BRITISH MICROLIGHT AIRCRAFT ASSOCIATION SERVICE BULLETIN

Reference: BMAA Service Bulletin 2624 issue 1
Title: Savannah Pitch Control and Trim Systems Configuration
Applicability: All UK Savannah MXP-740 aircraft (except G-CCII, S/N BMAA/HB/285)
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Classification: Essential Service Bulletin

1 Introduction

It has been discovered that not all UK Savannah aircraft have their pitch control (elevator) and trim systems configured correctly. This Service Bulletin is issued so that owners can ensure that their aircraft are configured correctly. An incorrectly configured aircraft can result in handling deficiencies and/or failure of the trim system, as well as invalidating the Permit to Fly.

Read and understand the entirety of this Service Bulletin - including the Appendices - before proceeding.

2 Compliance

Compliance of the pitch control and trim systems configuration with this Service Bulletin must be confirmed by a BMAA Inspector with categories B and H, and recorded in the airframe logbook, ***no later than the first Permit to Fly revalidation inspection on or after 1 April 2018***. An inspection checklist is provided in Appendix 3, which must be forwarded to the BMAA Technical Office when complete. It may be scanned and emailed with the Permit revalidation application.

Note: if the pitch control or trim systems are discovered to be incorrectly configured, this must be rectified ***before further flight*** (unless otherwise authorised - in writing - by the BMAA Technical Office). Following rectification work, compliance with this Service Bulletin must be confirmed by a BMAA Inspector as described in the previous paragraph ***before further flight***.

In accordance with normal BMAA procedure, maintenance of these systems - which is considered to include minor adjustments to the pitch trim system (for trim speed range tuning purposes) - does not require the oversight of a BMAA Inspector. (It does, however, require a second inspection - see Appendix 1.)

3 Elevator setup

The elevator deflections are limited by stops at the rear of the aircraft:

- The elevator 'down' stop is provided by an angle bracket riveted to the fuselage beneath the elevator. See figure 3.1.
- The elevator 'up' stop is provided by a cut-out in the base of the fin. See figure 3.2.

Figure 3.1 - elevator 'down' stop

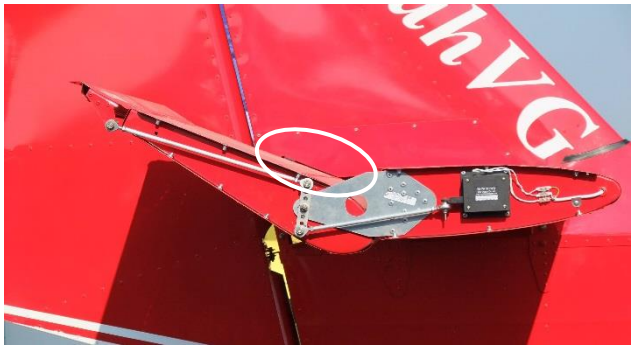

Figure 3.2 - elevator 'up' stop

Some aircraft have been found where the pitch control cables have been adjusted so that elevator travel is limited by the control mechanism at the front of the aircraft, and the elevator cannot reach its proper stops. This is incorrect and should be able to be resolved by adjustment of the pitch control cables that run the length of the fuselage.

Note: on the ground, the elevator must sit on the 'down' stop, and it must easily reach the 'up' stop using the control stick.

4 Elevator deflections

The elevator deflections are shown in table 4.1. Because the deflections are set by stops 'built-in' to the rear of the aircraft, the deflections are not adjustable. If the deflections are incorrect it indicates that there is a problem with how the aircraft has been assembled, which must be investigated, not ignored.

Elevator up (stick back)	30° ±2°
Elevator down (stick forward)	23° ±2°

Table 4.1 - elevator deflections from neutral (elevator in line with the tail-plane)

There are 2 methods of measuring the deflections:

1. With a protractor, measure the angle between the centrelines of the tail-plane and elevator with the elevator in the fully up and fully down positions. This method can only be satisfactorily used with the tip fairings removed from both the elevator and tail-plane.
2. With an inclinometer attached to the elevator, measure the difference in elevator inclination between the neutral position (elevator in line with the tail-plane) and the elevator fully up and fully down positions. This method does not need the tip fairings removed. A smartphone - running a suitable app - temporarily attached to the elevator can be used as an inclinometer.

Note: in method 2, make sure that the aircraft does not change its attitude between measurements - for example, due to a person climbing into the aircraft to manipulate the stick, or when manipulating the elevator directly.

5 Savannah electric trim system

The Savannah trim system has 2 purposes:

1. To act as an anti-balance, or anti-servo, tab to increase stick forces, which are otherwise very light. This is achieved by the movement of the trim tab relative to the elevator as the elevator is moved using the control stick.
2. To act as a conventional adjustable trim tab to allow the aircraft to be trimmed at different speeds. This is achieved by the movement of the trim tab relative to the elevator as the electric trim is operated.

