Air Accident Investigation Unit Ireland

FACTUAL REPORT

SERIOUS INCIDENT
Bolkow, Bo208, D-EKMY
Carntown, Co. Louth

17 June 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 13[1] to the Convention on International Civil Aviation, Regulation (EU) No 996/2010[2] and Statutory Instrument No. 460 of 2009[3], 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.

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[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, Jürgen Whyte, on 17 June 2017, appointed himself as the Investigator-in-Charge, assisted by Kate Fitzgerald to carry out an Investigation into this Serious Incident and prepare a Report.

Aircraft Type and Registration:	**Bolkow, Bo 208, D-EKMY**
No. and Type of Engines:	**1 x Continental O-200-A**
Aircraft Serial Number:	**514**
Year of Manufacture:	**1963**
Date and Time (UTC)[4]:	**17 June 2017 @ 06.55 hrs**
Location:	**Carntown, Co. Louth**
Type of Operation:	**General Aviation**
Persons on Board:	**Crew - 1 Passengers - Nil**
Injuries:	**Crew - Nil**
Nature of Damage:	**Substantial**
Commander's Licence:	**Private Pilot Licence (PPL) Aeroplane (A), issued by the UK CAA[5]**
Commander's Age:	**44 years**
Commander's Flying Experience:	**484 hours, of which 44 were on type**
Notification Source:	**Airfield Operator**
Information Source:	**Airfield Operator AAIU Report Form submitted by the Pilot**

[4] **UTC**: Co-ordinated Universal Time. All timings in this report are quoted in UTC; to obtain the local time add one hour.
[5] **CAA** Civil Aviation authority

SYNOPSIS

The Bolkow Bo 208 aircraft departed from Navan Airfield (EIHH) at 06.35 hrs with the Pilot's intention to fly to Biggin Hill, UK (EGKB). A short time after take-off the aircraft canopy opened in flight. The Pilot, who was the sole occupant, carried out a forced landing in a nearby field. The aircraft canopy shattered and the aircraft sustained damage to the tailplane. The Pilot was uninjured.

NOTIFICATION

The AAIU was notified of the occurrence by the operator of EIHH.

1. FACTUAL INFORMATION

1.1 History of the Flight

The aircraft departed Runway (Rwy) 27, EIHH at 06.35 hrs with the Pilot's stated intention to fly to EGKB. After take-off the aircraft climbed to 2,000 feet (ft) and proceeded east towards the Irish Sea. A short time later the aircraft forward canopy opened unexpectedly. The canopy was held briefly by a restraining cable and initially opened by approximately 25 millimetres (mm). The fastener at the end of the cable broke shortly afterwards, allowing the forward canopy to fully open and hit the rear canopy located behind the Pilot's head. The canopy Perspex shattered.

At the time of the occurrence, the aircraft was travelling at 110 Knots (Kts). The open canopy caused the aircraft to pitch upwards. The aircraft inverted and began to lose altitude. The Pilot recovered the situation by using full left aileron. The Pilot informed the Investigation that the open canopy changed the flight characteristics of the aircraft and that he had to maintain full engine power in short bursts. This kept the aircraft above stall speed whilst protecting the engine from a significant overspeed. The Pilot began to experience breathing difficulties because of the force of the air flow and he elected to land as soon as possible. He identified a suitable field, and carried out a successful forced landing.

1.2 Field Investigation

Two Inspectors from the AAIU travelled to the scene of the occurrence where they inspected the aircraft and interviewed the Pilot.

1.3 Landing Site

The landing site was an agricultural field at Carntown, Co. Louth. The field was approximately 340 metres (m) long and approximately 170 m wide. The site had a gentle slope and at the time of the occurrence was covered in long grass. The Pilot landed perpendicular to the slope. **Photo No. 1** shows the final position of the aircraft.

Photo No. 1: D-EKMY Final Position

1.4 Licensing and Certification

The aircraft was a German registered Bolkow Bo 208, a two seat, light aircraft, manufactured in 1963 under license from Malmö Flygindustri, a Swedish aircraft manufacturer. The aircraft's Certificate of Airworthiness (CofA) was issued on the 4 August 2016 by an LBA[6] registered organisation and was due for renewal on 20 August 2017.

The Pilot held a PPL(A) issued by the UK Civil Aviation Authority (CAA) which was valid until 31 July 2018, and a Class 2 Medical Certificate issued by an Aero-Medical Examiner approved by the Irish Aviation Authority (IAA) which was valid until 11 March 2018.

