SERIOUS INCIDENT

Aircraft Type and Registration:	Aeroprakt A22L Foxbat, G-CEWR
No & Type of Engines:	1 Rotax 912 ULS piston engine
Year of Manufacture:	2008
Date & Time (UTC):	5 November 2011 at 1300 hrs
Location:	Otherton Airfield, Staffordshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to elevator and rudder anti-balance tab control horn
Commander's Licence:	Private Pilot's Licence
Commander's Age:	53 years
Commander's Flying Experience:	713 hours (of which 497 were on type) Last 90 days - 11 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

Shortly after takeoff the pilot experienced "severe vibration" which lasted for about 30 seconds after which the rudder jammed in the neutral position. The pilot was able to maintain control of the aircraft and landed back on the departure runway. The vibration had been caused by a rudder 'flutter' event which was caused by the seizure of the rudder anti-balance tab's spring hinge. Two modifications have been developed by the Light Aircraft Association to prevent a recurrence.

History of the flight

After a normal pre-flight inspection the pilot departed from Runway 34 at Otherton. At a height of about 200 feet and an airspeed of 60 kt the pilot experienced "severe vibration". He immediately banked left to follow the circuit pattern to make an emergency landing. The vibration stopped after about 30 seconds and then he noticed that the rudder had jammed in the neutral position. He maintained control of the aircraft with aileron and elevator and landed safely on Runway 34.

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

provided 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 1

G-CEWR prior to the accident
(photograph courtesy Graham Wiley)

Aircraft examination

G-CEWR was examined by an engineer from the Light Aircraft Association (LAA). He discovered that the control horn, which connects the cable to the tab, had bent downwards and had impinged on the elevator, leading to damage to the elevator's upper surface and restricting movement of the rudder (Figure 3). He also discovered that the anti-balance tab's spring hinge had seized, which meant that there was no spring return force and therefore the tab could flap freely from left to right. After the spring hinge was cleaned and lubricated the spring force returned and the tab operated correctly during rudder movement. The control horn was then

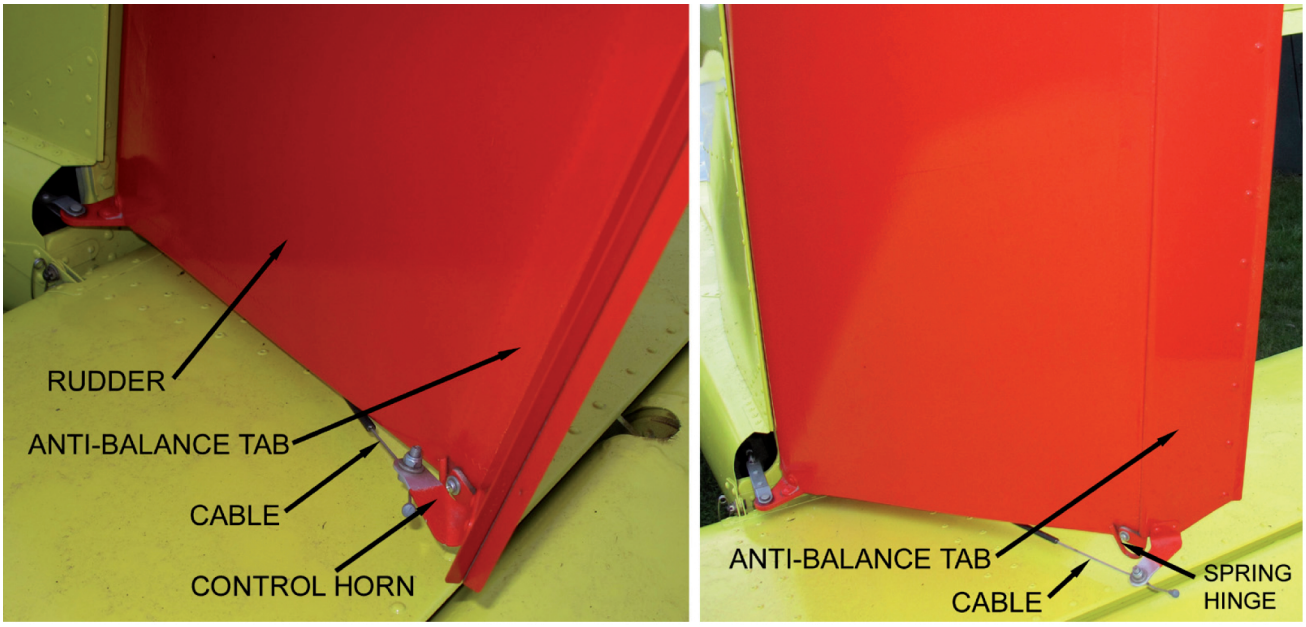

Figure 2

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)

replaced and the bolt securing the cable was orientated 'head down' (as in Figure 2) which is how the bolt should have been attached to provide maximum clearance. The aircraft was then test-flown and the rudder anti-balance system worked normally.

Safety action

The LAA concluded that the vibration experienced by the pilot had been a type of rudder 'flutter' event which was caused by the seizure of the anti-balance tab's spring hinge. This allowed the tab to flap freely from left to right and set up a resonant frequency. The consequent high loads at the control horn caused it to bend downwards, jamming the rudder against the elevator.

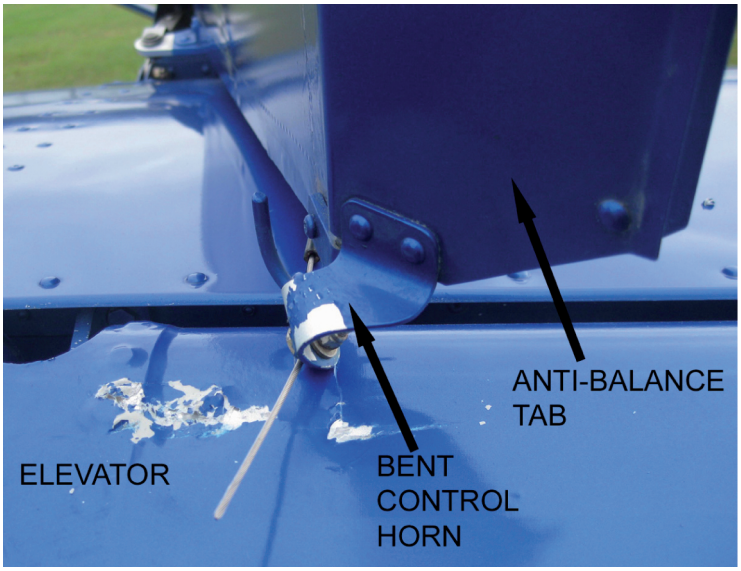

Figure 3

Bent control horn and damaged elevator on G-CEWR
(photograph courtesy Light Aircraft Association)

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.

However, on 10 January 2012, despite these checks having been completed, another similar incident of rudder 'flutter' occurred to a Foxbat A22L (registration G-CGWP) which resulted in the anti-balance tab detaching at the lower hinge and causing the elevator to jam in flight. Full details on this serious incident are published in this bulletin (Bulletin 7/2012). As a result of this incident the LAA published an AIL entitled '*Aeroprakt A22L Foxbat, Concerns about Rudder Flutter, Temporary Grounding*' (MOD/317/003 dated 16/01/2012) which grounded the aircraft type until a modification could be developed. 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).