



Air Accident Investigation Unit Ireland

FACTUAL REPORT

SERIOUS INCIDENT

**Bellanca Decathlon, 8KCAB, EI-BIV
Cork Airport Controlled Traffic Region
29 October 2017**



**An Roinn Iompair
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport**

Foreword

This safety investigation is exclusively of a technical nature and the Final Report reflects the determination of the AAIU regarding the circumstances of this occurrence and its probable causes.

In accordance with the provisions of Annex 13¹ to the Convention on International Civil Aviation, Regulation (EU) No 996/2010² and Statutory Instrument No. 460 of 2009³, safety investigations are in no case concerned with apportioning blame or liability. They are independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. The sole objective of this safety investigation and Final Report is the prevention of accidents and incidents.

Accordingly, it is inappropriate that AAIU Reports should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

Extracts from this Report may be published providing that the source is acknowledged, the material is accurately reproduced and that it is not used in a derogatory or misleading context.

¹ **Annex 13:** International Civil Aviation Organization (ICAO), Annex 13, Aircraft Accident and Incident Investigation.

² **Regulation (EU) No 996/2010** of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.

³ **Statutory Instrument (SI) No. 460 of 2009:** Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulations 2009.



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In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No 996/2010 and the provisions of SI No. 460 of 2009, the Chief Inspector of Air Accidents on 29 October 2017, appointed Paul Farrell as the Investigator-in-Charge to carry out an Investigation into this Serious Incident and prepare a Report.

Aircraft Type and Registration:	Bellanca Decathlon, 8KCAB, EI-BIV	
No. and Type of Engines:	1 x Lycoming AEIO-360-H1A	
Aircraft Serial Number:	464-79	
Year of Manufacture:	1978	
Date and Time (UTC)⁴:	29 October 2017 at 11.42 hrs	
Location:	Cork Airport (EICK) Air Traffic Control Zone	
Type of Operation:	Pilot training	
Persons on Board:	Crew - 2	Passengers - Nil
Injuries:	Crew - Nil	Passengers - Nil
Nature of Damage:	Nil	
Commander's Licence:	Commercial Pilot Licence (CPL), issued by the Irish Aviation Authority (IAA)	
Commander's Age:	59 years	
Commander's Flying Experience:	10,965 hours, of which 200 were on type	
Notification Source:	Duty Air Traffic Control Officer (DATCO), EICK	
Information Source:	DATCO, EICK AAIU Report Form submitted by the Pilot AAIU Field Investigation	

⁴ **UTC:** Co-ordinated Universal Time. All timings in this report are quoted in UTC; Local time is UTC which was the same as local time on the date of the accident.

SYNOPSIS

During a training flight for the purposes of demonstrating upset recovery techniques, the Pilot was demonstrating recovery from near inverted flight. On rolling the aircraft to recover to an upright attitude, the Pilot could not neutralise the ailerons. The ailerons were stuck with respective deflections of 10-15 degrees (starboard up, port down), with the aircraft rolled to the right. The Pilot managed his aircraft's energy and attitude and safely landed the aircraft with the ailerons still restricted. On shutdown, the restriction cleared. Subsequent examination identified a loose bolt within the wing structure which was the likely cause of the restriction.

NOTIFICATION

The DATCO at EICK contacted the AAIU Inspector-On-Call (IOC) to advise of the event, while the aircraft was still airborne. Subsequently, following landing, the Pilot contacted the AAIU IOC by phone to provide his account of the event. The Pilot later completed and submitted an AAIU Report Form.

1. FACTUAL INFORMATION

1.1 History of the Flight

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The aircraft was conducting an upset recovery training flight from EICK. The Pilot was instructing another pilot by demonstrating some aerobatic manoeuvres and stall recovery. The Pilot then undertook a demonstration of recovering an aircraft from a near-inverted flight attitude.

The Pilot said that he entered a roll to the left which he paused at approximately 170°. He then rolled the aircraft to the right to recover to a normal attitude. The Pilot reported to the Investigation that when he reached the wings level position (the point at which he would normally neutralise the ailerons), he found he could not stop the aircraft rolling right. He said that with considerable force applied to the left, it was apparent to him that the ailerons were jammed, and that both were deflected by 10-15 degrees, starboard up, port down.

The Pilot said that he checked and found nothing obvious was impeding control movement at either pilot seat position. He declared a Mayday on the EICK Approach frequency. He said that the controller was very professional, provided all the assistance she could, and also allowed him to stay on the same frequency throughout the emergency.

The Pilot said that straight and level flight at around 85 miles per hour (mph) Indicated Airspeed (IAS) was possible with a significant left rudder input.

The Pilot said that he considered using positive and negative 'G' manoeuvres in the hope of disturbing whatever was impeding his aileron movement. However, the Pilot said that as the second pilot aboard the aircraft was unwell and he (the Pilot) could not be sure that his actions might not make his situation worse, he opted to accept the situation as was, and continue his flight with the restriction in place.



The Pilot said that he flew with the aircraft yawed to the left with approx 15 deg bank to the right. After some experimentation with power and speeds the Pilot was satisfied that he could control the aircraft's direction using a combination of rudder and speed (*“go faster turn right, go slower turn left”*). Accordingly, he decided to attempt an approach to the in-use runway, (RWY) 35, at EICK.

The Pilot said that he was anxious to land as soon as possible because he felt that prolonged flight with slip could manifest a problem with the engine fuel feed. The Pilot said that he was satisfied with the approach except for a slight crosswind from the left. On landing, the right wheel touched first and the Pilot said that it was immediately obvious to him that the only safe option was to go-around.

