

MICROLIGHT AIRWORTHINESS APPROVAL NOTE

MAAN NO: 2013

ISSUE 4

DATE: 26 March 2007

TITLE: Microlight Airworthiness Approval Note 2013, Savannah – Service Bulletin 2013: modification of rear cross-member

Applicability: All Savannah aircraft

STAGE: Authorisation

1. INTRODUCTION

The MXP740 Savannah is an amateur-built microlight aeroplane described in Microlight HADS HM10.

This MAAN authorises the issue a service bulletin which is raised in response to in-service experience of this type. This service bulletin is appended to this MAAN and is mandatory.

The MAAN is raised to issue 4 to approve a permanent modification to address the issue.

2. BASIS FOR APPROVAL

The basis for approval of the Savannah aircraft referred to in this MAAN is BCAR Section S issue 3. This modification complies with paragraphs S303, S305 & S307.

3. DESCRIPTION

An instance of cracking of cross-member SF054 had been found on an in-service aircraft in the UK. This member attaches the rear end of the cockpit control column to the fuselage. Significant cracking was found on the port side at a point coincident with the upper corner of the reinforcing plate (p/n SF272). In addition, the rivets attaching a reinforcement plate were found to have been inserted back-to-front. A second failed example, exhibiting similar characteristics, had also been found. Inspection records show that once a buckle-defect is present, fractures quickly develop.

This service bulletin approves a modification to the cross-member assembly to prevent such damage occurring under predicted operational loads. The modification consists of the addition of a 1.6mm aluminium alloy reinforcement to the upper flange of the cross-member.

4. TECHNICAL INVESTIGATION

Aircraft G-CCLP was found to have significant cracking in p/n SF054 during an annual inspection. The owner reports that since the area had last been inspected some 13 months previously, the aircraft had accumulated only 15 hours. The aircraft had a total of 102 hours since its first flight in January 2004; this is the third owner. The current owner also reports that he has had no hard landings whilst flying the aircraft, although he did have a small (~5mph) flap over-speed on one occasion, but this was at 18° flaps rather than the full 36°. This is not considered a significant event.

The original kit constructor has furnished photographs that show the original installation of this particular part. There appear to be no obvious faults or deformations in the part at that stage of the build.

The Italian manufacturer (ICP Srl) reports that the worldwide fleet consists of over 1,000 aircraft, with the fleet leader accumulating in excess of 2,000 hours. No similar failure has been reported on any other aircraft.

On examining the failed part the following observations are made:

1. The rivets fastening the reinforcement plate SF272 have been installed the wrong way around, which might have put significant stress in the vicinity of the holes that fasten SF272 to SF054.
2. When the reinforcement plate was removed, there was no evidence of poor finishing (burrs, etc) on either part and no interference of SF272 along the length of the upper flange bend line of SF054, except in the region of the crack (which appeared to be due to deformation of the flange following partial failure rather than a pre-existing contact point).
3. Significant quantities of powdered aluminium alloy were observed between the reinforcing plate and cross-member in the region of the damage, and score marks were evident on the port upper corner of the reinforcing plate and the cross-member flange. This would seem to indicate that significant movement had occurred in this region for a number of flight cycles.
4. With the damaged cross-member in-situ, operation of the roll controls with the flaps set to full resulted in vertical deflections of the centre of the member of about 10-20mm. The operation of all the controls remained smooth and free of restrictions. Note that this aircraft type has a 'flaperon' system, whereby flap commands are mixed with aileron commands. The 'flaperons' run the whole length of each wing.
5. Flight loads on the deployed flaperons at non-zero flap settings would result in a vertical downward load being put into the cross-member at the point where the control column torque tube bears on the cross-member.
6. The damage occurs at a point of significant change in beam properties.

A subsequent metallurgical examination of the failed part has not revealed any conclusive evidence. It appears that the part failed in fatigue due to vibrational loads in a fore/aft sense. The mis-installed rivets appear to have had no bearing on the failure. It was not possible to determine the fatigue history/timescales involved.

A second aircraft (G-CDVK) has subsequently been discovered with a fractured cross-member. The following observations were made:

1. Approximately one flying hour was completed between the previous inspection of the part and a kink being discovered on the upper flange of the cross-member.
2. A further one and a half hours were flown on the aircraft and a subsequent inspection revealed a fracture from the upper flange to the top of the second lightening hole from the centre of the beam on the starboard side (the opposite side from the previous example, and further outboard).

The attached Service Bulletin SB BMAA MAAN 2013 issue 4 describes a modification to the cross-member to be implemented before the end of 30 June 2007. In the meantime, the SB permits a continuing inspection regime until such time as the aircraft is modified.

The modification consists of a reinforcement to the upper flange of the cross-member. This acts to stabilise the flange against buckling loads acting on the beam introduced by the aerodynamic action of the flap/aileron loads in the control system. Calculations and subsequent load test results are held on the BMAA file associated with this MAAN, and demonstrate that the modified cross-member is sufficiently strong to withstand the expected in-service loads.

5. FLIGHT TESTING

Not required.

6. MANUALS, PLACARDS AND INFORMATION

All inspections in the maintenance schedule in the operator's manual are to be amended to incorporate the inspection contained within the service bulletin. The service bulletin is to be appended to the operator's manual. Compliance with this service bulletin is to be recorded in the aircraft's airframe logbook, and each inspection recorded.

When the cross-member assembly has been modified, a BMAA inspector authorised in categories B and H is to sign in the aircraft's airframe logbook that major modification 2013 has been installed on the aircraft and that SB 1013 issue 4 has been complied with.

7. NOISE CERTIFICATION

Not affected.

8. RADIO

Any aircraft radio installation is not affected by this note.

9. INSPECTION

To HADS HM10 in its latest version, plus the Service Bulletin issue 4 as appended to this MAAN.

10. WEIGHT AND BALANCE

Weight and balance are not significantly affected.

11. SIGNIFICANT FEATURES AND LIMITATIONS

Not affected.

12. CERTIFICATION

I authorise issue of Service Bulletin SB BMAA MAAN 2013 issue 4, as appended to this MAAN.

I request that the CAA up-issue Mandatory Permit Directive (MPD) 2006-006 to reflect Savannah Service Bulletin 2013 issue 4.

Prepared by:

Authorised by:

J A F Viner
Chief Technical Officer
British Microlight Aircraft Association

J A F Viner
Chief Technical Officer
British Microlight Aircraft Association

Initial Distribution:

CAA Aircraft Projects Dept (Gatwick)
CAA Applications and Certifications Section (Gatwick)
Savannah Post approval File
MAAN File 2013
Sandtoft Ultralight Partnership
Savannah owners (SB only)

BMAA – AIRCRAFT SERVICE BULLETIN

<i>Title: UK Savannah: Inspection of rear cross-member</i>	
<i>Reference: SB BMAA MAAN 2013 issue 4</i>	<i>Applicability: UK Savannah aircraft</i>
<i>Issue date: 26 March 2007</i>	
Mandatory inspections and modification.	
This SB must be actioned BEFORE FURTHER FLIGHT.	

1. Introduction

Why has this Service Bulletin been issued?

This Service Bulletin is issued in response to an instance of cracking of cross-member SF054 being found on an in-service aircraft in the UK.

This Service Bulletin introduces a modification to the aircraft to reinforce the affected area.

This Service Bulletin is effective immediately: inspections of the affected parts may continue until the mandatory modification has been installed, but in any case the modification must be carried out before the end of 30 June 2007.

Issue 4 of this Service Bulletin supersedes all previous issues.

What aircraft are affected?

All UK Savannah aircraft.

What parts are affected?

The cracking occurred on cross-beam p/n SF054 between the upper flange and one of the lightening holes. The modification introduces a reinforcement to the upper flange of the cross-beam. An inspection of the control system torque tube is also required.

What documents are affected?

The aircraft's logbook and maintenance manual.

2. Qualifications

Who may implement this Service Bulletin?

The owner/operator or their employee may implement this service bulletin.

Who may certify that this Service Bulletin has been properly carried out?

The inspection part of this service bulletin does not require an independent check; however, a BMAA inspector independent of the installation work, authorised in categories B and H, must inspect the installation of the modification.

Where must record be made of the Service Bulletin?

