



RECREATIONAL AVIATION AUSTRALIA INC

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RECREATIONAL AIRCRAFT AIRWORTHINESS NOTICE

AIRWORTHINESS NOTICE IDENTIFICATION NUMBER: **AN300710-1 (Issue 2)**

INSPECTION OF WING LIFT STRUTS FOR CORROSION ON ALL THRUSTER AIRCRAFT

Issue 2 posted for clarification - and indicating that both ends of the strut may be affected.

To: All owners and operators of Thruster Aircraft.

Background:

An owner has reported that they found severe corrosion in the starboard forward wing lift strut top joint; where the aluminium end plug (bracket) is fitted into the tube, causing a total replacement of the strut.

Discussion:

Any time two dissimilar metals are placed together in a damp environment, there is always the possibility of galvanic corrosion occurring. This type of corrosion can occur even when the components are made from the same base metal, (in this case aluminium), since the various components are made from slightly different alloys or have differing surface treatments.

In the case of tubing, there is always some possibility of moisture collecting over time. Damp air enters through any flaw or gap regardless of how small, once this damp air is cooled, some of the water is released and falls to the lowest point, if there is no method of draining this water it will collect and pool eventually. But even before this the inner surface of the tubing is covered by a layer of moisture which will also have any airborne impurities dissolved in it. In most cases this will form a mild acidic solution, which will eventually cause the tubing to corrode. If the tubing is placed in a salty environment then the process of corrosion will be accelerated. Aluminium is especially sensitive to "chloride environments", i.e. salt. The problem with corrosion inside metal tubing is that it will not be visible until it is completely or almost completely through the wall of the tube, and may only be evident in one part of the structure while the remaining structure is corrosion free, this is because this is the piece of tube which has a small flaw, which will allow moisture in.

Action Required:

BEFORE NEXT FLIGHT: Examine the integrity of the both ends of the wing lift struts for signs of corrosion. Remove the struts and ends and check internally for signs of corrosion. Corrosion may present itself as small, holes, bubbling of the metal, white powder at openings or joints, thickening of the metal material. By placing pressure on the area it will be evident if the metal is thinner in this area compared to the remainder of the tube. If the damage is minor (that is less than 1/10 (0.142mm) the thickness of the tube wall, (in the case of the Thruster the tubing is made from 6061 T6, or 6082 T6 Aluminium with a wall thickness of 1.42mm, (which is strong enough when the required loads are placed on it, but even minor degradation, can severely affect the materials load carrying capability).

Any struts with greater corrosion than this should be removed from service and scrapped and be replaced with a new one.



Fig 1: Corrosion from outside of the tube.



Fig 2a:

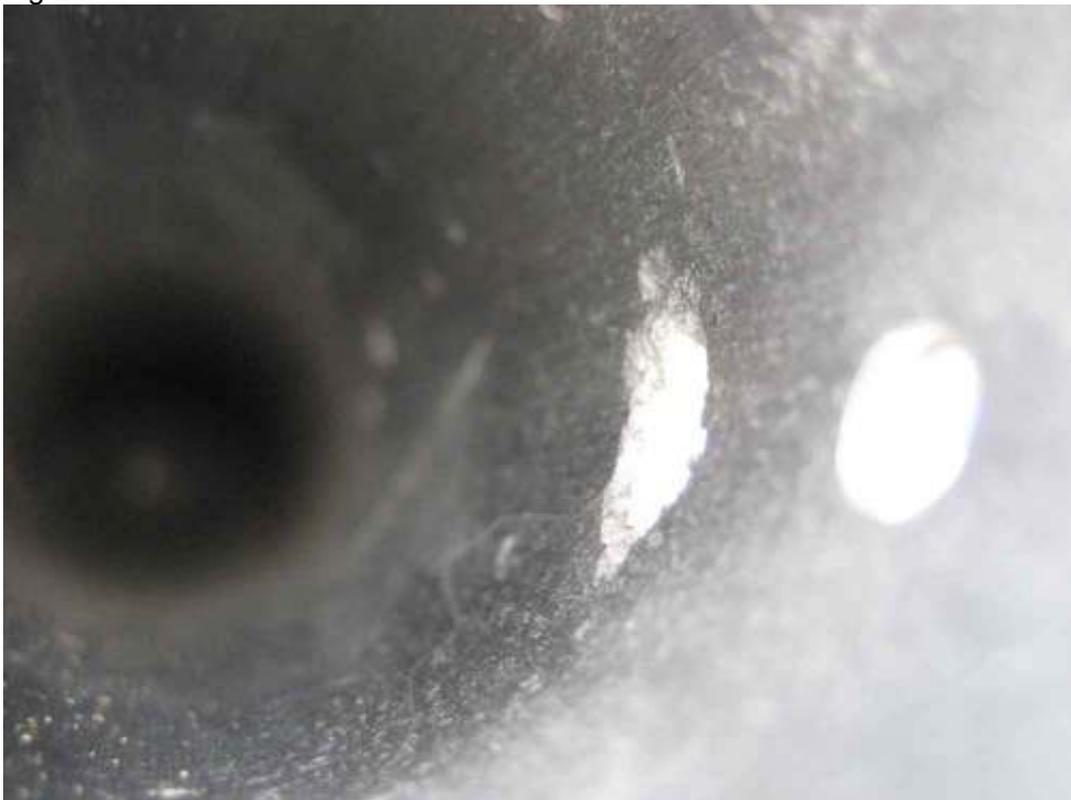


Fig 2b:

Fig 2 a and b: Internal Corrosion in strut tube.

Thruster Lift Struts – Ongoing Airworthiness from TOSG.

It has come to the attention of TOSG that there exist a number of unapproved* modifications to Thruster lift strut assemblies, some of which cause extra risks to the long-term safety of the aeroplanes – the possibility of losing a wing in flight, exists!

**In the case of owner-maintained single seaters (CAO 95:10 aeroplanes), no approval is needed. However, any modification makes you a test pilot.*

All production Thrusters, from the prototype T83 to the T600, handle the main (~66% of the total) lift loads with a flat truss – which is vertical when the fuselage boom is horizontal.

This truss is formed by the front wing spars, the front lift struts, the undercarriage carry-through beam, and the front “A”-frame tubes.

These aircraft all have a pair of thin steel plates at each end of the U/C carry-through beam, one in front and one behind, as f.1; the inner (lower) ends of the front lift struts go between these plates and a single AN-6 (two-seaters) or AN-5 bolt picks up each strut tube end and both plates.



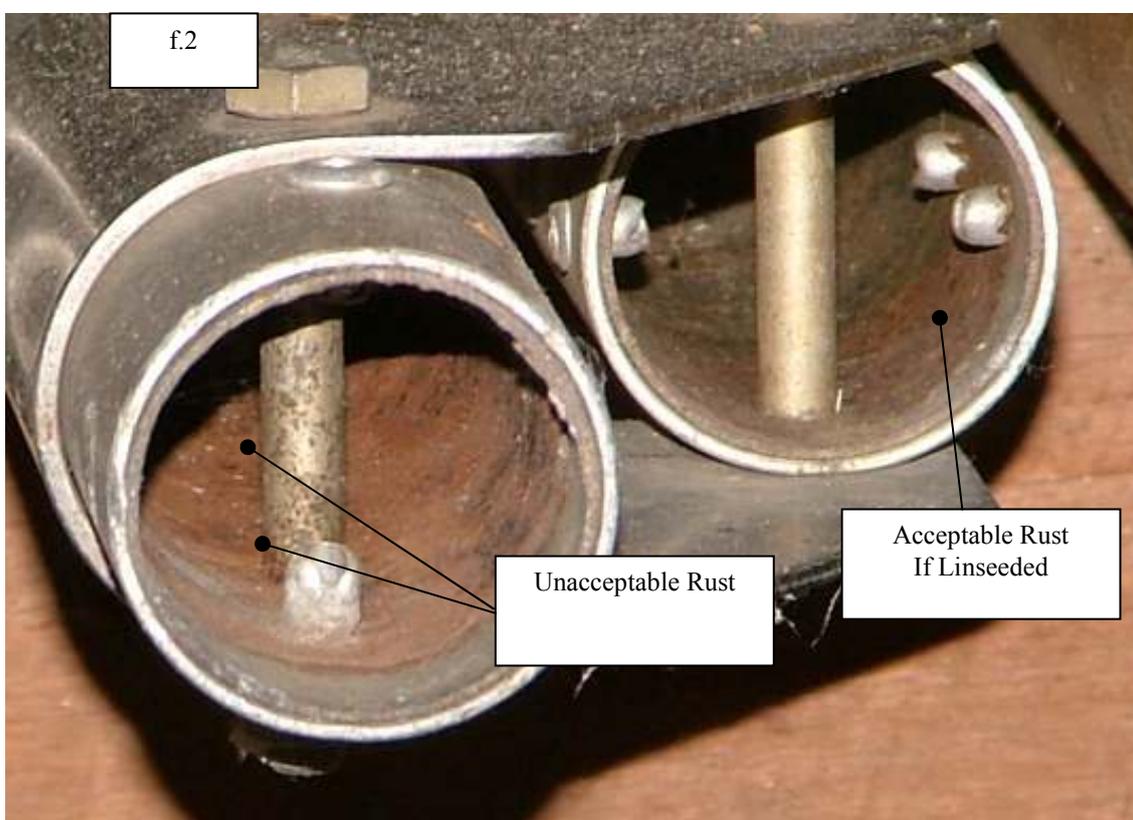
The T-83 to T-500 have 0.056” (1.42mm) wall thickness 6061-T6 struts (1.25” OD on the single seaters, 1.5” OD on the two seaters); in order to handle the bearing loads each inner attach bolt puts on the edges of the hole through each strut, a short plated steel insert (most single seaters use an aluminium insert) is riveted in the inner end of the strut tubes.

