



24th August 2009

KIT BUILT EV-97 & EV97A EUROSTAR AIRCRAFT
SERVICE BULLETIN SB-EV-97-10
INSPECTION AND RECTIFICATION OF RUDDER TOP BEARING

Classification - Recommended

Nature of Defect

It has been reported by Evektor from the Czech Republic that a loose upper rudder bearing has been discovered. The upper bearing consists of a rose joint fitted to the fin spar by a self locking nut to the front, and a plain nut secured with a tab washer at the rear. The photograph in Appendix 1 shows the loose bearing, showing the loosened plain nut, which had been improperly secured by the tab washer.

Airworthiness implications

Although the upper bearing cannot become completely detached, due to the self locking nut, if it comes loose, handling of the aircraft may be affected, and considerable wear of the bearing attachment could result.

Aircraft Affected

The inspection should be carried out on all homebuilt EV97 teamEurostar aircraft.

Inspection Required

Before further flight check the top rudder bearing for security. Hold the top of the fin with one hand and the top front of the rudder with the other hand, and try to move the rudder top from side to side. Any play indicates that the top bearing is loose. Also carry out a visual inspection of the security of the bearing by turning the rudder to full deflection when it will be possible to clearly see the top bearing.

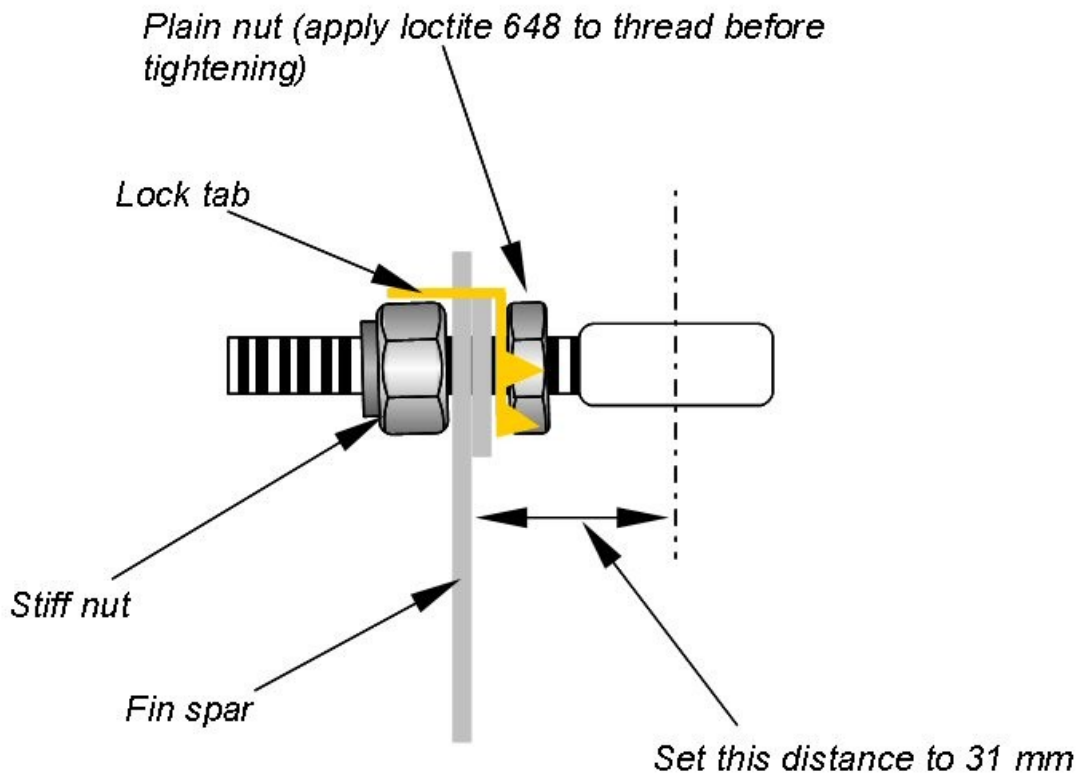
Rectification Action Required

If the top rudder bearing is secure, no further action is required, but enter the fact that this bulletin has been carried out in the aircraft log book. Ongoing inspection of the bearing should, of course, be carried out at preflight checks as specified in the POH, and at maintenance events as specified in the Maintenance Manual.

If the top rudder bearing is loose, rectification must be carried out in accordance with Appendix 2, but if there is any wear in the hole in the spar, consult with Cosmik Aviation before proceeding. Please note that the tab washer should be fitted behind the spar (against the rear face as shown in diagram) and not in front as previously. Tab washers are available from Cosmik Aviation.

