

SERIOUS INCIDENT

Aircraft Type and Registration:	Aeroprakt A22L Foxbat, G-CGWP	
No & Type of Engines:	1 Rotax 912 ULS piston engine	
Year of Manufacture:	2011	
Date & Time (UTC):	10 January 2012 at 1510 hrs	
Location:	Enstone Airfield, Oxfordshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to rudder anti-balance tab, rudder and elevator	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	58 years	
Commander's Flying Experience:	329 hours (of which 60 were on type) Last 90 days - 35 hours Last 28 days - 8 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

Shortly after departure the aircraft started to “shudder violently”. The pilot reduced power and the shuddering stopped, but then the rudder jammed and subsequently the elevator also jammed. The pilot was able to make a safe landing using ailerons to steer the aircraft and engine power to control the descent rate. The aircraft shuddering had been caused by a rudder ‘flutter’ event and the rudder and elevator jammed when the lower hinge of the rudder anti-balance tab separated causing the tab to move aft. The exact cause of the rudder ‘flutter’ and the hinge separation could not be determined. However, the aircraft type was briefly grounded following this incident and two modifications have been developed by the Light Aircraft Association to prevent a recurrence.

History of the flight

After completing the pre-flight checks, including a freeplay check of the rudder anti-balance tab, the pilot departed from Runway 26 at Enstone. About 4 minutes after departure, while approaching 2,000 feet, the aircraft started to “shudder violently”. The pilot thought he had an engine problem so he reduced power and the shuddering stopped, but then he realised that the rudder was jammed and the aircraft was yawing to the right. As the pilot applied pressure to the left rudder pedal he heard a bang and the rudder moved to a neutral position and then jammed again. He then discovered that the elevator was also jammed. Using ailerons to steer the aircraft, and engine power to control the descent rate, he turned back towards Enstone and declared a PAN. He established

the aircraft on a long final to Runway 26 and decided to keep the flaps up to avoid any pitch changes. Shortly before touchdown he applied a burst of power to raise the nose and the aircraft touched down normally on its main wheels. After touchdown the nosewheel, which is linked to the rudder, could not be controlled so the aircraft ran off to the left of the runway and onto the grass where it came to rest.



Figure 1

Aeroprakt A22L Foxbat of the same configuration and colour as G-CGWP
(photograph courtesy Graham Wiley)

Aircraft description

The Aeroprakt A22L Foxbat is a kit-built three-axis microlight aircraft (Figure 1) operated under a Permit to Fly. When the aircraft type was first flight tested in the UK for a Permit to Fly it was discovered that the rudder did not return to a neutral position after deflection. To solve this problem a rudder anti-balance tab was fitted which provides a centring force when deflected. This tab is attached to the trailing edge of the rudder with a spring hinge that is loaded to deflect the tab to the right. A cable attached

between the airframe and the lower leading edge of the tab provides an opposing force to the spring. When the rudder is neutral the tab is neutral; when the rudder is deflected left the tab is deflected left and the cable is placed under increasing tension; and when the rudder is deflected right the tab is deflected right under spring tension while the cable slackens (Figure 2).



Figure 2

Rudder of a similar Foxbat A22L;
full left rudder deflection and full left anti-balance tab deflection (left image);
full right rudder deflection and full right anti-balance tab deflection (right image)

Aircraft examination

G-CGWP was examined by an engineer from the Light Aircraft Association (LAA). The anti-balance tab was found to have separated from the rudder at the lower hinge (Figure 3), allowing the tab to move aft and damage the elevator. The damage to the elevator was consistent with it having been caused by the control horn which had bent downwards (Figure 4). The control horn cable was also found to have failed. The single screw and nut which had attached the lower tab hinge was missing. The top two hinge screws were found to be loose and there was evidence of rubbing on the tab leading edge. The tab was free to move and the spring hinge was working, although there was a clicking noise during rotation, indicating some extra resistance at one point in the tab's range of movement.

The LAA engineer was not able to determine the initiating cause of failure but theorised that if the lower hinge screw had failed or separated first, then that would explain the aft movement of the tab and the rudder flutter due to a reduction of spring force from the spring hinge. The rudder movement would then have stopped once the control horn jammed inside the elevator skin, thus also causing the elevator to jam. The cyclic loads that overloaded the pitch horn probably also caused a fatigue failure of the cable. Alternatively, the lower hinge screw could have failed or separated due to a 'flutter' event caused by some other factor. The evidence of rubbing on the leading edge of the tab could indicate an over-close fitment when the aircraft was manufactured, or it could have been a result of the loose hinges found.

