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20<sup>th</sup> February 2013

Dear XXXXXXXXXXXXX

CZAW SPORTCRUISER LAA 338 xxxxxxxxxxxxxx

I am writing to let you know that the improved nosewheel spindle assembly design is nearing the final stages of the modification approval process and that the coordinators of this modification, Airspeed Aviation Ltd. at Derby airfield, are nearing the point where they need to have the components manufactured. Naturally, the more units in the initial order, the cheaper these parts will become.

I understand, after receiving numerous telephone calls from interested parties on this subject, that there may be some confusion about both the need for the replacement of this part and issues of cost; it might be useful here to explain, from the LAA Engineering's perspective, the situation as we see it. Firstly, the reasons for the need to replace this item and the approval process of the replacement part.

You will know that we, as a community, were first alerted to a serious problem with the design of the nose undercarriage spindle on CZAW SportCruisers in early August 2012, when an owner suffered a nose undercarriage collapse at very low speed. An Airworthiness Information Leaflet (AIL) (MOD/338/015 issue 1) was issued by the LAA requiring disassembly and inspection of the undercarriages on all CZAW SportCruisers whilst investigations into the reasons for this failure were explored. Feedback from these checks hasn't been encouraging, with both cracking in the forks and serious corrosion being found by members. A subsequent AIL (MOD/338/016 issue 1) requiring close checks on the fork assembly was issued in November 2012.

It is now clear that the reason for the catastrophic failure of the spindle was Stress Corrosion Cracking (SCC), the origins of which lie in the material choice and the detail design of the component. Stress corrosion cracking happens when a material is subject to continual stress (in this case the origin for stress is probably the welded nature of the construction), and the sequential oxidation of the internal intra-atomic bonds within the materials structure. Effectively, SCC is an internal process and, as such, without sophisticated technology, impossible to inspect for.

During the process of re-designing this component it was discovered by analysis that, under some conditions, the design strength of the item could be considered marginal, although the LAA has received no reports of problems with the original spindle related to strength.

LAA is very concerned about this noseleg issue because the consequences of failure could be a nose-over type accident, with the possibility of the occupants being trapped in the upturned aircraft. Due to the difficulties of obtaining the later type Pipersport legs, we have been pleased that a team from Derby, coordinated by Airspeed Aviation, have designed a replacement spindle assembly. Primarily, this modification has been designed to offer complete 'inspectability' of the component but, to meet the appropriate design codes, the item has been increased in strength substantially. The 'inspectability' objective has been accomplished by making the pin removable; this has the added advantage of removing the need for welding in this area. The Spindle itself has been increased in diameter and is now made from very much tougher material.

Whilst this modification has been designed to solve the SCC issue on one member's aircraft, the team from Derby have always hoped to make this item available as a Standard Modification to other owners; naturally, the introduction of some 'implied' commercial interest here may cause issues with liability. As an organisation, we're lucky that Airspeed Aviation, a company that, incidentally, is owned and managed by long term and very supportive LAA members, has a sufficient stature to be able to, with certain conditions, accept the liability for this component. Also, the originator of the mod has decided that he is prepared to finance the manufacture of the items required whether this be one (for his own use) or any number required by the LAA fleet.

It has been suggested that it would be useful if the drawings and process information could be available to members so that, if they wished, they could manufacture the components themselves. This is not, in this instance, an appropriate option, primarily because the LAA Design Department have agreed, with the Design Engineer from the Derby team, a schedule for testing and quality control during the manufacturing process which couldn't realistically be transferred to the individual home builder. This QC programme is necessarily rigorous due to the nature of the materials used.

Because of the ongoing risk of failure of this spindle due to the unseen hand of Stress Corrosion Cracking, the LAA will shortly be re-issuing LAA/MOD/338/015 requiring a component change. At this moment in time there are three options for the owner.

1. Change the undercarriage completely to the PiperSport noseleg, which is an LAA accepted factory option, listed as such on the LAA TADS.
2. As a cheaper alternative, fit the alternative design of spindle assembly by Airspeed Aviation, when it becomes available, as an LAA accepted Standard Modification. Final acceptance of this mod will however be subject to satisfactory flight testing on the first completed example but due to the nature of the design change it's unlikely that this will cause any problems.
3. Design a replacement spindle assembly and apply, using the LAA prototype Modification Approval Process, for Mod Approval. Clearly due to time constraints LAA Engineering would not wish to have to carry out in-depth evaluations of multiple design solutions to the same problem, but if a different design solution was put forward then we would, of course, consider it.

If you have an aircraft still fitted with the CSAW Spindle assembly then realistically, in order to keep the aircraft in an airworthy state you will need to source a replacement leg from Pipersport or take up Airspeed's design, which will allow a considerable saving in cost.

I do appreciate that the Airspeed modification components appear expensive at first sight but unfortunately this is inevitable for components produced to aerospace standards, especially in a small batch. I know that profit is not a motive for any of the parties involved and that the efforts made on SportCruiser owners' behalf by the Derby team have been considerable. We are hoping that there will be a good take-up of the Derby solution and that as a result they will be able to have the parts made in a reasonable sized batch so that the final cost will be a bit lower than the initial estimate.

In order that we can continue to manage this airworthiness issue and plan ahead for the re-issue of LAA/MOD/338/015 in a manner that will cause minimum inconvenience to owners, may I ask you to email us here at LAA Engineering ([engineering@laa.uk.com](mailto:engineering@laa.uk.com)) letting us know:

1. What type of noseleg assembly is fitted to your aircraft.
2. Your intentions for replacement if CZAW leg fitted (see 3 options above).

Please mark your email: FAO Fiona Storer.

Thank you for your cooperation in this matter.

Yours sincerely,

Malcolm McBride,  
Airworthiness Engineer