1.5 Aircraft Damage

The aircraft forward and rear canopies were shattered and the aircraft suffered damage to the tailplane. **Photo No. 2, 3 and 4** shows the extent of the canopy damage.

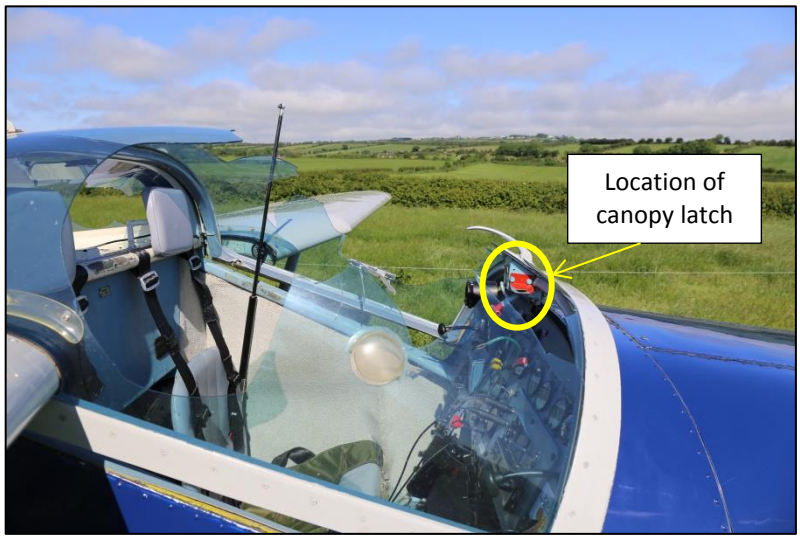

Photo No. 2: Forward Canopy Damage in Closed Position

[6] **LBA:** Luftfahrt-Bundesamt, the aviation regulator of Germany

Photo No. 3: Forward Canopy Damage in Open Position

Photo No. 4: Rear Canopy Damage

1.6 Subsequent Inspection of the Canopy and Canopy Latch

Subsequent to the recovery of the aircraft, two Inspectors of Air Accidents carried out a detailed examination of the canopy latch and the canopy, both of which had been removed from the aircraft. The canopy latch showed some signs of wear but the mechanism appeared to be operational.

The procedure for closing and locking the canopy of D-EKMY involved several steps. Firstly the canopy, which was hinged at the rear, was closed forward and down, and aligned with two dowel pins, one at either side of the canopy. The canopy was then locked into position by pulling down a red lever in the centre of the canopy (**Photo No. 5**). This hooked the canopy latch under a bracket installed above the cockpit instrument panel. The Pilot then pressed down a small spade-shaped tab, designed to lock the canopy latch into position and prevent re-opening. Locking of the mechanism was confirmed by a *'click'* noise.

The canopy could also be opened and closed from outside the aircraft using a handle mounted on the canopy. Opening of the canopy is assisted by a spring loaded strut installed on the inside of the canopy.

