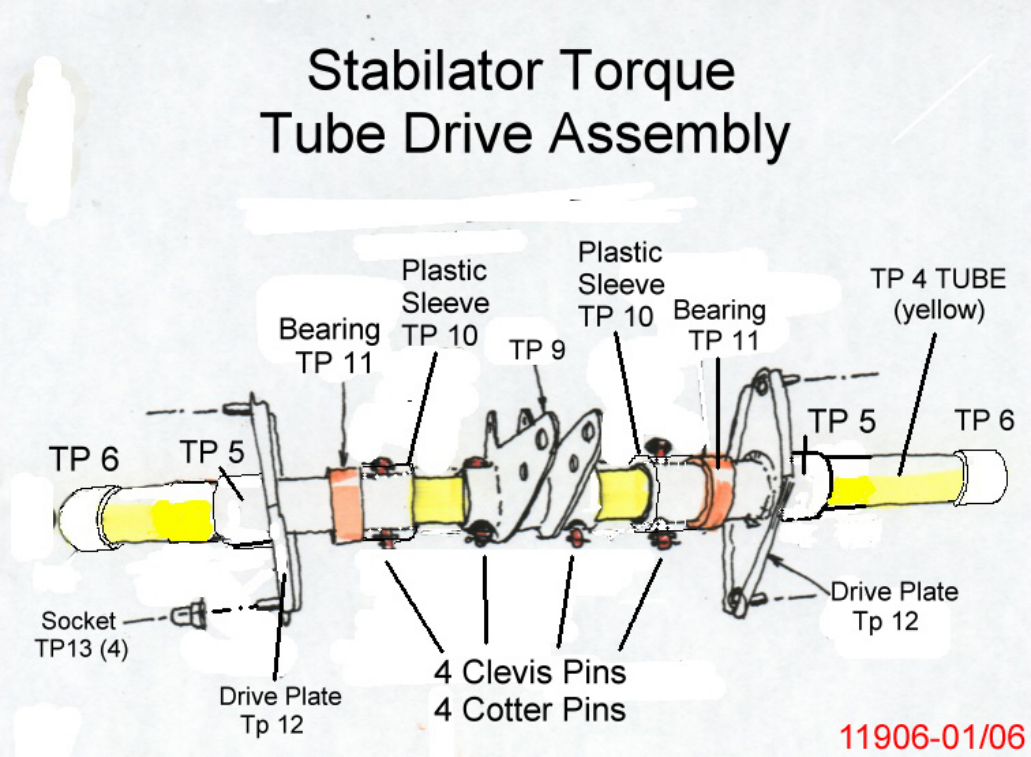
5.3 Interim inspection of the torque tube assembly is at the discretion of the owner / operator.

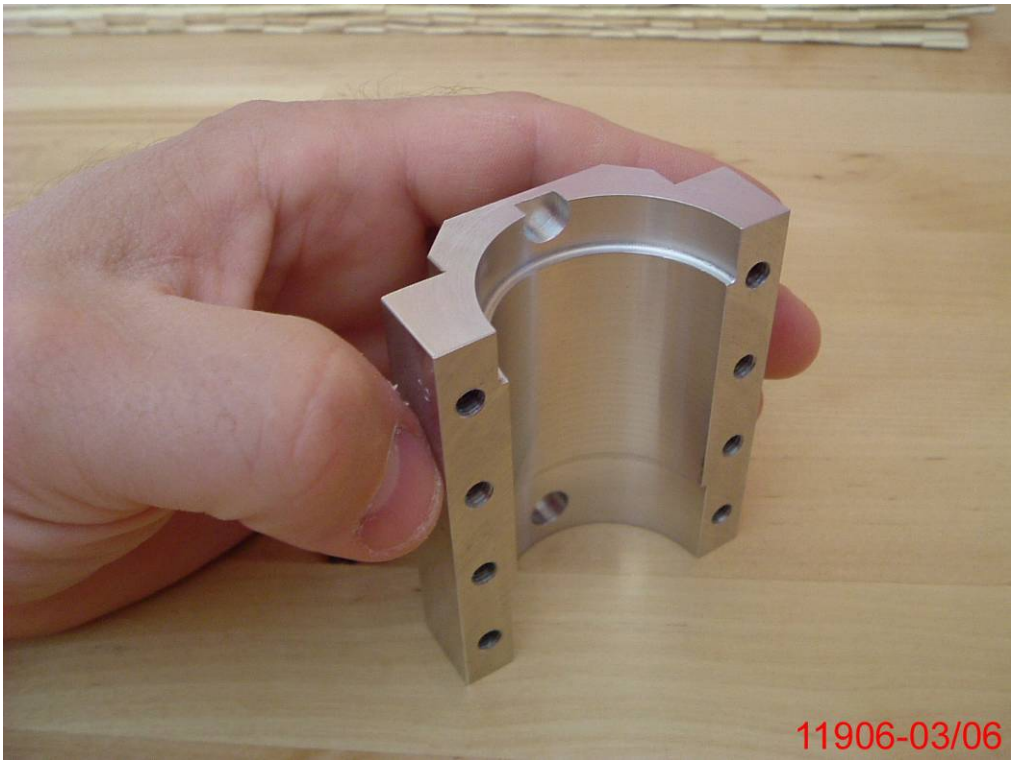
6. Certification

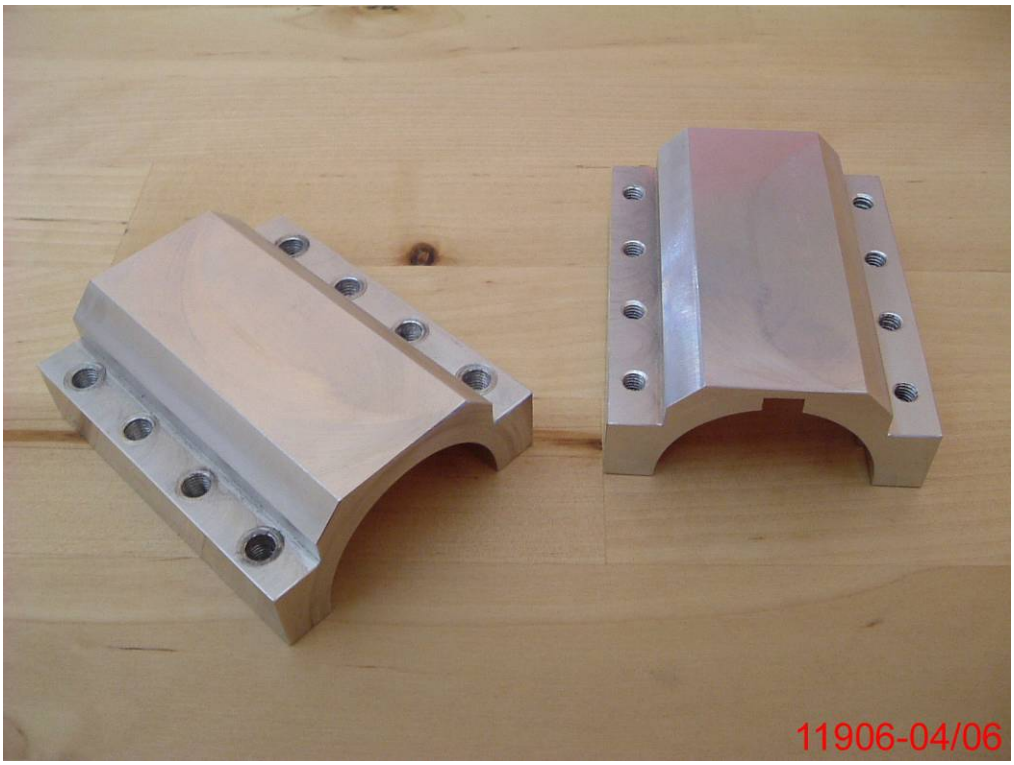
Where this modification is embodied in an already permitted aircraft, before the modified aircraft is flown an LAA inspector must check the work done and also ensure that compliance with LAA Service Bulletin 247/FSB 006 is achieved, paying particular attention to sections 1 and 3 of the bulletin. Any movement between the components of the torque tube will deem the clamps not fit for use. Once the inspector is satisfied, a logbook entry must be made including reference to the mod no SM11906 and a PMR (Permit Maintenance Release) signed by the inspector.

