Tailplane mass balance arm replacement

Classification: This modification has been classified as mandatory by the PFA (UK).

Applicability: All Europas delivered before February 2005

Compliance: Aircraft with serial numbers shown in the Appendix, or those which have suffered a heavy landing or ground loop - within the next 5 flying hours, or before the next annual Permit renewal, whichever is the sooner.
All other Europas - within the next 25 flying hours or the next annual Permit renewal, whichever is the sooner.

Introduction

A failure of the TP18 tailplane mass balance arm assembly has occurred on an aircraft on the British register which had previously suffered a number of landing mishaps. Whilst this was an isolated occurrence, investigation showed that the assembly needs to be uprated. A new design has been produced and tested. This new unit is similar in dimension to the old unit, but is constructed from heavier gauge tubing, with a stronger adjusting mechanism. It has been found unnecessary to include the restraining cables in the new design, provided that low friction guide strips are fitted to the inside faces of the pitch control stop support structure. A general arrangement of the modified arm assembly is shown at figure 4.

Action

Step 1 - Removal of redundant parts

Note: *To gain access to the mass balance arm assembly it is desirable for the fuselage to incorporate access panels at the rear. For aircraft which do not currently have these panels fitted details can be found on the company's website, europa-aircraft.biz. See the technical section, build manuals, chapter 23M or 23T. Reference to the chapter - Tailplane Mass Balance and Control Stop will also be helpful in visualizing the necessary work.*

Remove the tailplanes. Remove the "D" panel from the cabin rear bulkhead, and gaining access into the rear fuselage remove and retain the roll pin on the forward end of the mass balance arm, and remove the counterbalance weights. Remove and discard the M00 hose clamp.

Working from the side access holes (or from inside the rear fuselage) remove the restraining cables from the lugs on each side of the old mass balance arm, but leave them attached to the torque tube for now.

Next remove the two AN3-10A bolts with their nuts and washers which hold the TP18 arm to the tailplane torque tube, and withdraw the mass balance arm assembly.

Step 2 - Preparation of replacement assembly.

Insert the plain end of the end fitting TP18B into the rear end of the shorter tube of the new TP18/6 arm as far as it will go.

Drill through the fitting with a 4.8mm drill using the pre-drilled holes in the tube as a guide, see figure 1.

Using the bolt, washer and nut from the old assembly, bolt the TP18B to the arm assembly.

Screw the adjuster TP18C and its check nut onto the TP18B. Check that there is at least one diameter engagement of the end fitting in the adjuster. Using the old arm assembly as a template turn the adjuster so that the new assembly has the same overall length as the old unit - this will minimise any further adjustment after reassembly in the fuselage. After adjustment, tighten the locknut.

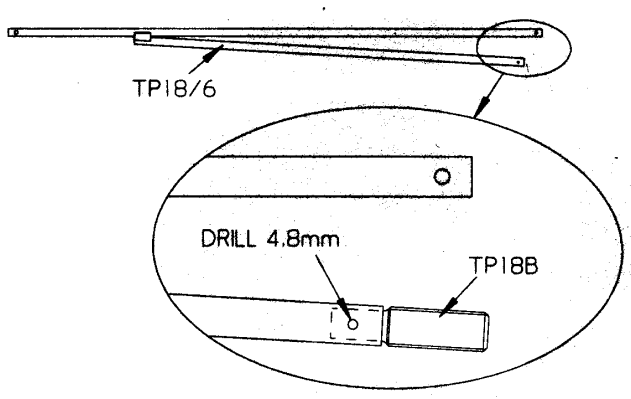

Fig 1. Drilling TP18B

Step 3 - Guide strips

With the mass balance arm out of the way, install the low friction guide strips, one to each of the inside faces of the pitch control stop support structure - see figure 3 overleaf.

Three countersunk screws, MS24693-S274, are used to secure each guide strip. Mark out and drill the 4.8 mm holes in each guide strip according to figure 2.

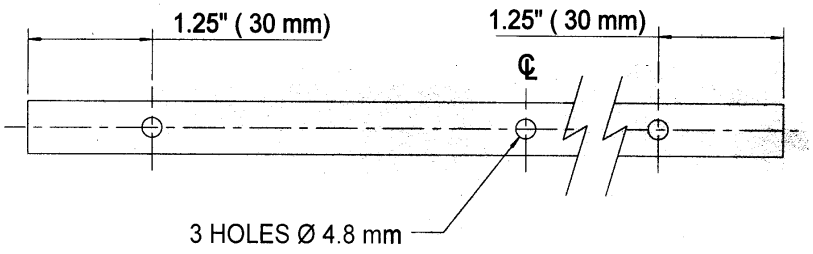

Fig 2. Drilling guide strips.

Countersink the holes on one side (using a larger drill spun between your fingers will be acceptable) ensuring that the heads of the countersunk screws will be below the surface of the guide strips.

Position the guide strips such that they cover the movement of the mass balance weights from the bottom stop to the top stop. Drill through the support structure with a 4.8mm drill and bolt in position with the countersunk screws, AN960-10L washers, and MS21042-3 stiffnuts.

The diameter of the mass balance weights is 50mm, and the nominal clearance is 2mm each side - check that the clearance achieved is between 1mm and 4mm each side.