6 Trim tab horn

Early UK Savannah aircraft were originally fitted with a bungee trim system. This system is no longer approved, and all UK Savannah aircraft (except for G-CCII that has its own, individually approved, trim system) must now be fitted with the electric trim system. Reference: UK CAA MPD 2010-007.

The electric trim system uses a larger trim tab horn than the original bungee trim system. It is essential that only this large horn is used with the electric trim system. If the original, smaller horn is used with the electric trim system, the trim tab moves too much, which strains, and can break, the trim tab control system. Figure 6.1 shows the trim tab going 'over-centre' as the elevator approaches its maximum upward travel.

Figure 6.1 - incorrect (small) horn from obsolete bungee trim system

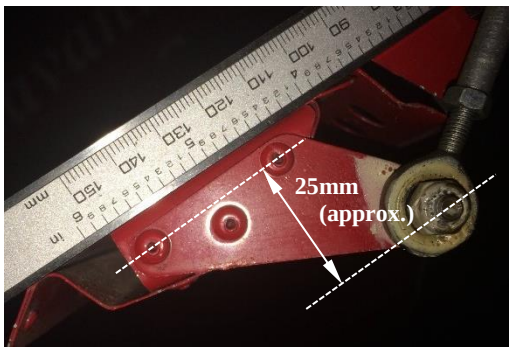

Figure 6.2 - correct (large) horn for use with electric trim system

7 Trim tab set up

Setting up the trim tab system on a new build aircraft is described in detail in Appendix 2. On an existing aircraft the trim system should be set up similarly to this. The tail-plane and elevator tip fairings need to be removed to gain proper access to the trim system.

Note that:

- A standard set up - as shown in figure 7.1 - has the length of rod A chosen so that crank D is at right angles to the centreline of the fixed horizontal tail when the trim tab servo C is in its mid position. Although the precise length of rod A is not critical, it should be possible to position crank D at right angles to the centreline of the fixed horizontal tail (as shown in the figure) for some trim tab servo position, even if this is not the mid trim tab servo position. If rod A is so short - or so long - that this is not possible, it is likely that rod A is of an inappropriate length.
- The aircraft shown in figure 7.1 has the trim tab in the default neutral position: aligned with the elevator when the elevator is in line with the tail plane with the trim tab servo C in its mid position. This aircraft can be trimmed on approach (full flap) with full nose-up trim set. On other aircraft it might be necessary to bias the neutral trim position somewhat to achieve this.

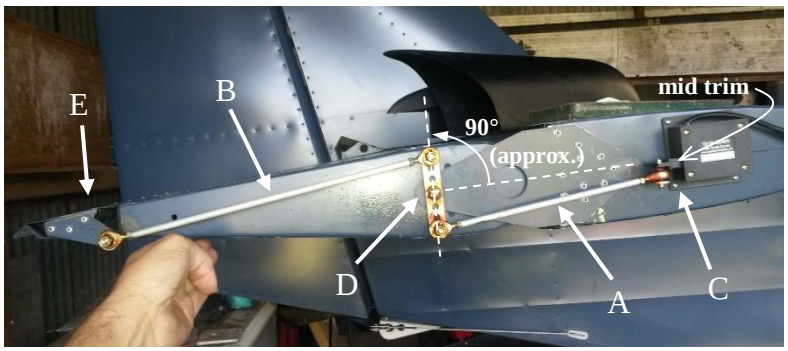

Figure 7.1: standard trim-system set-up

8 Extreme trim tab deflections

If the trim system is set up incorrectly, it can damage - or destroy - itself at the extremes of its deflection.

Extreme trim tab deflections are checked as follows:

1. With full nose-up trim set (trim tab biased down), and full forward stick (elevator down), confirm that there is positive clearance between the trim tab and elevator. See figure 8.1.
2. With full nose-down trim set (trim tab biased up), and full back stick (elevator up), confirm that the trim tab is in no danger of going 'over-centre'. See figure 8.2.

Also ensure that there is no conflict between any part of the trim system and tail-plane and elevator tip fairings.

Figure 8.1: positive clearance between trim tab and elevator

Figure 8.2: trim tab in no danger of going 'over-centre' (compare with fig 6.1**)**

Note: The technical content of this document is approved by the BMAA, UK CAA organisation approval ref. DAI/8909/84.

Appendix 1 - Important Notes

Control cable tension. The pitch control cables should be tensioned so that there is negligible free play in the system. Check by clamping the elevator and trying to move the stick fore and aft. Although the control cables must not be slack, they do not need to be under unduly high tension, and indeed cannot maintain high tension without relaxing over time.