Approved:	F Donaldson B.Tech C.Eng FRAeS Chief Engineer	Signed:	

Drawings and Images



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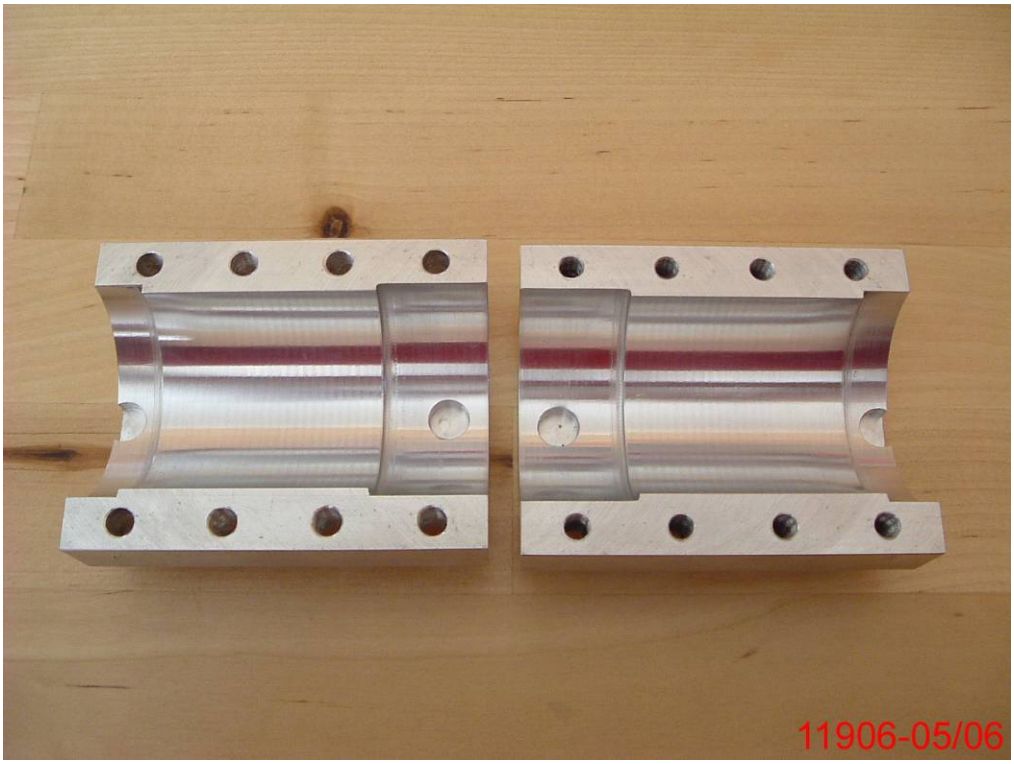
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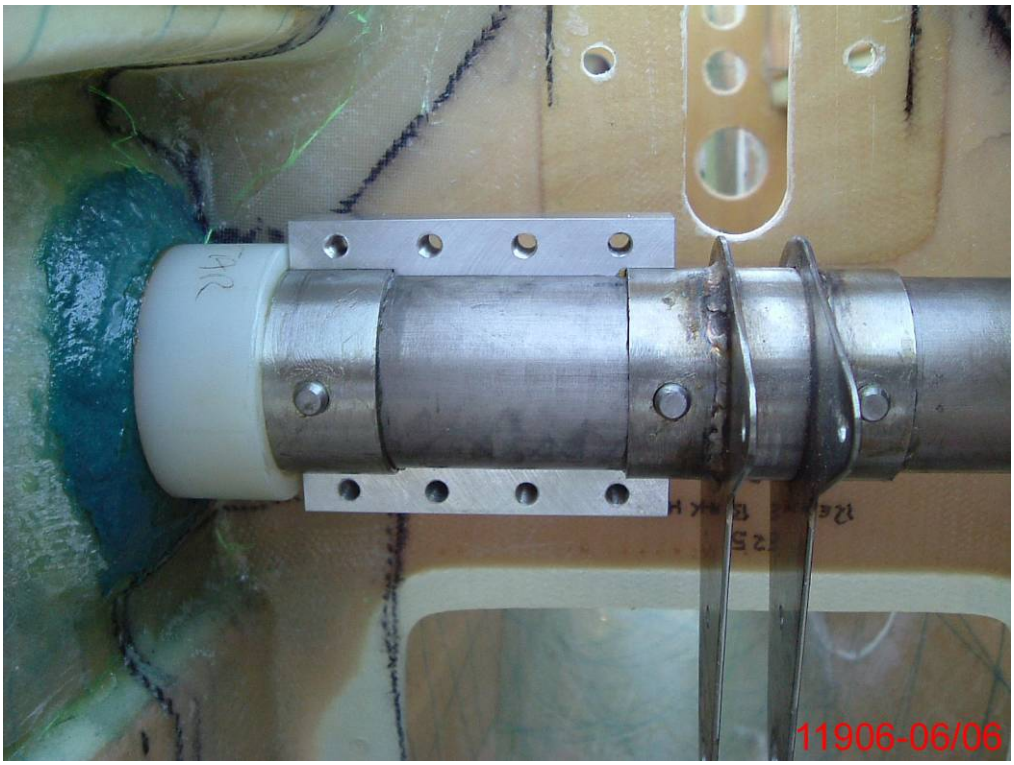
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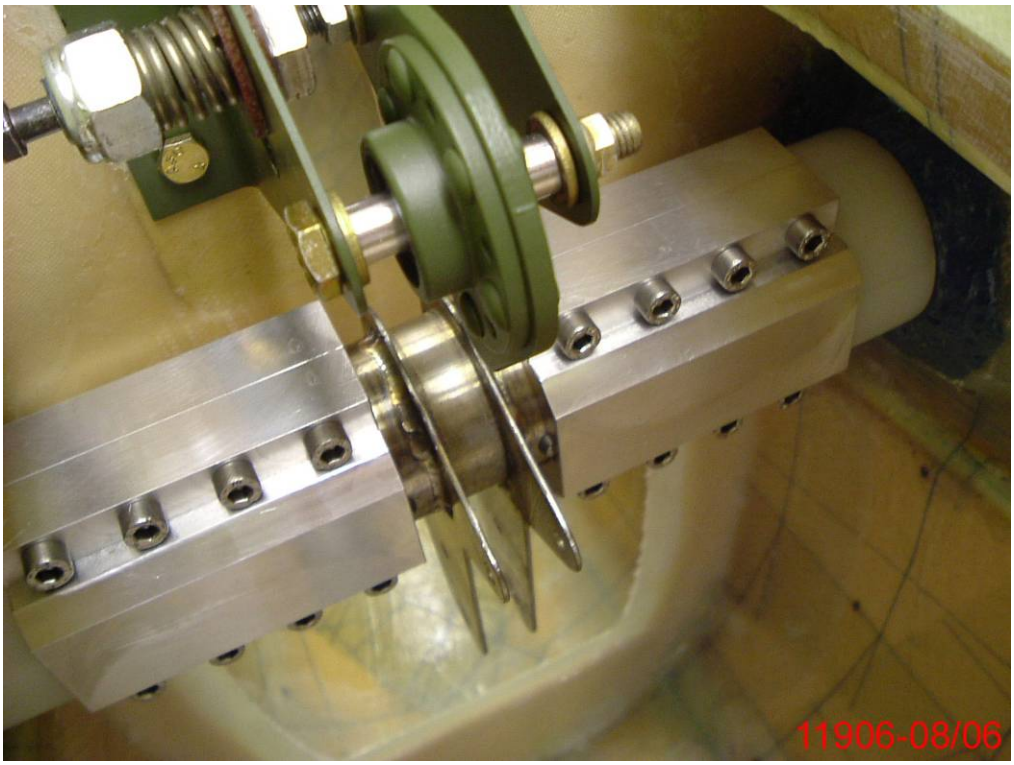