The diagram below shows the correct assembly after rectification. In addition to the tab washer use a drop of loctite 648 on the thread of the plain nut for additional security, but make sure no loctite gets on to the rudder pivot of the rose joint.

The 31mm dimension is what all UK factory built aircraft are set at, but homebuilt aircraft may be slightly different. Either check the original dimension before dismantling, or after assembly check there is full and free movement of the rudder in both directions, and the front of the rudder is visually parallel with the rear of the fin.



As the rudder is a primary control, a dual inspection of the finished job will be necessary. Record the work in the aircraft log book and keep a copy of this bulletin in the aircraft records.

Nigel Beale

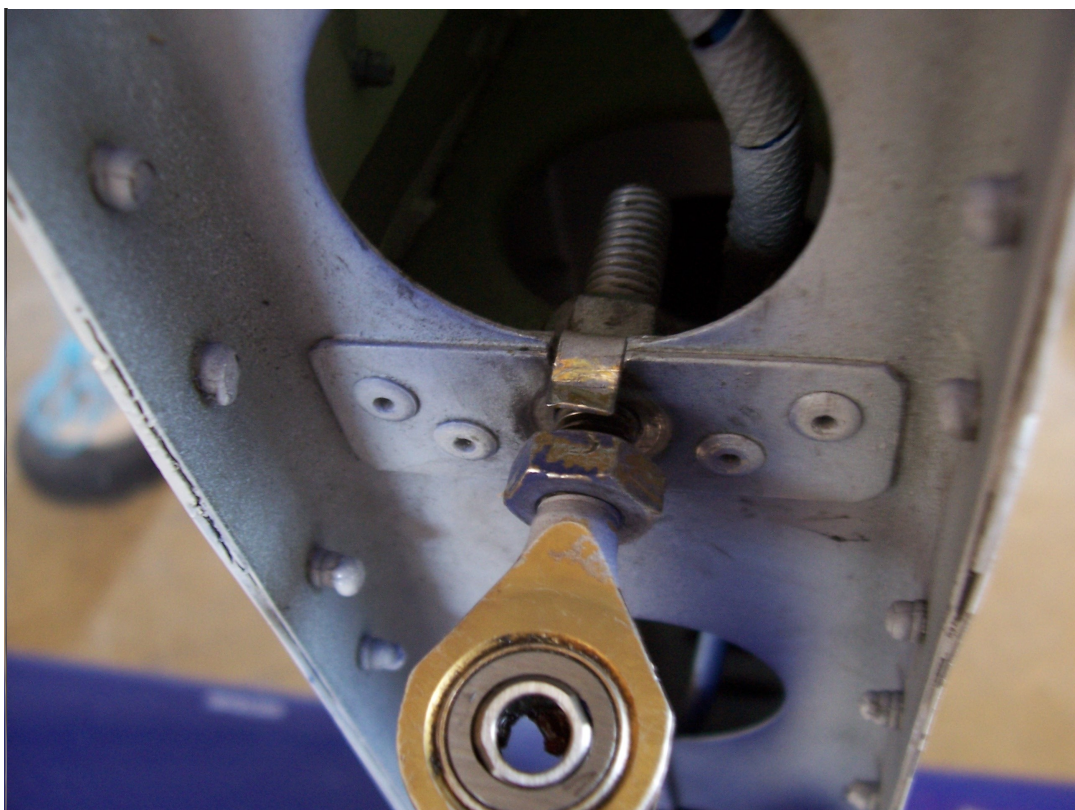


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Appendix 1

Loose upper hinge of the rudder





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Appendix 2

Procedure to modify nut securing of the rudder upper hinge

Required material:

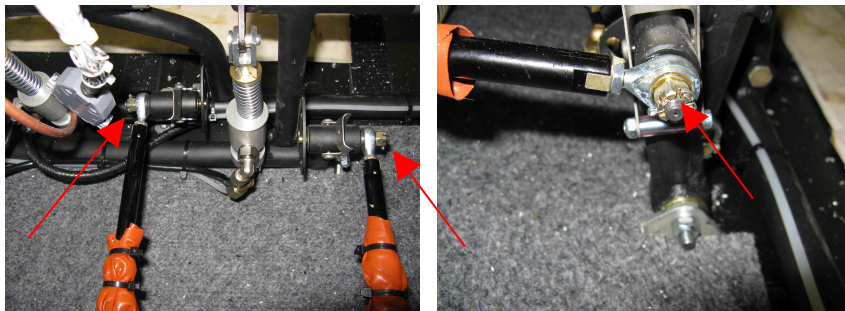
1. New tab washer under the rudder upper hinge
(it is not recommended to straighten and use original tab washer due to possible cracking after re-bending)
2. 2 new tab washers under the rudder cable attachment screws
3. M6 bolt (sufficiently long, 80 mm), 2 M6 nuts, 2 washer of approx. 25 mm diameter to release and tighten the rudder hinge