Exactly the same set-up is found in the rear struts, which are attached to the front struts with a single AN bolt through the strut tube and “two” stainless steel plates (one bit of sheet, wrapped around the front strut).

At Least Annually, the insides of the plated steel inserts should be inspected with a dentist's mirror and torch for rust – the plating will eventually break down, and rust become visible. If no rust is visible, and no corrosion evident on the ends or outside of the aluminium strut tube in this area, the aeroplane should be good for another year "as is", provided it stays away from the seaside!

If the plating appears mostly sound, and no aluminium corrosion is evident, but a little rust colour (no "pitting") is found on the insert, the strut should be removed; the outer end fitting (a machined "plug") inspected with a 10X glass for pitting, or distortion of the strut tube; and the strut tube checked along its full length for pitting. If pitting or distortion is found, contact TOSG (tosgtech@gmail.com) or replace strut assembly before further flight.

If pitting/distortion is not found, hold the root/inner end of the strut higher than the outer end and tip about a plastic cup of boiled Linseed oil into it. Roll over and slosh around a bit, then set outer end high to drain for a couple of days. Once the linseed oil film has become gummy, the strut can be refitted and used; and should be safe from internal corrosion for several years **(DO NOT NEGLECT ANNUAL INSPECTION!)**.



If the insert shows a lot of rust / any pitting, the strut will need to be completely disassembled and inspected, and the insert at least replaced. Contact TOSG for Approved replacement fittings.