The Pilot said that during the go-around he realised that ideally a runway with a *“strong”* crosswind from the right was required. The Pilot reasoned that such a runway would need right aileron and left rudder on touchdown which was the way he was being forced to fly the aircraft. With clearance from ATC, he positioned for finals and landed *“relatively normally”* on RWY 25. The control restriction remained in place during the taxi-in but it disappeared on shut-down. The aircraft was then secured and quarantined pending inspection by the AAIU.

1.2 Aircraft Inspection

The Investigation subsequently attended the quarantined aircraft to oversee a technical examination of the aircraft which was being conducted by the Maintenance Organisation (MO) responsible for maintaining the aircraft.

Following a detailed description of the scenario from the Pilot, an initial inspection of the aircraft was conducted. This revealed that there was no restriction then present in any control movements.

No obvious signs of damage were noted from an external viewing of the aircraft. Removal of panels was effected to allow inspection of the control runs beneath the aircraft floor, but no abnormalities were noted. Inspection was then focused on the aileron operating mechanisms within the fabric covered wings.

During inspection of the starboard wing, two areas of primer damage were observed on the aileron bell-crank mechanism (**Photo No. 1**). The larger of these (ringed in green) was dull in colour and consistent with normal wear and tear from contact with the control stop (ringed in orange).

The smaller area (ringed in red) was bright in appearance and did not correspond to any normally-expected wear and tear. Tapping on the adjacent fabric wing surface revealed the presence of a large bolt. Positioning the bolt within the aileron bell-crank mechanism (**Photo No. 2**) showed that, with the bolt contacting the bright area of primer damage, it could produce a restriction of the aileron control consistent with that reported by the Pilot.

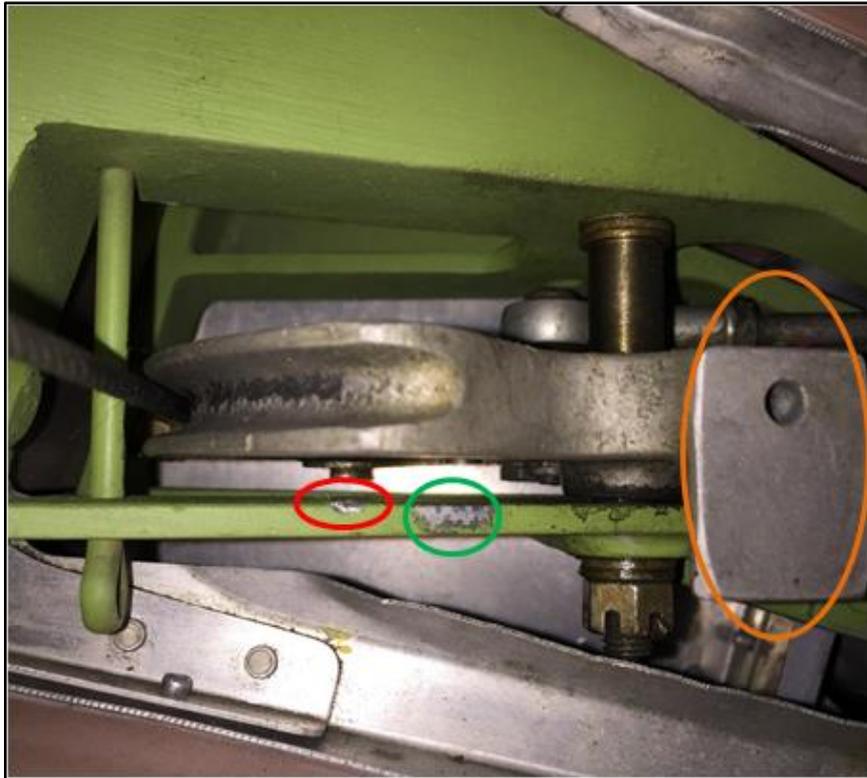


Photo No. 1: Starboard aileron bell-crank mechanism (*The Pilot*)

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Photo No. 2: Bolt positioned within aileron bell-crank mechanism (*The Pilot*)



1.2.1 The Bolt

Measurement of the bolt identified it as an 'AN7-17A'. Examination of the aircraft Illustrated Parts Catalogue showed that only two 'AN7-17A' bolts were fitted on the aircraft; these bolts attach the wing front spars to the fuselage at the forward wing root area. Inspection of the aircraft showed that both bolts were in their correct positions.

The bolt was neither a serial numbered nor a batch numbered item and accordingly it was not possible to definitively determine its provenance. Maintenance records showed that the aircraft wings had been removed three times (by two different organisations) since 2012, most recently in 2015. It was noted that there is a sill/channel with a high vertical face in the fuselage area adjacent to the forward wing root. If during one of the wing removal operations a bolt had been left behind in this sill it could, over time, have migrated via the wing root area and opening in the trailing edge wing root, to the area of the outboard aileron bell-crank mechanism. The exact circumstances by which the bolt could then become entangled within the aileron bell-crank would then be a matter of chance and circumstance i.e. the bolt could have been in the area for some time without causing any adverse effects, but the aircraft attitudes on this particular flight allowed it to cause the restriction which the Pilot experienced.

Although the bolt may have been in the wing (and migrating) for some time, the fabric surface of the wing would have made it less likely to be detected aurally, particularly since sounds of its movement would have been masked by ambient aircraft noise (engine, airflow, etc.).

2. AAIU COMMENT

This was a serious incident which was handled well by the experienced Pilot, and facilitated by ATC. The circumstances serve to highlight the importance of thorough maintenance practices; loose article checks prior to closing up an area; and part and tool control discipline.

- END -

In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010, and Statutory Instrument No. 460 of 2009, Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulation, 2009, the sole purpose of this investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

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