Required tools:

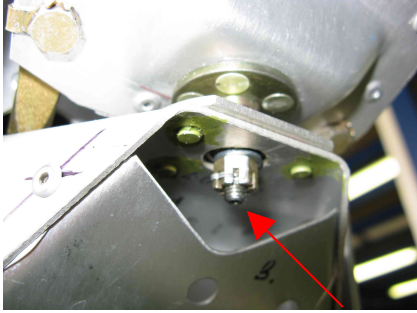
- Universal pliers
- Nut wrenches M8, M9, M13
- Flat screwdriver
- Slide calliper or another suitable ruler
- Steel bar of approx. 6 mm diam., length 150-200 mm
- Middle size hammer
- A wire to fix the rudder cables

Work procedure:

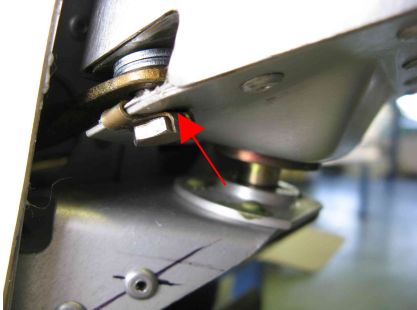
1. Release tension of the rudder cables (without doing this the cables will be dragged into the fuselage after being disconnected from the rudder). Draw a cotter pin out of the castle nut at the nose wheel control rod attachment to the rudder pedals. Then use M9 nut wrench to unscrew the castle nut. Do this on both control rods. Disconnect nose wheel control rods from the rudder pedals. Adjust pedals position rearward to release tension of the cables.



2. Use a suitable pliers to draw a cotter pin out of the castle nut securing rudder lower hinge.



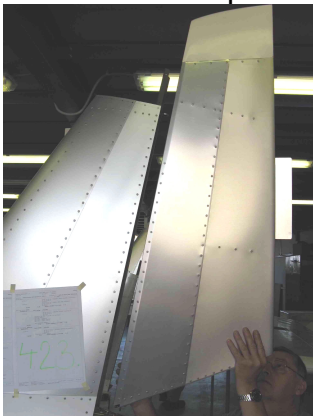
3. Use M8 nut wrench to release and unscrew castle nut from the rudder lower hinge.
4. Use a suitable tool (flat screwdriver) to straighten up the tabs of the tab washers under the screws which attach control cables to the rudder bottom.



5. Use M9 nut wrench to unscrew both screws attaching the cables to the rudder and pull the cable ends slightly out and fix together by a wire, so that to not be drawn into the fuselage.



6. Lift the rudder up and remove from the fin.



7. Use a slide calliper or another suitable rule to measure distance of the hinge eye rear edge from the fin rear spar and note this value.



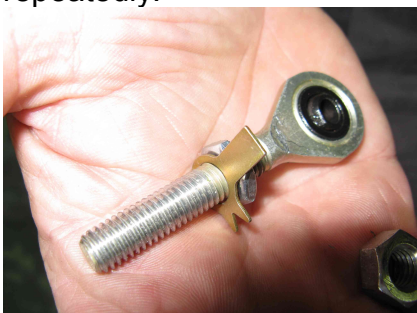
8. Screw M6 nut on a sufficiently long M6 bolt (80 mm), then put a washer (25 mm diam.) on the bolt and insert into the hinge from above. Put another washer on the bolt from below and tighten with another M6 nut. Now set M13 nut wrench through a lightening hole on the self locking nut inside the fin (right figure below) and turn the M6 bolt to release and unscrew the hinge. Take care at the end, so that the self locking nut and washer do not fall down into the fuselage.



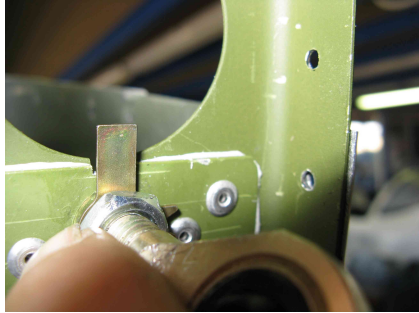
9. Pull out the hinge, self locking nut and tab washer.