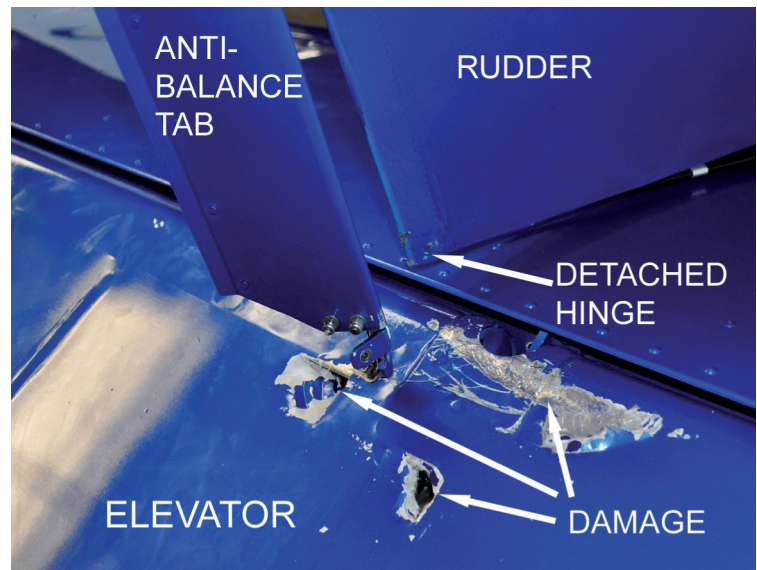


Figure 3

Damaged elevator and separated anti-balance tab hinge on G-CGWP

(photograph courtesy Light Aircraft Association)

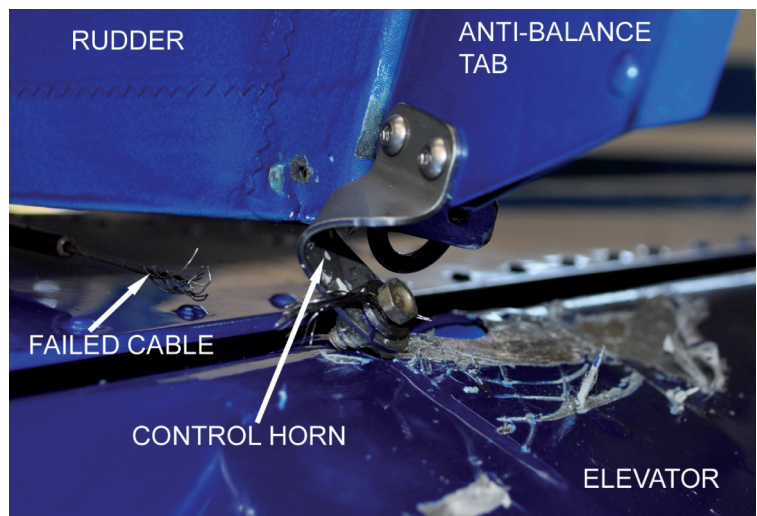


Figure 4

Bent control horn and failed cable on G-CGWP

(photograph courtesy Light Aircraft Association)

Previous similar incident

A previous similar rudder 'flutter' event occurred on a Foxbat A22L (registration G-CEWR) on 5 November 2011, also reported in this bulletin (Bulletin 7/2012). In this incident the 'flutter' was caused by seizure of the anti-balance tab spring

hinge. In response to this incident the LAA published Airworthiness Information Leaflet (AIL) entitled '*Aeroprakt A22L Foxbat, Pre-Flight Functioning Checks of Rudder Anti-Balance Tab*' (MOD/317/002 dated 22/11/2011). The AIL required that prior to further flight and during every pre-flight inspection a check of the range and freedom of movement of the rudder anti-balance tab was carried out. It stated that this could be accomplished by pressing down on the tailplane (to take the weight off the nosewheel) and moving the rudder fully left and right, while checking that spring pressure was maintained. The pilot of G-CGWP stated that he was aware of the AIL and had carried out this check prior to the incident flight.

Safety action

Due to the similar nature of the G-CGWP and G-CEWR incidents and the serious risk of control jams when a rudder 'flutter' event occurs the LAA decided to ground the UK fleet of Foxbat A22L aircraft with

the publication of the AIL entitled '*Aeroprakt A22L Foxbat, Concerns about Rudder Flutter, Temporary Grounding*' (MOD/317/003 dated 16/01/2012). This AIL affected all Foxbat A22L aircraft fitted with a rudder anti-balance tab, which was a modification fitted to all but one UK-registered aircraft.

On 13 March 2012 the LAA published Airworthiness Alert '*Aeroprakt A22L Foxbat, Modification Approval for changes to Rudder Anti-Balance Tab*' (AWA/12/02) which detailed two modification options, and installing either one would remove the flight restriction. The first modification replaces the tab cable with a pushrod and adds doublers to the tab hinge attachment (LAA Modification Approval 13310). The second modification removes the anti-balance tab and replaces it with a rudder centring spring to provide the necessary centring force that was provided by the tab (LAA Modification Approval 13311).