

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Savannah VG Jabiru(1), G-SAVY	
<b>No &amp; Type of Engines:</b>	1 Jabiru 2200A piston engine	
<b>Year of Manufacture:</b>	2009 (Serial no: BMAA/HB/499)	
<b>Date &amp; Time (UTC):</b>	8 May 2016 at 1154 hrs	
<b>Location:</b>	2 nm southwest of Mablethorpe, Lincolnshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Elevator trim tab servo arm fractured	
<b>Commander's Licence:</b>	National Private Pilot's Licence	
<b>Commander's Age:</b>	64 years	
<b>Commander's Flying Experience:</b>	345 hours (of which 141 were on type) Last 90 days - 6 hours Last 28 days - 6 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

**Synopsis**

Shortly after the aircraft entered cruising flight the trim servo actuator arm of the left elevator anti-balance trim tab fractured, resulting in severe vibration of the aircraft's pitch control circuit. The pilot carried out a successful precautionary landing in a field. Examination of the aircraft showed that excessive up elevator deflection had caused bending loads to be applied to the trim servo actuator arm, leading to its structural failure.

**History of the flight**

The pilot was flying the aircraft from North Coates Airfield in Lincolnshire to Otherton Airfield in Staffordshire. Following a normal departure from North Coates, the aircraft was cruising at 95 mph at 2,000 ft amsl when the pilot felt "a loud thump" from the rear of the aircraft. He reported that the control column was immediately "ripped" from his right hand and continued to shake violently in pitch. The pilot managed to regain hold of the control column and he reduced airspeed to 60 mph, after which the elevator vibration abruptly reduced.

The pilot retained full control in roll, yaw and over the engine but was concerned about pitch control, so he decided to make an immediate precautionary landing in a field 2 nm southwest of Mablethorpe, Lincolnshire. Following the precautionary landing, which was completed successfully, the pilot inspected the aircraft and discovered that the actuator arm of the electric trim servo, which was connected to the left elevator anti-balance tab, had fractured leaving the tab free to rotate, which had caused the severe elevator vibration.

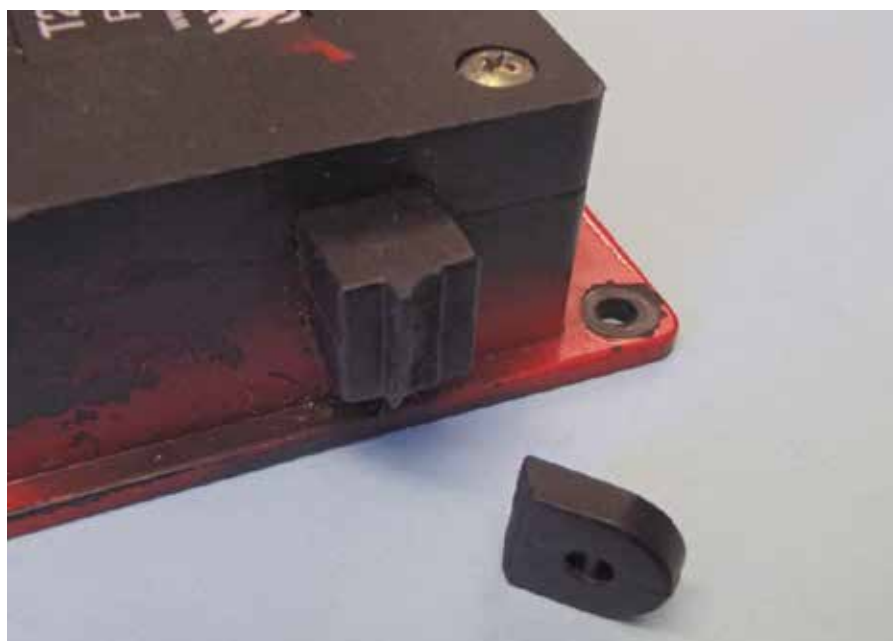
## Elevator trim system

The Savannah VG pitch trim system consists of two anti-balance trim tabs, one fitted to the trailing edge of each elevator. Each tab is separately moved for trim by an electric trim servo mounted on the tailplane tip rib, via a system of pushrods and a lever. As the elevator rotates, the anti-balance tab gearing provides an increase in elevator forces. The neutral position of the anti-balance tab is adjusted via the trim servo to provide pitch trim. Figure 1 shows the left elevator anti-balance tab and trim system, following the precautionary landing, with the elevator tip fairing removed for clarity. The electric trim actuator arm, manufactured from a toughened thermoplastic material, had fractured in downward bending overload and there was no evidence of fatigue or progressive failure (Figure 2).



**Figure 1**

Fractured elevator anti-balance trim tab servo arm



**Figure 2**

Bending failure of the trim tab servo arm

The pilot reported that this was the second such failure of a trim servo actuator arm on the aircraft, following fracture of the right elevator trim servo arm in 2015. The BMAA had no records of any similar trim actuator arm failures on other UK-registered Savannah aircraft.

### **Examination of the aircraft**

The aircraft was examined by a member of the BMAA Technical Office<sup>1</sup>. The range of elevator deflection was found to exceed the allowable limits for the aircraft. When the elevator was fully up, the anti-balance tab gearing could cause the tab deflection to go over-centre, producing a bending load in the servo trim actuator arm. This tendency was exacerbated with additional nose-down trim input from the trim servo. The pilot stated that it was his normal practice after landing to hold the nose of the aircraft up for aerodynamic braking, by using full up elevator. This could have induced bending loads on the servo actuator arm.

### **Safety action**

The BMAA is currently surveying other UK-registered Savannah aircraft to determine whether any other examples exhibit the excessive elevator deflections found on G-SAVY, and will notify UK owners of their findings.

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### **Footnote**

<sup>1</sup> G-SAVY is a BMAA amateur-built aircraft and the BMAA is responsible for its continued airworthiness

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