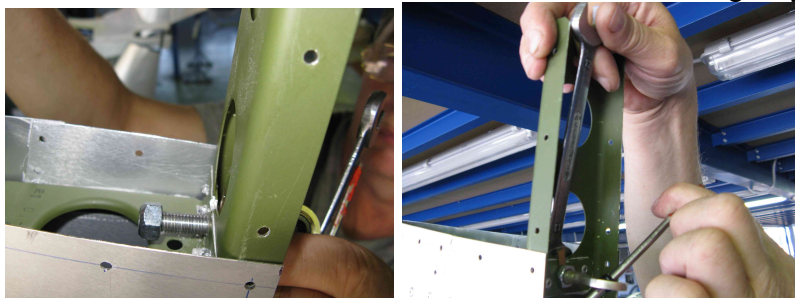
10. Set a new tab washer (size 8) onto the hinge thread. It is not recommended to straighten up and use original washer, due to possible cracking when being bent repeatedly.



11. Set the hinge back on the fin spar, the washer must be on the outside of the spar as shown on the picture.



12. Screw the self locking nut (it has steel core so can be re-used) and turn it several times to be fixed on hinge thread. Then follow step 8 to install M6 bolt, washers, and nuts. Turn the bolt clockwise to screw down the hinge eye.



13. Measure the distance between hinge eye rear edge and fin spar and if different from the original one, then screw or release the hinge to adjust this distance.

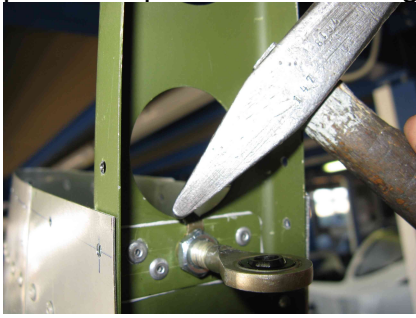


14. When the distance is adjusted tight the nut by M13 nut wrench.

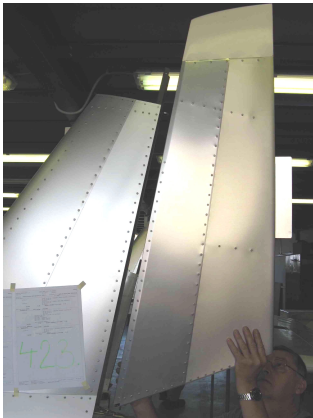
15. Use suitable tools (screwdriver and pliers) to bend tabs of the washer to secure the nut against release.



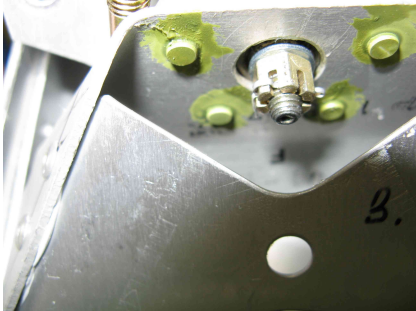
16. The washer bigger tab must be bent forward by a suitable tool (e.g. flat screwdriver and hammer) to protect the washer from rotation. The end of bigger tab should be pressed up to the self-locking nut edges.



17. Set the rudder back onto the hinges.

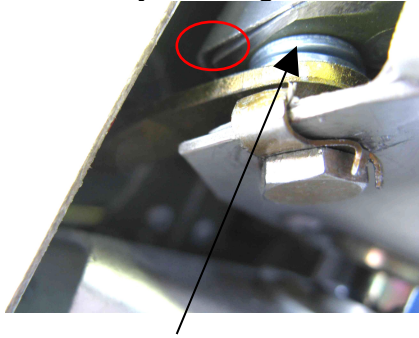


18. Re-install the castle nut back on the rudder lower hinge, tight with M13 nut wrench and secure by the cotter pin.



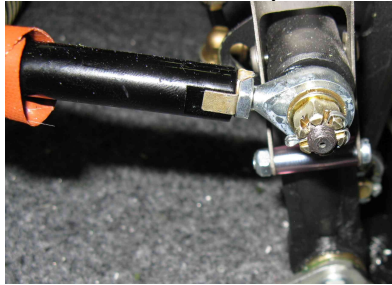
19. Set new tab washers (size 6) on the cable attachment screws.

20. Re-connect the cables and screw down the screw. Secure screw heads against release by bending the washer tabs.



Note: The two „normal“ washers above the cable ends are installed to prevent cables from being chafed from the rudder front lower edge (marked red). Installation of these washers is recommended if not installed and there is an evidence of chafing in this area.

21. Set the rudder pedals back to their original position and re-connect the nose wheel control rods to the pedals. Install castle nuts and secure by the cotter pins.



22. Check visually performed modification and securing of all joints.

23. Record performance of this bulletin in the Aeroplane Log Book.