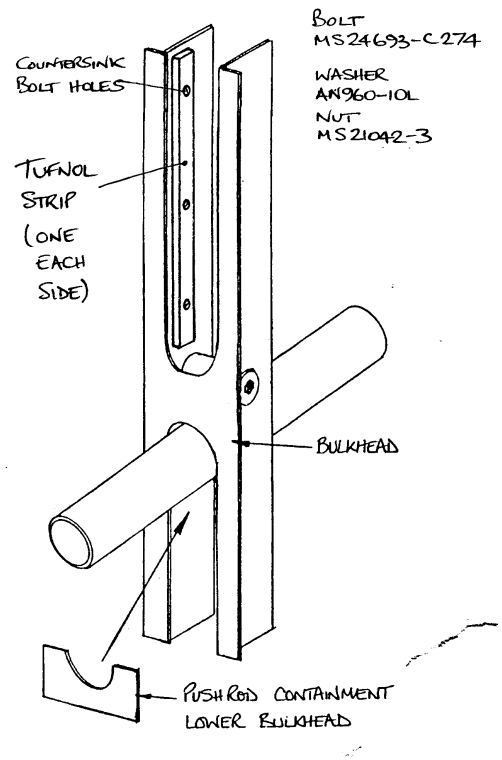

Fig 3. Position of guide strips.

Step 4 - Installation

Using the preferred method of access connect the new arm assembly to the tailplane torque tube using the existing bolts, washers and nuts. The adjuster TP18C has two flats machined - this will assist in fitting the unit to the hole in TP9. It has been found that it is best to fit the lower bolt first.

Back inside the rear of the fuselage refit the weights onto the end of the mass balance arm and temporarily fit an AN3 sized bolt with its head cut off into the hole for the roll pin to stop the weights from sliding off the end. Ensure that the weights are up against the temporary bolt and check for mass balance. (Note that the balance should be checked with the tailplane operating controls connected). Alter the amount of weight, if required, to achieve best neutral balance. To reduce the balancing mass drill small holes in the front weight; in the unlikely event that an increase is needed contact Europa.

Now measure the amount of space between the rearmost weight and the end of the support strut of the mass balance arm. Cut an appropriate length of the sleeve TP18D, remove the weights, install the sleeve, then reinstall the weights and secure them with the 6mm roll pin - if the pin is not a tight fit it must be replaced. Finally, if necessary, adjust the TP18C unit so that the tailplane movement range is between 12° - 13° trailing edge up and 4° - 5° trailing edge down when the weight is in contact with the control stop. The tailplanes are in neutral when the port tailplane is lined up with the fuselage moulding on the port side.

Check also that the movement of the weights runs parallel to the guide strips and that they are not rubbing. If the pitch control stop structure is not mounted parallel to the mass balance arm movement, the fixing brackets will require removal and re-making. Refer to the chapter Tailplane Mass Balance and Control Stop in the build manual.

If the weights are rubbing against a guide strip, it is permissible to reduce the thickness of the strip, down to the depth of the bolt head only, provided that the clearance limits are maintained by adding a spacer behind the opposite guide strip. Alternatively, cables may be used, as in the original installation, to centre the end of the arm. To provide a means of attaching the cables to the front of the arm, a part that fits in place of the TP18D sleeve is available on request. This part, TP18F, is a sleeve with added lugs positioned such that, with the use of AN115-21 shackles, the original cable should be able to be used. To fine tune adjustment of cable length, cable tensioners, such as turnbuckles, will be required. If you do not re-use the cables, they must be cut off from the torque tube and discarded.

Check for loose objects in the rear fuselage and refit all the access panels. After completion the aircraft must be inspected in accordance with the requirements in force for the country of operation. Annotate the aircraft record - Mod 70 Incorporated.

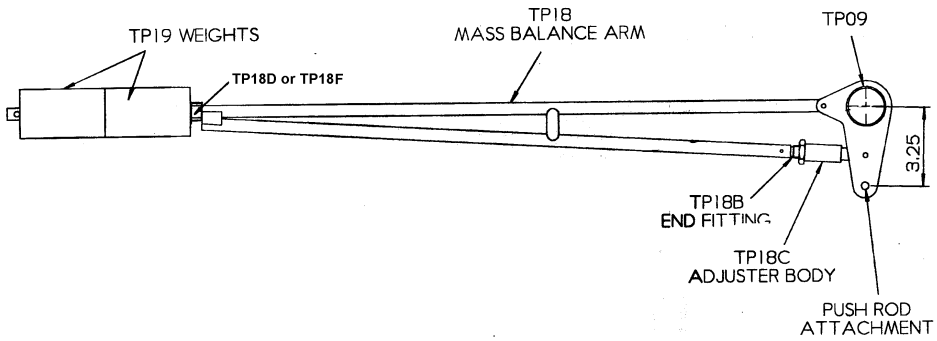

Fig 4. General arrangement of mass balance arm assembly.

In case of difficulty please contact the Technical office of Europa - tel:++44 (0)1751-431773, e-mail roger@europa-aircraft.com.

Appendix
Europa serial numbers (builder numbers) subject to 5 flying hours limitation:-

1	16	33	46	63	82	112	146
3	17	36	47	65	83	118	149
4	18	37	49	66	84	119	151
6	20	38	50	67	87	125	158
7	22	39	52	68	88	126	160
8	25	40	53	69	89	127	161
10	26	41	54	70	90	130	173
11	27	42	56	72	95	134	174
12	29	43	57	73	99	135	194
13	31	44	60	80	105	137	
14	32	45	62	81	106	143	