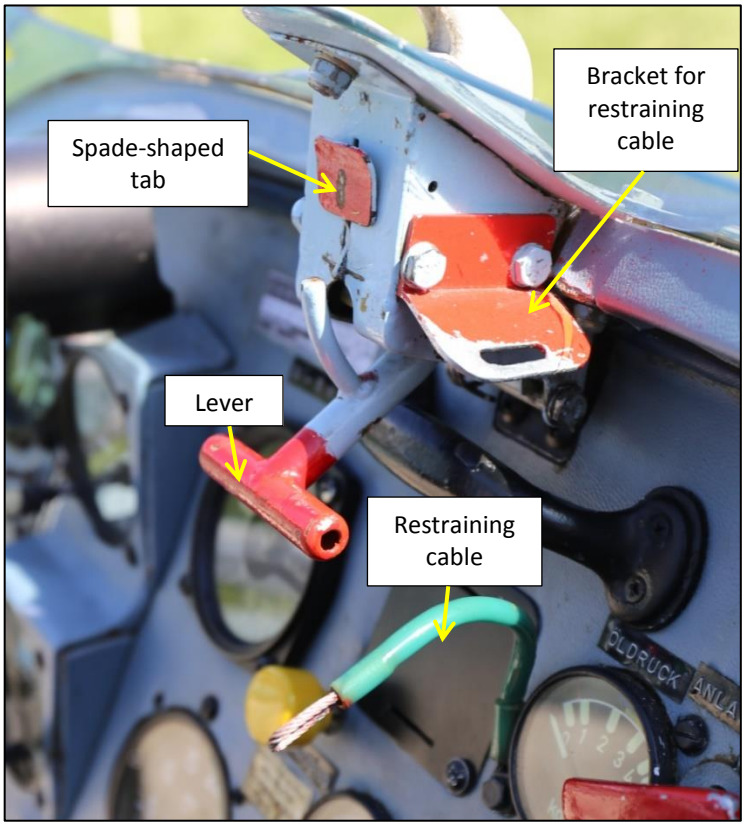

Photo No. 5: Canopy Latch

1.7 Restraining Cable

In this aircraft a bracket had been attached to the right side of the latch mechanism (**Photo No. 5**). Once the canopy was locked into position a cable which was affixed to the aircraft firewall was hooked through the bracket, preventing the canopy from opening by more than 25 mm. The Pilot stated that it was his belief that the cable was a safety cable to prevent the canopy opening fully and noted that the fastener at the end of the cable may have been inadequate for that purpose. The Pilot also informed the Investigation that the restraining cable held for approximately 30 seconds and that this time allowed him to '*make a judgement and plan a return to airfield*'.

The Investigation contacted the type certificate holder for this aircraft and obtained an original drawing of the canopy latch. The bracket and cable do not appear in the original design, nor are they the subject of any subsequent Service Bulletins or Airworthiness Directives. Therefore, it is likely that the bracket and cable were added as an unapproved modification at a later date. The Pilot informed the Investigation that the restraining cable and bracket were installed on the aircraft when he purchased it.

Aircraft which are operated on a CofA can be modified. However, the modifications are subject to a European Aviation Safety Agency (EASA) design approval process known as 'Part 21[7]'. This process ensures that the modification is properly tested and integrated into the aircraft configuration. The design and manufacture of such modifications can only be carried out by EASA Part 21 approved organisations. A check of the historical records for the aircraft did not reveal any evidence that a Part 21 process relating to this modification had been undertaken.

[7] **Part 21:** Regulation (EU) 748/2012, Initial Airworthiness

1.8 Maintenance

The maintenance manual for the Aircraft recommended a functional check and lubrication of the latch mechanism every 100 flight hours as part of a series of 100 hours inspections. Maintenance records indicate that the 100 hours inspection was last carried out in August 2016 by an EASA approved maintenance organisation.

1.9 History of Canopy Incidents

The Investigation received anecdotal information that the Bolkow Bo208 canopy was susceptible to sudden in-flight opening and that many owners had modified their canopies in an attempt to prevent the canopy from fully opening in flight. The Investigation is aware that there are still a significant number of Bolkow Bo208 aircraft in use. For example, both Germany and the UK have Bolkow Bo208 fleets with 45 and 17 aircraft registered respectively. A review of the occurrence databases of the UK, Ireland and Germany revealed five instances (including this occurrence) of inadvertent canopy opening in a Bolkow Bo208; however, the canopy latch design was not the same in all cases.

2. AAIU COMMENT

In June 2017, there were two occurrences in Ireland of cockpit canopies opening unexpectedly during flight, including the subject occurrence. These types of incidents can result in the loss of an aircraft due to the '*startle effect*'[8] on the pilot and subsequent control difficulties. In both of the June 2017 cases the pilots were able to perform successful forced landings in what were likely extremely challenging scenarios.

In this occurrence the aircraft was fitted with a restraining cable. It was an unapproved modification to the aircraft and had not been engineered to withstand the combined forces caused by the airflow on the open canopy and the canopy strut. Although in this case the restraining cable did not contribute to the initial canopy opening, unapproved modifications can introduce unknown risks to an aircraft as their design and manufacture have not been through the rigorous approvals process which is required for aircraft components.

This occurrence serves to remind General Aviation Pilots of the importance of canopy locking mechanisms. They should be of robust design and maintained in good condition. If there is any doubt, a pilot should seek a second opinion from an approved maintenance organisation. In addition, a '*canopy locked check*' should be carried out prior to every flight.

3. SAFETY RECOMMENDATIONS

This Investigation does not sustain any safety recommendations.

- END -

[8] **Startle Effect** is defined as an uncontrollable, automatic reflex, raised heart rate, blood pressure etc., that is elicited by exposure to a sudden, intense event that violates a pilot's expectations (April 2015, FAA circular 120-111, '*Upset Prevention and Recovery Training*', Federal Aviation Administration).

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

AAIU Reports are available on the Unit website at www.aaiu.ie

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