Entries must be made in the aircraft's airframe logbook after each inspection and once the modification has been

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installed.

3. What is required to implement this Service Bulletin?

Inspection

Appropriate tools to remove/refit the fuselage cover.
A bright electrical torch.
A magnifying glass.
A mirror, if required, to see rear face of part.

Modification

A straight edge.
A 3.2mm drill.
A 4mm drill.
A set of 4mm clecos/skin pins and pliers.
A deburring tool.

4. How to implement this Service Bulletin

Inspection

1. Before next flight, carefully inspect p/n SF054 for cracking or for dents/defects, as noted in Appendix A to this bulletin. A bright torch and magnifying glass will be required to show up any cracks. A mirror is likely to be required to check the rear face of the cross-member.
2. The part should be inspected on both forward and rear faces and also the upper and lower flanges. Particular attention should be given to the area where the reinforcement plate SF272 is attached, the edges of the lightening holes, the rivet locations, the upper flange and the bend radii. Note that the rivets attaching the reinforcement plate must be installed such that the heads are on the rear face (i.e. the face easiest to see), and the tails are on the thicker reinforcement plate. The photographs in Appendix A show the areas to be inspected.

Note that the rivets attaching the plastic bushes should be installed such that the tails of the rivet are on the metallic side.
3. If any cracking or dents/defects are evident, the part SF054 must be replaced before further flight and the modification installed as described below.
4. This inspection is to be repeated before each flight, with a maximum flight time between each inspection of two flying hours (i.e. each flight segment is limited to two hours, at which point a landing must be made to inspect the cross-member). Amend the maintenance schedule in the operator's manual to incorporate the inspection contained within this service bulletin. Append this service bulletin to the operator's manual.

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5. An entry must be made in the airframe logbook stating that “*BMAA Service Bulletin 2013 (inspection of cross-member) has been carried out*”, along with the name, qualification and signature of the person implementing the service bulletin.
6. The above inspection is cancelled once the modification below has been installed.

Modification

1. Gain access to the cross-member area by removing the rear-fuselage inspection panel.
2. Thoroughly inspect the part SF054 for defects as described above. If any defects are found, the part must be replaced with a new part to be supplied by Sandtoft Ultralight Partnership prior to installing this modification.
3. Inspect the control column torque tube in situ for straightness using a straight edge placed along the length of the torque tube: the sections either side of the crank on which the elevator controls mount must be in alignment. Check in at least two positions at approximately 90° to each other (see figure 1). If the torque tube is found to be out of true (greater than 1mm over the distance of the crank), this must be replaced with a new part to be supplied by Sandtoft Ultralight Partnership.

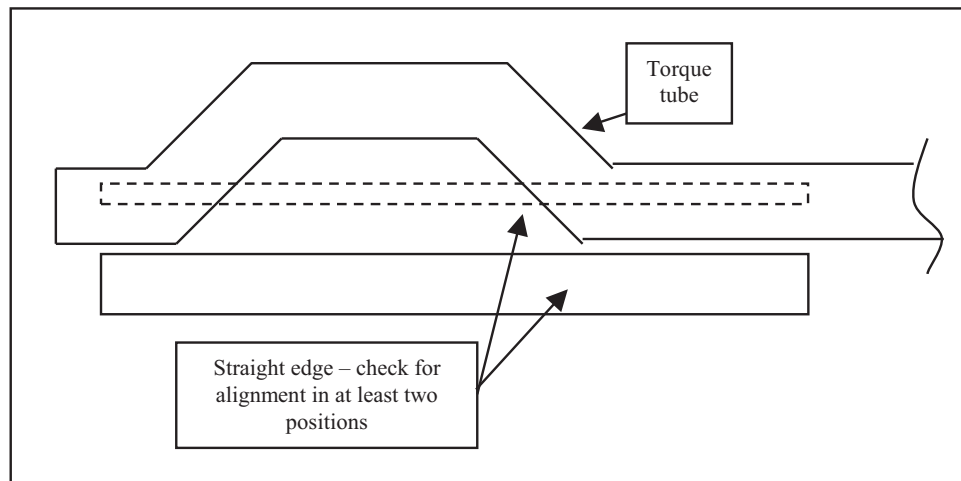


Figure 1

4. Remove the aileron bellcrank by unscrewing the bolt AN3 which joins the bellcrank to the torque tube (“A” in Figure 2). Carefully remove the rivets “B” (10 rivets) with a 3.2 mm drill and enlarge those holes using a 4mm drill. Also remove rivets “C” (4 rivets) with a 3.2mm drill.
5. Ensure the torque tube rotates freely in the nylon bushes: rotation of the torque tube should not cause any

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deflections of the cross-member.



Figure 2

6. Apply a layer of primer on the surfaces that will be in contact with each other on both angle SF024 (new part) and cross-beam SF054.
7. Insert the angle SF024 on the torque tube, fixing it with a pair of clecos on the holes already present on the cross-beam SF054 and re-install rivets “B” and “C” using the rivets supplied with the modification kit. Ensure that the rivets “C” are riveted with the head on the plastic side, using rivets A5 countersunk into the plastic plate to permit a flush head. Copy all other holes of angle SF024 on to the cross-beam (4 mm diameter), deburr then rivet using the A5 rivets supplied. In this phase it will be necessary to remove some parts (for example the battery support), in order to gain access to copy all the necessary holes.
8. Reinstall the aileron bellcrank using bolt AN3-15A, washer AN960-3 and self-locking nut AN365-3. Tighten firmly, ensuring that the tube is not crushed.
9. This assembly is to be inspected for defects annually or at each 150 flying hours, whichever occurs first. Amend the maintenance schedule in the operator’s manual to incorporate this inspection. Append this service bulletin to the operator’s manual.
10. An entry must be made in the airframe logbook stating that “*BMAA Service Bulletin 2013 (modification of cross-member) has been carried out*”, along with the name, qualification and signature of the person implementing the service bulletin and countersigned by an independent BMAA inspector (see Section 2 on

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page 1).

11. The pre-flight inspections detailed above and in previous issues of this SB are cancelled once the modification above has been installed.

The following figures show the installed part SF024:



Figure 3 – View looking forward



Figure 4 – View of port fuselage wall, looking forward

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Figure 5 – View looking at forward face of cross-member with nylon bush reinstalled

5. Changes to operating data

Changes to Weight and Balance

Negligible.

Changes to the Operator's Manual

A copy of this service bulletin must be retained with the Operator's Manual.

Changes to the Maintenance Manual

Amend the maintenance schedule in the operator's manual to incorporate the inspections contained within this service bulletin.

Changes to Placards

None.

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6. Authorisation

This Service Bulletin has been authorised by the BMAA Chief Technical Officer.

Authorised by

J A F Viner
Chief Technical Officer
British Microlight Aircraft Association

Initial Distribution:

- All registered owners of Savannah aircraft
- Mr S Whittaker (Sandoft Ultralight Partnership)
- MAAN file 2013
- CAA: (1) Mr A Love (Aircraft projects, Gatwick)
(2) Mr R Bedwell (Regional office, Gatwick)

1. List of Appendices to this Service Bulletin

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Appendix A – How to inspect the cross-beam

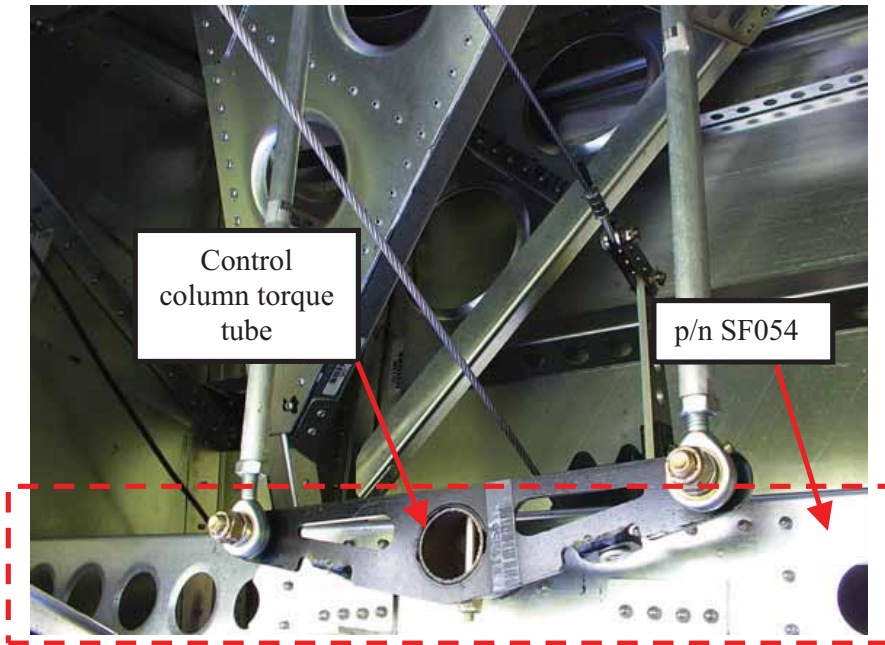


Figure 6: General location

The area to inspect is accessed through the panel in the lower rear fuselage section, just aft of the cockpit. The pecked box in the above photograph highlights the cross-member SF054.

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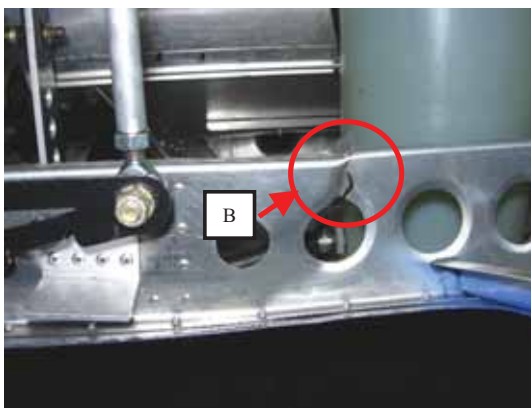
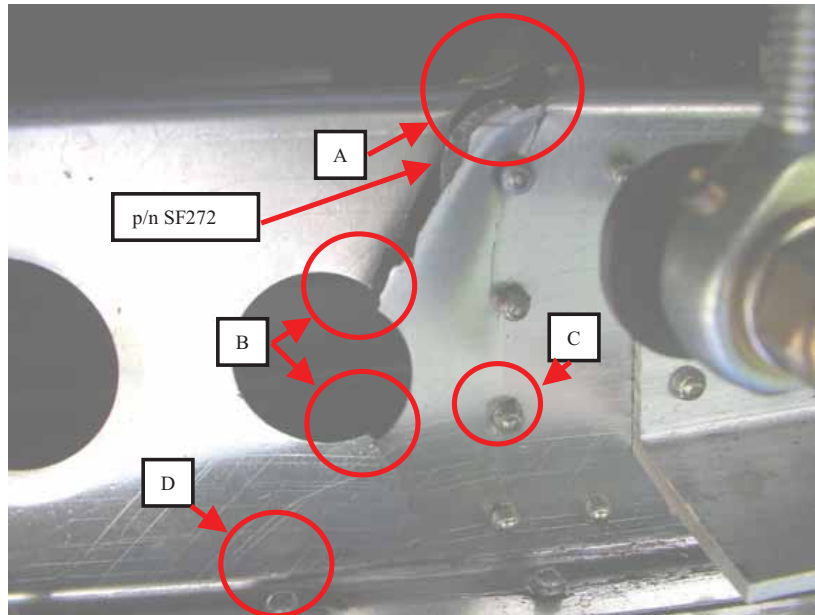


Figure 7: Areas to check

The following areas should be checked (note that the whole beam should be checked, not just in the region of the lightening holes):

A: The top flange. Check for any bends, buckling or cracks. The flange should be flat all the way across. Check for cracks on the inside (forward face) of the bend radius.

B: The lightening holes. Check for cracks anywhere around the edge of each hole (note that all holes should be checked on each side of the aircraft).

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C: The rivets. Check for cracks emanating from the rivet holes, particularly where the reinforcement plate SF272 attaches. Check that the heads of the rivets are on the aft face (this illustration shows the tail incorrectly positioned on the aft face).

D: The bottom flange: Check for any cracks in the inside bend radius. Check for any cracks emanating from rivet holes.

Appendix B – Contact Details

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