11906-07/06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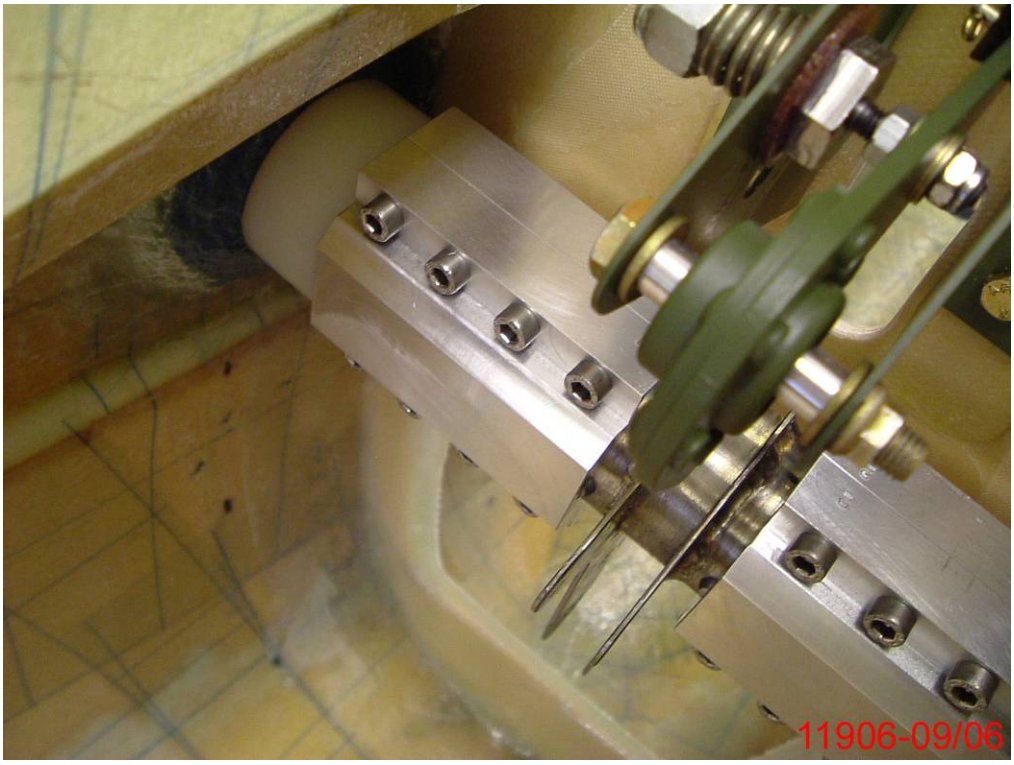
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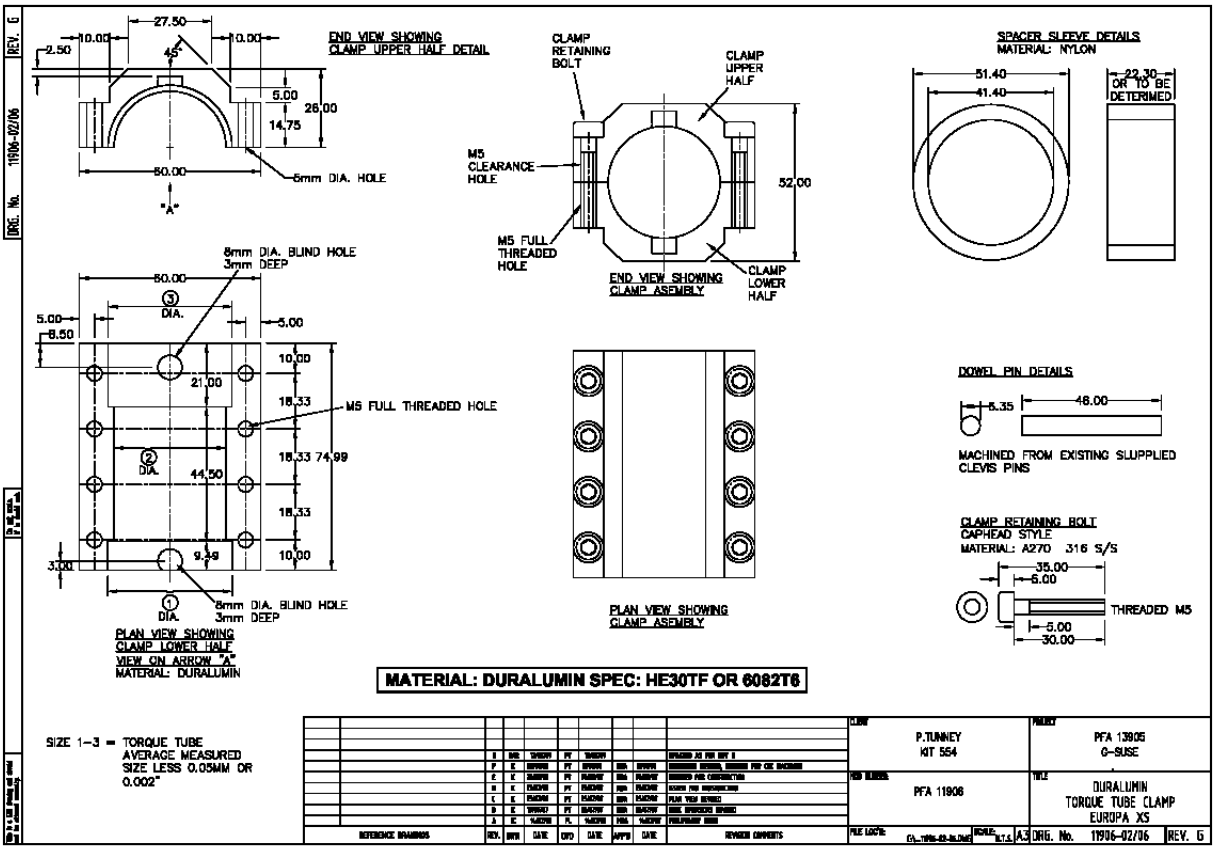
11906-09/02


END VIEW SHOWING CLAMP UPPER HALF DETAIL
CLAMP RETAINING BOLT
CLAMP UPPER HALF
M5 CLEARANCE HOLE
M5 FULL THREADED HOLE
END VIEW SHOWING CLAMP ASEMBLY
CLAMP LOWER HALF
SPACER SLEEVE DETAILS
MATERIAL: NYLON
OR TO BE DETERMINED
8mm DIA. BLIND HOLE 3mm DEEP
M5 FULL THREADED HOLE
PLAN VIEW SHOWING CLAMP LOWER HALF VIEW ON ARROW "A" MATERIAL: DURALUMIN
PLAN VIEW SHOWING CLAMP ASEMBLY
DOWEL PIN DETAILS
MACHINED FROM EXISTING SUUPPLIED CLEVIS PINS
CLAMP RETAINING BOLT
CAPHEAD STYLE
MATERIAL: A270 316 S/S
THREADED M5
MATERIAL: DURALUMIN SPEC: HE30TF OR 6082T6
SIZE 1-3 = TORQUE TUBE AVERAGE MEASURED SIZE LESS 0.05MM OR 0.002"
P.TUNNEY
KIT 554
PFA 13905
G-SUSE
PFA 11906
DURALUMIN
TORQUE TUBE CLAMP
EUROPA XS
DRG. No. 11906-02/06
REV. G