Second (independent) inspection. If a primary control system is disturbed it ***must*** be inspected by an independent, competent person - i.e. who did not do the work - before flight. This second inspection is in addition to the inspection by the person who has done the work. Record the work and both inspections in the airframe logbook.

Synchronising the trim tabs. It is possible for the two trim tabs to get out of sync' over time. To synchronise, drive the trim to one extreme (until both servos stop whirring), and then the other extreme (until both servos stop whirring again). This should be performed before every flight as well as before inspecting / maintaining the trim system.

Maintenance Check Flight. After working on the pitch control or trim systems a Maintenance Check Flight is required. Maintenance Check Flights - including important safety information - are described in the BMAA Check Flying Handbook, available on the BMAA website. Check flying points specific to this Service Bulletin are:

- Adjustment of the elevator control system might mean that the stick is in a different position (for a given airspeed); make sure that you fly the aircraft at the correct airspeeds, not 'by feel' using the previous - now incorrect - stick positions.
- Adjustment of the trim system will change the trim speed for a given trim setting, and might subtly change stick forces in flight; again, make sure that you fly the aircraft at the correct airspeeds, not 'by feel'.
- When tuning the trim system to achieve a satisfactory trim speed range, make only small changes between flights. After every change check that the extreme trim tab deflections are satisfactory as described in Section 8. Record each change in the airframe logbook before the check flight.

Appendix 2 - Trim tab set up

Basic instructions for setting up the trim tab are contained in the Build Manual and reproduced in figure A2.2. Note that, despite what the instructions say, either rod A or rod B can be used to change the neutral position of the trim tab, while both rod A and rod B have to be adjusted to alter the 'throw' of the anti-balance tab (without changing the neutral position). In practice it is normally unnecessary to alter the 'throw' of the anti-balance tab. Assuming rod A is about the correct length, rod B is actually best used for small adjustments to the neutral position (to fine-tune the trim speed range).

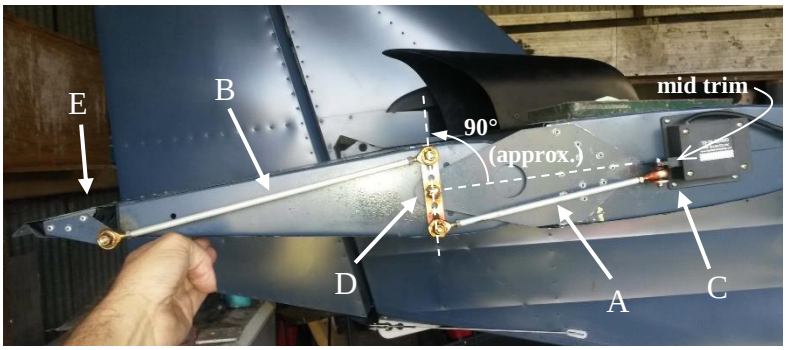

Figure A2.1: default trim-system set-up (mid trim)

It is recommended that the trim tabs are set up similarly to that in figure A2.1.:

- The length of rod A should be chosen so that crank D is approximately perpendicular (at right angles to) the horizontal tail-plane (fixed surface) when the trim tab servo C is in its mid position (middle LED lit on the trim indicator).
- The length of rod B should be chosen so that the trim speed range of the aircraft is satisfactory: the aircraft can be trimmed at the approach speed (flaps down), and at a fast cruise. Start with the default neutral position shown in figure A2.1 (trim tab servo C in its mid position) and then adjust in small increments, and only as much as necessary, to achieve a satisfactory trim speed range.
- Ensure the trim systems on both sides of the aircraft are set up the same and operate symmetrically, and ensure the extreme trim tab deflections are satisfactory (as described in Section 8 above).