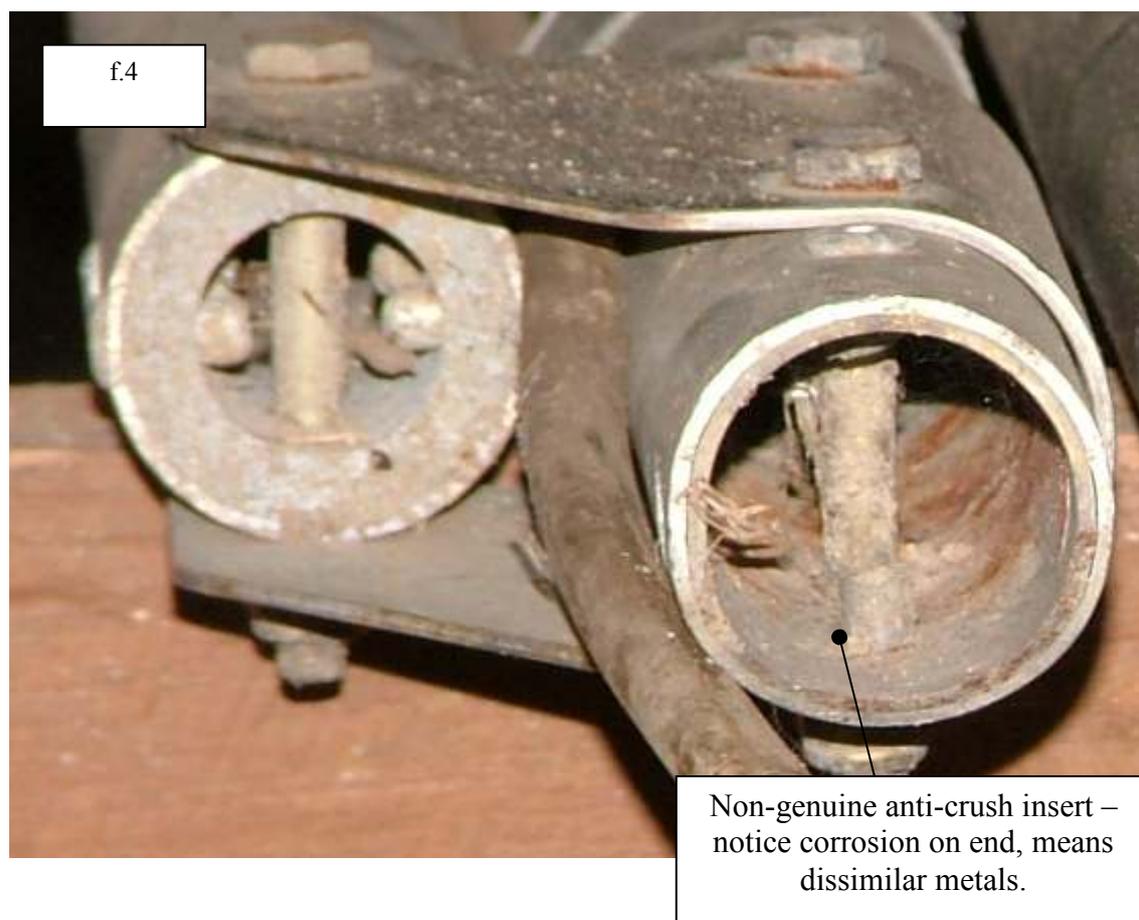
The Vision 600 has tubular steel inner strut ends, with anti-crush tubes for the through-bolts; again, an annual inspection with a dentist's mirror and torch for internal rust is warranted. If rust is found, either Vision Aircraft should have a repair scheme, or TOSG can produce one.



As the Australian Thrusters had no anti-crush tubes for the attach bolts, and many operators automatically over-tightened these bolts, a number of aircraft have had solid inserts of wood or plastic driven into the strut inner ends; these are guaranteed to cause corrosion problems, and should be immediately removed and disposed of.

The attach bolts are loaded ONLY IN SHEAR; they do not need nuts, just split-pins to stop them being vibrated out. Nyloc nuts are used as an off-the-shelf solution. The nuts should NEVER be tightened past their first contact with the stainless plate.

If a strut inner fitting of machined “plug” form (as per outer), or any other not described above, it is almost certainly “bogus”; contact TOSG before further flight, at the very least.



If the strut inner attach plates are not stainless steel, or the U/C carry-through beam is not aluminium (possibly with a steel insert if a two-seater), again contact TOSG. It MAY not be unsafe; or it may (if a two-seater) be an illegal modification, and should be analysed and officially blessed – or replaced – before further flight.

If the original struts have an aluminium strut extrusion slid over the outside and riveted on in a few places, this is a legitimate modification. If the original struts have had the ends cut off and fastened into the ends of a piece of airfoil strut extrusion, the struts need a specific engineering Approval before use – contact TOSG if in doubt!

At Each Daily Inspection.

Visually inspect the external area for signs of corrosion.

Recommended Further Action.

This is a continuing airworthiness notice. It is also recommended that: the struts be inspected annually, using the TOSG recommendations included; be visually inspected for signs of corrosion and treated before reassembly and fitment. If the lift struts are found to have been modified, then assistance should be sought from TOSG and/or the RA-Aus Technical Manager.

Reports and Recording.

The initial inspection is to be recorded in the aircraft log book, citing **AN300710-1 (issue 2)** and any deficits found are to be reported to the RAAus office



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Safe Flying & Safe Fixing

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Defect Reporting is one of the primary ways we have in ensuring continued safety in our operations.