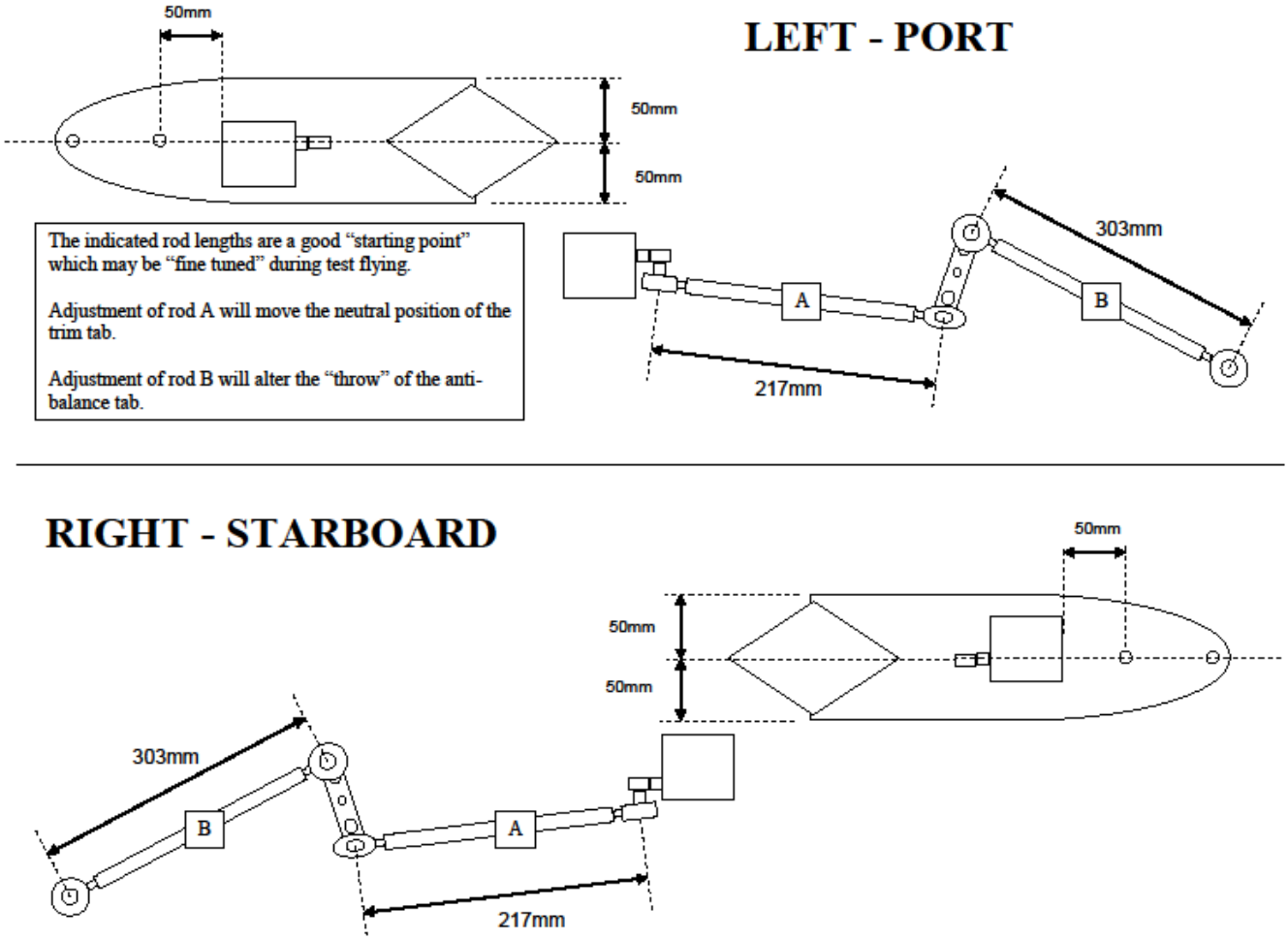

Figure A2.2: trim tab set up (Build Manual extract)
Use with reference to additional guidance in this Appendix and Sections 7 and 8

Appendix 3 - Inspection Schedule

Aircraft registration: G -

Aircraft owner:

Item	Description	Initials BMAA Inspector
1	Confirm that correct 'large' horns installed on trim tab end ribs. Refer to Figures 6.1 and 6.2. Ensure that trim tab horns, trim tab end ribs, and trim tab are all in satisfactory condition and securely riveted together.	
2	Confirm that pitch control system set up as per Sections 3 and 4, ensuring that elevator deflections limited by stops at tail (not by control system parts coming into contact at front of aircraft). On ground, elevator must sit on 'down' stop, and easily reach 'up' stop using control stick.	
3	Confirm that elevator control cables correctly tensioned as described in Appendix 1.	
4	Ensure that complete elevator control system - from stick rearward to elevator - operates 'full and free' (without parts binding or cables rubbing).	
5	Measure elevator deflections from neutral as described in Section 3: Up: _____ ° Down: _____ ° The deflections were measured using a **protractor / inclinometer** (delete as applicable).	
6	Confirm that trim tab systems set up as per Section 7, and set up symmetrically.	
7	Ensure that servos and remainder of trim tab activation systems in satisfactory condition and secure. Check plastic servo actuating arms for any signs of damage or distress.	
8	Confirm extreme trim tab deflections satisfactory as per Section 8.	
9	With tail-plane and elevator tip fairings in place, ensure that no parts of trim tab systems come into contact with fairings (through full elevator and trim ranges).	

Signed: Date: BMAA Inspector #:

Name:

Comments: