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AAIB Special Bulletins and Interim Reports

This section contains Special Bulletins and Interim Reports that have been published since the last AAIB monthly bulletin.



# AAIB Bulletin S3/2014

## *SPECIAL*

### ACCIDENT

<b>Aircraft Type and Registration:</b>	Agusta AW139, G-LBAL	
<b>No &amp; Type of Engines:</b>	2 x Pratt and Whitney Canada PT6C-67C turboshaft engines	
<b>Year of Manufacture:</b>	2012 (Serial no: 31421)	
<b>Location:</b>	Near Gillingham Hall, Norfolk	
<b>Date &amp; Time (UTC):</b>	13 March 2014 at 1926 hrs	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 2	Passengers - 2
<b>Injuries:</b>	Crew - 2 (Fatal)	Passengers - 2 (Fatal)
<b>Nature of Damage:</b>	Aircraft destroyed	
<b>Commander's Licence:</b>	Commercial Pilot's Licence	
<b>Commander's Age:</b>	36 years	
<b>Commander's Flying Experience:</b>	Approx 2,320 hours (of which approx 580 were on type) Last 90 days - approx 105 hours Last 24 hours - 4 hours	
<b>Information Source:</b>	AAIB Field Investigation	

### The investigation

The Air Accidents Investigation Branch was notified of the accident at 2002 hrs on Thursday 13 March 2014. This Special Bulletin is published to provide details of the initial facts surrounding the accident; it includes information gathered from eye witnesses, from the cockpit voice and flight data recorders, and from a video recording of the helicopter's departure. The investigation is ongoing and a final report will be published in due course.

This Special Bulletin contains facts which have been determined up to the time of issue. It is published to inform the aviation industry and the public of the general circumstances of accidents and serious incidents and should be regarded as tentative and subject to alteration or correction if additional evidence becomes available.

## History of the flight

The helicopter was scheduled to depart Gillingham Hall for Coventry Airport at 1830 hrs but the passengers were not ready to depart until around 1920 hrs. By this time, night had fallen and dense fog had developed; witnesses described visibility in the order of tens of metres.

The co-pilot escorted the passengers to the helicopter and assisted them aboard, while the commander started the engines. The helicopter lifted into a hover at 1924 hrs, and then hover-taxed to the middle of the paddock in which the helipad was sited. The commander, who was the pilot flying, briefed that he would climb vertically from the hover before setting course.

The helicopter climbed, initially with very little ground speed. At a height of approximately 32 ft, the helicopter started transitioning, picking up forward speed as it continued to climb. The radio altitude peaked at 125 ft agl as the ground speed increased through 60 kt. The helicopter thereafter pitched progressively nose-down, entering a descent as it did so, reaching 35° nose-down one second before the end of the data recording. The final complete frame of recorded data analysed to date<sup>1</sup> showed a pitch attitude of 25° nose-down, a radio altitude of 82 ft agl and a ground speed of 90 kt. The recorded rate of descent was 2,400 ft/min and increasing.

In the final few seconds of the flight the co-pilot made two verbal prompts regarding pitch attitude to the commander. Simultaneously, the recorded data shows that full collective was applied.

The recorded data includes parameters relating to cautions, warnings and faults. None were active during the accident flight with the exception of the last data points when full collective had been applied and a gearbox torque-related caution was triggered. The data showed that trim release switches on the cyclic and collective controls, on which force must be applied against springs to achieve manual flight, were active throughout the flight.

The comprehensive recorded data set is subject to on-going analysis.

### *Initial engineering examination*

The helicopter struck the ground in a gently rising field immediately ahead of a row of rolled hay bales approximately 420 m from the take off point. There was no evidence that the helicopter had made contact with any other object prior to this point.

The first ground marks, made by the lower nose structure of the helicopter and the nose wheels, indicated that the landing gear was DOWN and that the helicopter had struck the ground level in roll and approximately 25° of nose-down pitch. It then passed through the hay bales into a ploughed section of the field. Ground markings confirmed that all of the main rotor blades had made contact with the ground shortly after the start of the

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### Footnote

<sup>1</sup> Future work may enable further data, recorded after the end of this frame, to be recovered.

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impact sequence. The distribution of wreckage indicated that, immediately after the main rotor blades struck the ground, the helicopter became airborne again and rotated clockwise about the main rotor head before striking the ground 45 m beyond the first ground mark. The helicopter came to rest upright 63 m from the initial impact point.

The helicopter suffered significant disruption to the fuselage which resulted in the failure of all the major structural elements of the cockpit and passenger cabin. The right fuel tank was intact, but the left tank was found to be leaking. Initial examination confirmed that both engines had been operating during the impact sequence and that the rotor head could turn freely. Impact damage had resulted in the failure of the tail rotor drive shaft at the base of the fin but witness marks confirmed that the drive shaft had been rotating during the impact sequence. The tail rotor drive shaft was also found to rotate freely when the main rotor head was turned. Information provided by the manufacturer showed that Emergency Airworthiness Directive 2014-0073-E, '*Inspection / Replacement of lower half scissor bearing*', published by EASA on 20 March 2014, was not applicable to G-LBAL.

The remains of the helicopter were recovered to the AAIB's headquarters, where they will be the subject of detailed examination.

## **Analysis**

AAIB investigation to date has not identified any technical malfunction which might account for the accident. The investigation continues, with the aim of identifying any technical matters of relevance, as well as focussing on flight in degraded visual environments.

*Published 3 April 2014*

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**AAIB Field Investigation reports**



**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Cessna T303 Crusader, N289CW	
<b>No &amp; Type of Engines:</b>	2 Continental Motors Corp IO-520-AE piston engines	
<b>Year of Manufacture:</b>	1982 (Serial no: T30300032)	
<b>Date &amp; Time (UTC):</b>	4 September 2013 at 0913 hrs	
<b>Location:</b>	Approximately 5 nm from Jersey Airport, Channel Islands	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - 1 (Fatal)	Passengers - 1 (Fatal)
<b>Nature of Damage:</b>	Aircraft destroyed	
<b>Commander's Licence:</b>	FAA Private Pilot's Licence	
<b>Commander's Age:</b>	56	
<b>Commander's Flying Experience:</b>	524 hours (of which 319 were on type) <sup>1</sup> Last 90 days - Not known Last 28 days - Not known	
<b>Information Source:</b>	AAIB Field Investigation	

**Synopsis**

The aircraft was on a VFR flight from Dinan, France, to Jersey, Channel Islands and had joined the circuit on right base for Runway 09 at Jersey Airport. The aircraft turned onto the runway heading and was slightly left of the runway centreline. It commenced a descent and a left turn, with the descent continuing to 100 ft. The pilot made a short radio transmission during the turn and then the aircraft's altitude increased rapidly to 600 ft before it descended and disappeared from the radar. The aircraft probably stalled in the final pull-up manoeuvre, leading to loss of control and impact with the sea, fatally injuring those on board.

**History of the flight**

The pilot had asked a Jersey based maintenance organisation to facilitate a repair of N289CW's autopilot. The pilot and his passenger intended to fly N289CW to Jersey and onward to France for a short holiday, after which they were to return to Jersey for the maintenance to be carried out.

They departed East Midlands Airport on 30 August 2013 and flew to Jersey Airport. The aircraft was refuelled to full tanks and flown to La Rochelle later that afternoon. The pilot and passenger then spent some time in La Rochelle before flying N289CW to Dinan Airport

**Footnote**

<sup>1</sup> The pilot's log book was not found and the flying hours shown are from a recent Certificate of Insurance.

on 2 September 2013. The pilot and passenger stayed in the local area before departing for Jersey Airport early on 4 September 2013.

The aircraft was first identified on Jersey radar at 0846 hrs, whilst over northern France and at a corrected altitude<sup>2</sup> of 2,600 ft. The following narrative is a description of events derived from radar and radio transmissions. At 0907 hrs, Jersey Approach gave the aircraft a radar control service as it entered controlled airspace and referenced information Quebec. The pilot was cleared to enter the Jersey control zone at an altitude not above 2,000 ft in order to remain clear of Class A airspace above that altitude. It is not known what navigation aids the pilot was using for the flight. At 0909:37 hrs the pilot was asked to report when visual and his response included a need to descend due to clouds. At 0909:52 hrs he was handed over to the Jersey tower frequency. The aircraft descended to between 1,300 ft and 1,500 ft as it tracked towards Runway 09 and the groundspeed was calculated at approximately 150 kt during that time. At 3 nm from the extended centreline, the aircraft commenced a descent to 1,100 ft before making a right turn onto final approach.

The aircraft passed through the extended centreline of Runway 09 at 0911 hrs at an altitude of 600 ft and continued to descend to 100 ft. At this point the aircraft was about 4 nm from the runway threshold and slightly left of the centreline. The aircraft then commenced a left turn during which the pilot transmitted to Jersey tower "ERM SORRY MAAM CAN YOU GIVE ME THE FREQUEN ... SORRY I'VE DONE ... COMPLETELY GONE WRONG WAY ROUND THERE JUST EH ... ONE MOMENT." The aircraft continued in the turn at 100 ft and the groundspeed decayed from 150 kt to 100 kt. After turning through 180°, the aircraft entered a rapid climb to 600 ft at a minimum rate of climb of 4,000 fpm. It then descended, at a similar rate of 4,000 fpm, to below the coverage of the radar.

Subsequently, floating debris was found on the sea and it was confirmed this was from N289CW and that the pilot and passenger had suffered fatal injuries.

### **Pilot's Information Manual**

The aircraft's weight was estimated at 4,642 lbs with a forward CG which according to the Pilot's Information Manual gave corresponding stall speeds of 55 kt with FULL flap set, 57 kt with 10° of flap and 63 kt with flaps UP.

The manual also states that:

*'Altitude loss during a conventional stall recovery may be 650 ft.'*

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### **Footnote**

<sup>2</sup> The corrected altitude was calculated from the transponder derived Mode C altitude, corrected for the aerodrome QNH of 1021 hPa.

## Weather

On the morning of the accident, Jersey Airport had been experiencing fog. This had later cleared at the airport but was extensive over the surrounding sea area and was estimated to be from the surface to a height of 500 ft. The pilot of a Trislander aircraft, which was on an IFR transit from Guernsey to Jersey at 2,000 ft, had been VMC on top of the fog with a clearly defined horizon and could see the runway and Island of Jersey. He reported that the Island was surrounded by fog with some still obscuring the most northern parts of the island. The Trislander had descended to 1,500 ft and carried out an ILS approach to Runway 09 at Jersey, and the pilot reported that the runway was clearly visible throughout the approach and landing.

It is not known what weather information the pilot of N289CW accessed prior to the flight, but the Airfield Terminal Information System (ATIS) was available and provided the following information:

*'Information Quebec at 0850 hrs, runway in use 09, surface wind variable at 03 kt, visibility 6km, fog in the vicinity, no significant weather, temperature 19, dew point 16, QNH 1021 hPa, QFE 1011 hPa, no significant change.'*

A CCTV video recording, from a camera located at a commercial property and pointing south-west, was of moderate quality but showed fog over the sea in the proximity of the runway threshold.

A lifeboat crewmember who attended the scene shortly after the accident noted that there was fog down to the surface approaching the area of the accident and near the floating wreckage.

## Aerodrome information

Jersey Airport has a single runway orientated 09/27. It is located on the western side of the Island of Jersey with the threshold for Runway 09 located 0.7 nm from the coast to the west. The runway is 1,706 m long by 46 m wide and has an asphalt/concrete surface. The Landing Distance Available (LDA) for Runway 09 is 1,645 m and the threshold elevation is 270 ft. Runway lighting comprises a High Intensity Approach Lighting System (HIALS), Runway End Identification Lighting (REIL), Runway Edge Lighting (REL) and Centreline Lighting (CL) with Precision Approach Path Indicators (PAPIs) set to an approach angle of 3°.

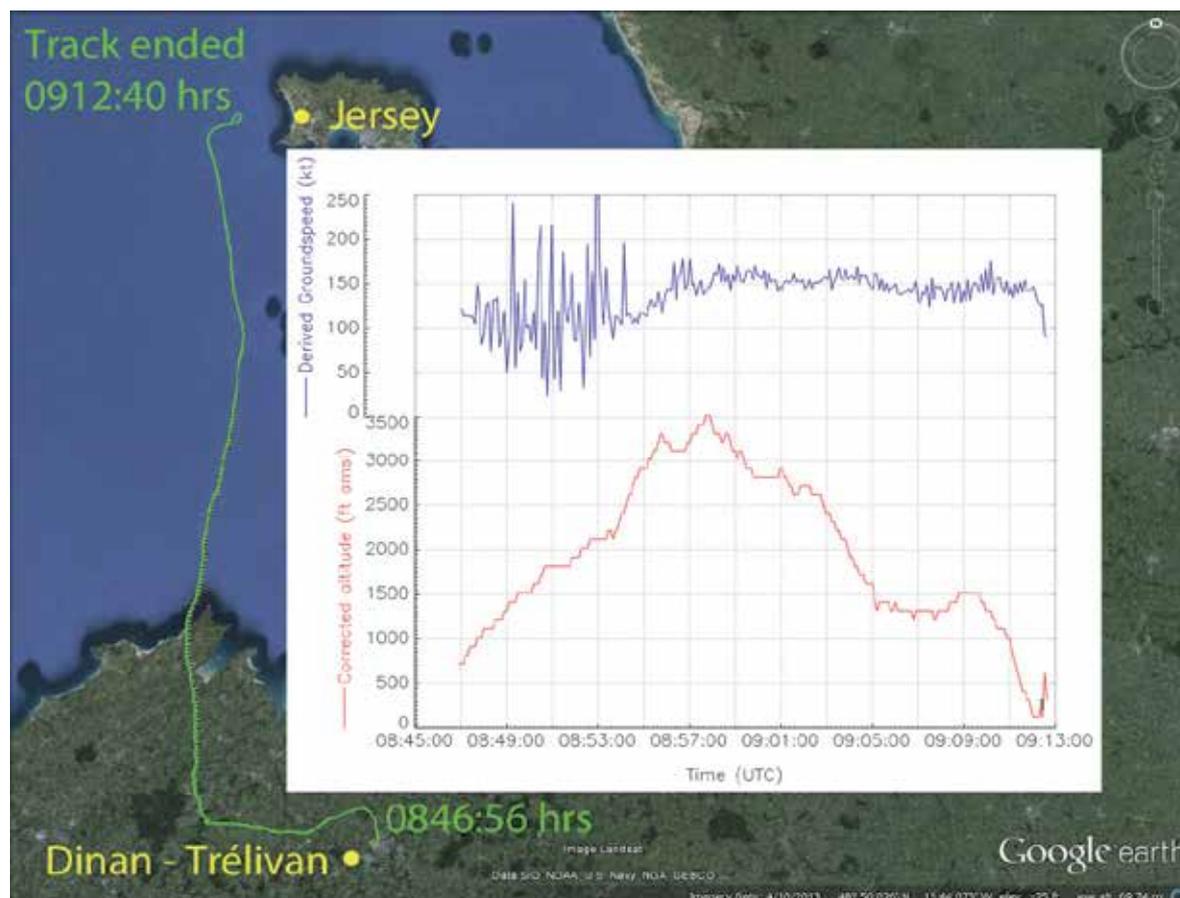
Radio communication is available on Zone, Approach, Tower and Ground frequencies with an Airfield Terminal Information System (ATIS) on frequency 134.675 MHz. Navigation is provided by a Non-Directional Beacon (NDB) radiating on frequency 329 kHz and Runway 09 is equipped with an Instrument Landing System on frequency 110.9 MHz, which is frequency paired with Distance Measuring Equipment (DME) and indicates zero at the 52 m displaced threshold.

## Recorded data

No onboard recordings were recovered. Radar returns from the Les Platons radar head in the north of Jersey, Jersey Airport radar and Guernsey Airport radar, along with radio transmissions were recorded by Jersey ATC and analysed. The Les Platons and Jersey Airport radar provided secondary radar that included encoded altitude. The coastguard radar also recorded a partial track but offered no additional information.

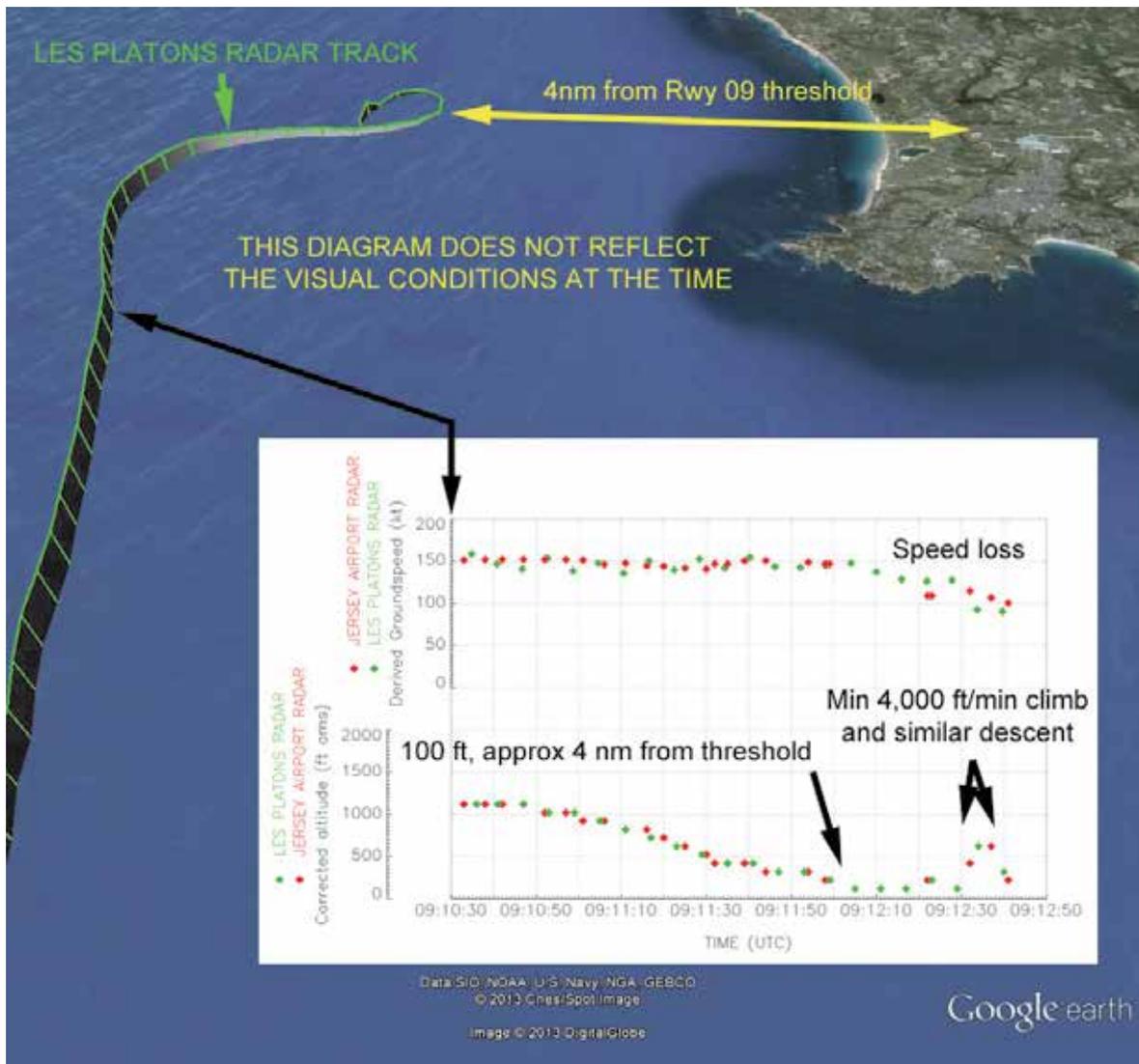
The radar recordings commence at 0846:56 hrs shortly after departure from Dinan and continue until the aircraft descended below the coverage of the radar at 0912:40 hrs. The recorded radar track is shown in Figures 1 and 2.

The speed is the radar ground speed derived from the point-to-point distance between radar returns. The initial erratic behaviour of the ground speed was due to the position inaccuracy of the radar before the aircraft had gained altitude, whilst it was over France. This also occurred at the end of the track, as the aircraft was at the limit of radar coverage and because of terrain obscuration, therefore the speed calculations are indicative of aircraft speed trends rather than absolute speed values.



**Figure 1**  
Recorded flight

The altitude values are encoded by the aircraft systems with a 100 ft resolution, and have been corrected for the ambient air pressure at the time.



**Figure 2**  
End of radar track

### Aircraft description

N289CW was a Cessna T303 Crusader, an all-metal twin-engine monoplane fitted with retractable tricycle landing gear, an autopilot and a weather radar. It was designed for general utility purposes and could carry six persons including the pilot. The aircraft was built in 1982 and registered in France. It was transferred from the French register onto the US register in 2007. Preparation for transfer and certification was carried out by a FAA authorised UK based company. At this time the aircraft had completed 5,717 flying hours. In the absence of a current journey log, the aircraft is estimated to have accumulated 6,000 flying hours at the time of the accident.

## **Wreckage**

After being notified of the accident, the Jersey Coastguard initiated a rapid response and sent a number of vessels to the area estimated from the last radar return. Floating debris, consisting of lightweight plastic, wooden and fabric items and personal effects, was subsequently recovered from the sea.

Further searches, including the use of side scan sonar, centred on the estimated position of the aircraft, found no further remains of the aircraft on the surface or on the seabed. It was probable that the tidal currents in the locality were highly dispersive on any floating and submerged wreckage.

All the identifiable items from the aircraft had originated from the nose bay or cabin of the aircraft with the exception of two similar aluminium honeycomb section panels. Both of these panels were from the left and right upper main plane surfaces between the engine nacelles and the fuselage situated above the mainwheel bays. These sections were distorted and bowed outwards. The forward edges of the panels, where they had been attached to the mainplane leading edges, had uniform 'concertina' crumpling along their entire length. The double row rivet holes on all sides were distorted and demonstrated an overload in tension and shear of the rivets.

The plastic aircraft cabin trim items, including the instrument panel combing, were fragmented, cracked and distorted. There were also small amounts of soft furnishings including three seat headrests, the co-pilot side map pocket and the remains of the small wooden pullout passenger table. The only part of a cockpit instrument recovered was a small black plastic knob with a steel shaft from the co-pilot (P2) attitude indicator.

From the limited items recovered it was not possible to determine the position of the flaps and landing gear during the approach.

## **Maintenance history**

The aircraft had been based at Perranporth Airfield in Cornwall. The most recent airframe, engine and propeller annual inspections had been carried out in October 2012. Apart from general preparations and pre-flight inspections the most recent work carried out was a repair to the co-pilot attitude indicator and the aircraft integrated navigation system. Discussions with the maintenance company responsible for this aircraft indicate that the aircraft was in a good condition.

## **Autopilot**

This aircraft was fitted with a Cessna 400B Navomatic Autopilot. This system is a two-axis automatic flight control system that commands servos to position the ailerons and elevators and provide automatic roll and pitch stability and tracking of any magnetic heading.

It was not known what the reported autopilot problem was. From discussions held by the owner with the aircraft maintenance companies at Perranporth and Jersey, it was thought to be regarding diagnosis and rectification of a problem with the autopilot servos. The problem was not likely to have affected the ability for a pilot to fly the aircraft manually.

## Analysis

The highly fragmented state of the recovered items of the aircraft show that it suffered a high energy impact consistent with a high speed collision with the sea. None of the recovered items had any evidence of fire or heat damage and there was no evidence of bird remains. There was also no evidence of mechanical damage, such as imbedded metallic debris from an airborne break-up of an engine or propeller, on any of the recovered items. The small amount of wreckage recovered after this accident does not provide conclusive evidence as to the serviceability of the aircraft prior to the accident. However, there is no evidence to suggest that the pilot was experiencing technical difficulties; indeed, for the aircraft to enter the rapid climb would have required both engines to be under power.

The pilot knew that the autopilot was unserviceable and had successfully flown the aircraft manually to Jersey, La Rochelle and Dinan. It would also be unlikely that the pilot was relying on the autopilot during the accident flight. It is therefore considered that the autopilot was not a factor in this accident.

The pilot was properly licensed and qualified to conduct the flight. He had filed a VFR flight plan and during the transit from Dinan appeared to be maintaining VMC. He held an FAA Instrument Rating. The aircraft's autopilot was unserviceable, therefore he was probably flying the aircraft manually.

The pilot maintained a safe altitude until shortly before turning onto the final approach when he commenced a continuous descent passing through the extended centreline at 800 ft and turning onto the final approach track. Whilst initially he may have been able to align the aircraft visually with the runway, once just above or in the fog it would not have been visible. He may also have used the ILS localiser or a combination of both visual and instrument alignment, but his continued descent to 200 ft would have placed him in IMC. His comment on the radio that he had 'COMPETELY GONE WRONG WAY ROUND' suggests that at that moment he was using the localiser beam bar indication which would have been displaced to the right on the indication. It is possible that instead of turning right to centre the beam bar, he mistakenly turned left having misinterpreted the indication and would have been the 'wrong way' to recover the centre line. The fact that the aircraft had descended to a low height probably indicates that the pilot was not monitoring his altitude or had misread the instruments.

The rapid pull up manoeuvre suggests that the pilot suddenly became aware of his low height or saw the immediate proximity of the surface of the sea. Depending on how much engine power was set, the high rate of climb suggests a nose-high pitch attitude that may have resulted in a significant loss of airspeed and a stall at 600 ft. Whilst the aircraft may have cleared the top of the fog and permitted external visual references, the subsequent recovery from the stall would probably have caused the aircraft to re-enter the fog. In this type of aircraft, the altitude loss for a conventional stall is about 650 ft; the pilot therefore had limited height from which to regain controlled flight. The aircraft's speed would have increased rapidly during the final descent and this resulted in a high energy impact with sea.

**Conclusion**

The accident was probably as a result of the pilot's attempt to recover to normal flight following a stall or significant loss of airspeed at a low height, after a rapid climb manoeuvre having become disoriented during the approach in fog.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Pegasus XL-R, G-MVKM	
<b>No &amp; Type of Engines:</b>	1 Rotax 447 piston engine	
<b>Year of Manufacture:</b>	1989 (Serial no: SW-WA-1399)	
<b>Date &amp; Time (UTC):</b>	6 October 2013 at 1653 hrs	
<b>Location:</b>	Stourton, West Midlands	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - 1 (Fatal)	Passengers - N/A
<b>Nature of Damage:</b>	Aircraft destroyed	
<b>Commander's Licence:</b>	Nil	
<b>Commander's Age:</b>	52	
<b>Commander's Flying Experience:</b>	73 hours (of which 59 were on type) Last 90 days - 2 hours Last 28 days - 1 hour	
<b>Information Source:</b>	AAIB Field Investigation	

**Synopsis**

The pilot was making an approach to a field when the microlight struck a set of power cables and fell to the ground. The microlight was de-registered and the pilot, who was unlicensed, was fatally injured in the accident.

**History of the flight**

The pilot was conducting a private flight from a farmer's field which he had used on previous occasions. He was assisted while he rigged the microlight and witness evidence suggested that the process proceeded normally. Witnesses also thought that the pilot appeared to be healthy and in good spirits.

The pilot started the engine, boarded the microlight and, at approximately 1640 hrs, carried out an uneventful takeoff in a south-westerly direction. Between 5 and 10 minutes later, the microlight returned to the area and, after circling the field, commenced an approach from a north-easterly direction. In the latter stages of the approach, the microlight struck a set of high-voltage power cables that spanned the corner of the field under the final approach path. Several people witnessed the approach, which appeared normal, and none of them reported seeing the microlight manoeuvre in an attempt to avoid the cables. The collision caused the cables to short circuit and part, after which the microlight crashed into the ground. The pilot suffered fatal injuries in the accident.

## Weather information

At the time of the accident, the weather conditions were good, with light winds from the southwest, clear skies and good visibility. The sun was low in the sky and the pilot would have been flying almost directly into it during his final approach to the field.

## Medical and pathological information

A post-mortem was carried out by an aviation pathologist. It established that the pilot died as a result of head and chest injuries sustained in the accident. In addition, the pathologist identified a number of pre-existing medical conditions, one of which had the potential to cause painful, distracting or possibly incapacitating symptoms. Toxicology tests revealed no evidence of drugs or alcohol.

## Pilot information

The pilot had been flying microlight aircraft since 2006; however, the investigation was unable to find evidence of him ever holding a pilot's licence. The pilot's logbook showed that he undertook 12 training flights between June 2006 and August 2007, with a total airborne time of 12 hours 5 minutes. Since then, he had recorded a further 82 flights in microlights that he was recorded as owning. None of these flights appeared to have been flown under instruction. The average duration of all flights undertaken by the pilot was 42 minutes.

## Pilot's licence requirements

The minimum qualification to fly microlight aircraft in UK airspace is the UK National Private Pilot's Licence (NPPL(A)) with a Microlight Aeroplane Class Rating – Restricted with Operational Limitations. Civil Aviation Publication (CAP) 804, *Flight Crew Licensing: Mandatory Requirements, Policy and Guidance*, specifies the requirements for the issue of this licence. These are, in summary:

1. A minimum of 15 hours flight time under instruction.
2. A minimum of 7 hours solo flight time.
3. Pass written examinations in the following subjects:
  - a. Meteorology.
  - b. Navigation.
  - c. Aviation law, flight rules and procedures.
  - d. Human Performance and Limitations.
  - e. Aircraft (General).
4. Pass a General Skills Test including an oral examination on the aircraft type used for the test.

In addition, a pilot must hold valid medical certification.

## Accident site

The accident site was located in a field next to farm buildings and a wooded area. The field was approximately rectangular, with the long axis orientated north-south; visible ruts on the surface ran the length of the field. A set of three high-voltage power cables, horizontally arranged, spanned the northeast corner of the field and, when viewed from the direction of the microlight's final approach, would have been closely aligned with the surface ruts below. Also, viewed from that direction, one support pole for the cables was located in the wooded area on the left and another was situated in the hedge line on the right. The microlight struck the ground 13 m from the overhead power cables which had short circuited and parted, causing the local electricity substation to trip. This was timed at 1653 hrs. There were several ground impact marks within the footprint area of the wreckage.

## Microlight description

The Pegasus XL-R is a two-seat, flex-wing (weight shift control) microlight aircraft, comprising a trike unit and wing connected by an upright monopole. The trike incorporates a tricycle undercarriage and a two-stroke Rotax 447 engine, fitted with a pusher propeller, and has a tandem seating arrangement for a pilot and one passenger. The wing is controlled via a control 'A' frame, which consists of a control bar braced by fore and aft flying wires and two uprights attached to the wing keel tube.

## Microlight examination

The microlight was found on its side with its flex wing lying across the rear of the trike. Both the monopole upright and wing keel tube had fractured, and the left wing leading edge tube was bent a short distance from the wingtip. The front tubular strut, between the trike 'snoot' (a forward extension of the trike keel tube) and monopole, was bent at its mid-point and there was evidence of cable abrasion, localised pitting and electrical arcing on its leading surface. The control frame was attached and structurally intact but there was evidence of power cable contact on the leading faces of its left and right uprights, and on the associated front flying wires.

The trike keel was fractured at its mid-section. The main landing gear axle wire-braced aluminium strut was also fractured and the left main wheel had folded underneath the trike, with evidence of soil and grass trapped between the outer edge of the rim and tyre. The nosewheel and yoke was undamaged except for a small area of electrical arcing on the head of the steel axle bolt. The fibreglass snoot fairing, directly above the nosewheel, had a short straight split in its gel-coat and fibreglass substrate and had separated from its attachment bolts, such that it was loose around the trike keel.

The Rotax 447 engine was undamaged but one of the two propeller blades had fragmented into several pieces. Otherwise, there was no evidence of pre or post-impact damage on any of the engine ancillary components. The fuel tank, supply pipes and filter were intact and were free from leakage, and there were 23 litres of two-stroke petrol/oil mix in the fuel tank. The blade fragmentation, together with propeller witness marks in the ground, indicated that the engine was producing power at the point of impact.

A detailed inspection of the structure, rigging, engine and ancillary components, together with witness video evidence taken shortly before the accident, showed that the microlight was in good condition and appeared to be operating normally prior to the accident.

### **Certification**

Data held by the BMAA indicated that the microlight's certificate of validity lapsed on 27 May 2010, following the last inspection and check flight by a BMAA authorised inspector and check pilot on 28 May 2009. The CAA aircraft register also showed that the microlight had been permanently withdrawn from use and de-registered on 30 November 2012.

### **Analysis**

The average duration of the pilot's previous flights, from records in his logbook, was 42 minutes. However, on this occasion, he returned to the field from which he had taken off after a flight lasting only 5 to 10 minutes. His reason for returning earlier than normal could not be established but two causes were considered possible. The flight was conducted late in the day and the pilot may have been concerned about the fading light. Secondly, the pilot had a pre-existing medical condition that had the potential to cause painful symptoms, which could have been distracting or partially incapacitating.

The microlight's approach, into wind and towards the low, setting sun, appeared to be under control until it struck the power cables. Although the pilot had operated from the field before, the angle of the sun and the close orientation of the power cables with the surface ruts in the field, together with the location of the power cable support poles, may have made the cables difficult to detect. The pilot did not appear to take any avoiding action, indicating that he did not see the cables or that he only did so when it was too late to avoid them.

The arc pitting, burning and abrasions on the airframe components indicated that the microlight made contact with the power cables, before further structural break-up was caused by impact with the ground. The evidence showed that the microlight had been in good condition and appeared to be operating normally prior to the accident. However, it could not be considered airworthy as it did not have the required certification in place.

The pilot had not completed the training required for a pilot's licence and this cannot be discounted as a contributory factor in the accident.

## **AAIB correspondence reports**

These are reports on accidents and incidents which were not subject to a Field Investigation.

They are wholly, or largely, based on information provided by the aircraft commander in an Aircraft Accident Report Form (AARF) and in some cases additional information from other sources.

The accuracy of the information provided cannot be assured.



**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Airbus A320-214, EI-EZV
<b>No &amp; Type of Engines:</b>	2 CFM 56-5-B4/P turbofan engines
<b>Year of Manufacture:</b>	2003 (Serial no: 2001)
<b>Date &amp; Time (UTC):</b>	16 January 2014 at 1505 hrs
<b>Location:</b>	London Heathrow Airport
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 6                      Passengers - 41
<b>Injuries:</b>	Crew - 4 (Minor)          Passengers - None
<b>Nature of Damage:</b>	None reported
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	34 years
<b>Commander's Flying Experience:</b>	7,272 hours (of which 6,878 were on type) Last 90 days - 96 hours Last 28 days - 19 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

**Synopsis**

The aircraft was in the final stages of an ILS approach to land. The thrust was reduced at the normal flare height but there was no reduction in the rate of descent and the aircraft landed heavily. The FDR data showed evidence of over-controlling in pitch with a late increase in pitch attitude which had no effect on the rate of descent.

**History of the flight**

EI-EZV was carrying out an ILS approach to Runway 27L at London Heathrow Airport with the co-pilot operating as the Pilot Flying (PF) and the commander as the Pilot Monitoring (PM). The weather was: surface wind from 180° at 12 kt, visibility of 9,000 m, few clouds at 2,200 ft, scattered clouds at 2,600 ft and temperature 9°C. The commander reported that the aircraft experienced light turbulence during the approach.

The crew saw the runway at approximately 5 nm from touchdown, disconnected the autopilot and autothrust, and configured the aircraft with FLAPS 3 for the final approach and landing. The commander reported that, at the normal flare height, the thrust was reduced but there was no noticeable flare. He called "flare" but there was no reduction in the rate of descent and the aircraft touched down heavily.

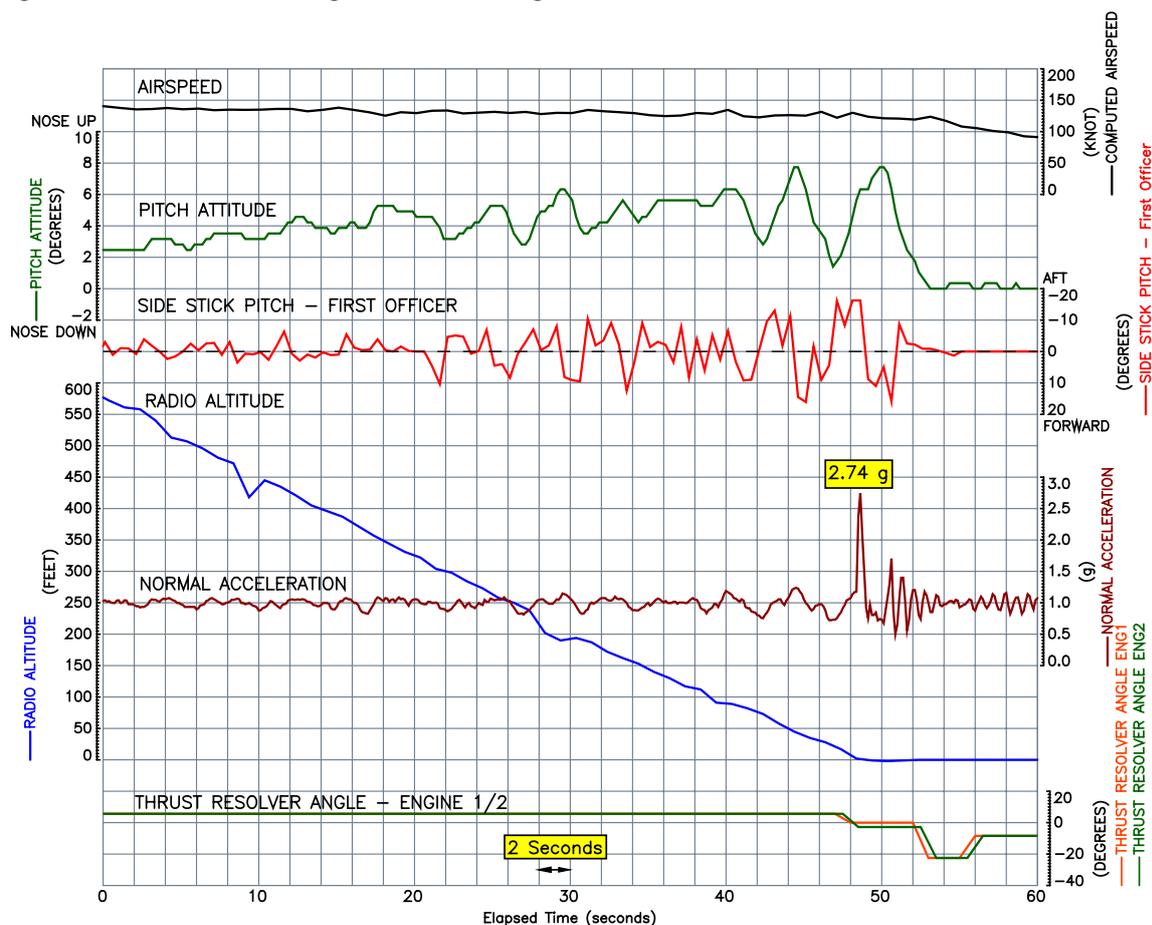
The crew were treated by paramedics for minor back and neck pain.

## Comment from the commander

The airline had recently introduced the practice of landing with FLAP 3, instead of FLAP FULL, on long runways. The pilots discussed that the aircraft would be more responsive during an approach and landing with FLAP 3 than would be the case with the more usual landing flap configuration. The commander thought that the light turbulence during the approach, combined with a more responsive aircraft than usual, might have led to the aircraft being over-controlled in pitch.

## Flight data

Flight data from the landing is shown in Figure 1.



**Figure 1**

Flight data from the landing

The computed airspeed at touchdown (equivalent to groundspeed in the absence of headwind) was approximately 130 kt. The thrust levers were retarded over approximately 1.5 seconds to reach idle at touchdown. The average rate of terrain closure was 706 fpm during the descent from 500 ft radio altitude to touchdown. This approximates to the aircraft's rate of descent given the flat and level ground over which the aircraft was flying during the final approach. The ILS 27L page in the UK AIP entry for London Heathrow Airport shows that a rate of descent of 690 fpm is required to maintain the ILS glideslope at 130 kt groundspeed.

In the final 28 seconds before touchdown, the amplitude of sidestick input slowly increased but, although the pitch attitude varied, the average rate of descent remained constant. In the two seconds before touchdown, the pitch attitude changed from approximately 1.5° to 6.5° nose-up.

### **Analysis**

During the final 28 seconds of flight, the high rate at which the pitch inputs were made and reversed meant that the pitch attitude did not always change in response. The pitch inputs also had little effect on the flight path and rate of descent. The pitch attitude varied significantly during the six seconds before touchdown, including a 5° nose-up pitch change in the final two seconds. However, the final increase in pitch attitude came too late to arrest the rate of descent leading to the hard landing.

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### **BULLETIN CORRECTION**

The following correction to this report was issued on 17 June 2014 online and published in the July 2014 Bulletin.

The scale for the parameter SIDE STICK PITCH – First Officer in Figure 1 is incorrectly labelled. The scale should read that positive values greater than zero indicate that the side stick has been moved forward and that negative values of less than zero indicate that the side stick has been moved aft. The revised plot has been inserted into the above report. The analysis remains unchanged.

**INCIDENT**

<b>Aircraft Type and Registration:</b>	ATR 72-212 A, G-COBO
<b>No &amp; Type of Engines:</b>	2 Pratt & Whitney Canada PW127M turboprop engines
<b>Year of Manufacture:</b>	2009 (Serial no: 852)
<b>Date &amp; Time (UTC):</b>	20 October 2013 at 0625 hrs
<b>Location:</b>	En route from Guernsey Airport to Gatwick Airport
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 4                      Passengers - 59
<b>Injuries:</b>	Crew - 2 (Minor)          Passengers - None
<b>Nature of Damage:</b>	Superficial damage to cabin furnishings.
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	51 years
<b>Commander's Flying Experience:</b>	10,300 hours (of which 4,524 were on type) Last 90 days - 158 hours Last 28 days - 78 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and enquiries by the AAIB

**Synopsis**

A sudden, short-lived bout of severe turbulence was experienced in the vicinity of cumulonimbus (CB) cloud at FL120. The autopilot disengaged, an oil pressure warning light illuminated briefly and the aircraft climbed almost 800 ft before being flown back to FL120. Both cabin crew members suffered minor injuries but the flight was able to continue to its destination. There was superficial damage to the cabin furnishings.

**History of the flight**

The crew of four, two pilots and two cabin crew, began their duty at 0500 hrs at Guernsey Airport. They were rostered to perform two return passenger flights to London Gatwick Airport. Meteorological data indicated the presence of showery troughs moving northeast along the English Channel. Scattered showers and localised thunderstorms were forecast and there were warnings of localised severe turbulence and windshear associated with CB clouds. The commander, who was PNF, briefed the cabin crew about the thunderstorms before they boarded the aircraft but expected to be able to avoid them.

After departure, the aircraft climbed through layers of stratiform clouds to FL150. Conditions were smooth and no significant weather returns could be detected, on radar, along the intended track. In accordance with normal procedures, the seat belt signs were turned off. As the aircraft approached the Isle of Wight, ATC instructed an initial descent to FL120.

On reaching this level, with the aircraft in cloud, the weather radar indicated a significant weather cell, painting as a red return, further along the route and close to waypoint AVANT. There were also a number of cells, with lower intensity returns, forming a line parallel to the aircraft's track, on the right and about 10 nm away. There appeared to be a gap between the most northerly of these cells and the large cell that was directly ahead. The crew decided to continue on track for a few more miles before asking ATC for a right turn towards this gap. A spell of turbulence was then encountered and the seatbelt signs were turned on. The commander did not foresee a need to suspend the cabin service but the co-pilot did start slowing the aircraft from around 230 KIAS towards 200 KIAS.

After the right turn had been made, the turbulence abated for 20 to 30 seconds. At this stage, the aircraft flew clear of cloud but it then experienced a pronounced downdraught, followed by a strong updraught which caused it to climb rapidly. The autopilot and flight director disengaged, so the co-pilot took manual control. There was then a negative g sensation, as the aircraft left the updraught, and the master warning sounded due to a low oil pressure indication on the left engine. This was a transient warning and the commander reassured the co-pilot that this was a known issue on turboprop aircraft.<sup>1</sup>

The turbulence lasted for around 30 seconds and then, because the aircraft had climbed 780 ft, the co-pilot descended it back to FL120. The flight director and the autopilot were re-engaged about two minutes later. The crew did not advise the altitude deviation or the turbulence encounter to ATC and did not recall ATC making a comment.

Once the autopilot was re-engaged, the commander called the cabin crew. They reported that drinks and small objects had been dislodged in the cabin. The senior cabin crew member had sustained a cut to her leg when one of the trolleys was overturned in the rear galley and her colleague had bumped her head on the ceiling. There was a general level of concern but the passengers were unharmed. The commander then made a passenger address to provide re-assurance and the flight continued to Gatwick, where the passengers were disembarked without further incident.

Following passenger disembarkation, a paramedic attended the aircraft, dressed the cut on the senior crew member's leg and checked that the other crew member had no apparent repercussions after banging her head. The return flight was then postponed, so that relief cabin crew could be positioned to Gatwick. An inspection of the aircraft did not reveal any airworthiness faults.

### **Crew comments**

Both pilots recalled that the aircraft remained at least 10 nm from the nearest, obvious weather cell and, based on previous experience, the commander did not believe that the cabin service needed to be suspended prior to the upset. The commander commented that the duration of the encounter was very short and did not classify it as severe turbulence.

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#### **Footnote**

<sup>1</sup> The UK Aeronautical Information Circular Pink 56/210, titled '*The Effect of Thunderstorms and Associated Turbulence on Aircraft Operations*', states: '*If negative 'G' is experienced, temporary warnings (eg low oil pressure) may occur. These should be ignored.*'

The co-pilot mentioned that he had completed his line training during the previous summer and had only limited experience of using the weather radar.

### Manufacturer's response

After reviewing the FDR data for this incident, the manufacturer indicated that recorded load factors remained within the aircraft's promulgated limits. The loads that were encountered induced flight control movements that caused the autopilot and the yaw damper to disengage, in a manner that was consistent with the design criteria.

The low engine oil pressure warning was caused by a -0.3g vertical acceleration. A temporary warning of this nature is considered to be normal behaviour in such circumstances.

### Procedures

The airline's Operating Manual (OM), recommended that for a '*turbulence encounter*', seat belt signs should be switched on, the igniters turned on continuously and speed reduced to 180 KIAS. The OM also noted that the autopilot may be used, that cabin crew should be warned as early as possible if turbulence was anticipated and, elsewhere, that:

*'If unexpected turbulence is encountered the Commander must inform the Cabin Crew immediately and tell them whether the service should be continued or not.'*

In a sub-paragraph about wake turbulence and windshear, pilots were told that they should be familiar with current UK Aeronautical Information Circulars (AICs). The Pink AIC 56/2010, titled '*The Effect of Thunderstorms and Associated Turbulence on Aircraft Operations*', was circulated during pilot conversion training and some of the detail from this AIC was repeated in the OM Part A, together with the following paragraph about turbulence. It stated:

*'If the weather conditions, cloud structure and route forecast indicate that turbulence is likely, the cabin crew should be pre-warned, and the passengers advised to return to, and/or remain in their seats, and to ensure that their seat belts/harnesses are securely fastened. Catering and other loose equipment should be stowed and secured until it is evident that the risk of further turbulence has passed. Consideration must be given to flying at the recommended turbulence speed/Mach.'*

There was no definition or description in the OM of different levels of turbulence, nor was there a direct instruction to crew that a technical log entry should be made if a specific level of turbulence is encountered. The manual did, however, contain a long list of occurrences that required an MOR to be filed. One example of this was a turbulence encounter that was deemed to require a '*turbulence check*'. No further guidance was provided to crews regarding such a check. In the operator's maintenance manual reference was made to an engineering check to be done when crew reported '*flight in turbulence*'.

The operator's OM Part A provided examples of circumstances that might be regarded as serious incidents. These included:

*'System failures, weather phenomena, operation outside the approved flight envelope or other occurrences which could have caused difficulties controlling the aeroplane.'*

#### AAIB comment

Pink AIC 56/2010 provides reference material regarding flight in the vicinity of thunderstorms. This event provides evidence that associated turbulence can be encountered some distance from weather cells that are depicted on aircraft radar equipment.

Page GEN 3.5-19 of the UK Aeronautical Information Publication (AIP) includes a stipulation that aircraft are to make special air-reports when the following meteorological phenomena are encountered or observed:

*'(a) moderate icing (MOD ICE) or severe icing (SEV ICE); or  
(b) moderate turbulence (MOD TURB) or severe turbulence (SEV TURB); or  
(c) severe mountain wave (SEV MTW); or  
(d) thunderstorms with or without hail (that are obscured, embedded, widespread or in squall lines) (TSGR or TS); or  
(e) if volcanic ash cloud is observed or encountered, or if pre-eruption volcanic activity or a volcanic eruption is observed to assist other Users, ATS Providers and the Volcanic Ash Advisory Centre (VAAC);'*

The UK AIP then provides table 3.5.6.1 which defines the different intensities of turbulence:

<b>Table 3.5.6.1 – TURB and other Turbulence Criteria Table</b>		
<b>Incidence</b>	<b>Occasional - less than 1/3 of the time Intermittent – 1/3 to 2/3 Continuous – more than 2/3</b>	
<b>Intensity</b>	<b>Aircraft Reaction (transport size aircraft)</b>	<b>Reaction Inside Aircraft</b>
<i>Light</i>	<i>Turbulence that momentarily causes slight, erratic changes in altitude and/or attitude (pitch, roll, yaw)  IAS fluctuates 5 -15 kt. (&lt;0.5 g at the aircraft's centre of gravity) Report as '<b>Light Turbulence</b>'. or;  <i>turbulence that causes slight, rapid and somewhat rhythmic bumpiness without appreciable changes in altitude or attitude. No IAS fluctuations. Report as '<b>Light Chop</b>'</i></i>	<i>Occupants may feel a slight strain against seat belts or shoulder straps. Unsecured objects may be displaced slightly. Food service may be conducted and little or no difficulty is encountered in walking.</i>

<b>Table 3.5.6.1 – TURB and other Turbulence Criteria Table (Cont)</b>		
<b>Moderate</b>	<p><i>Turbulence that is similar to Light Turbulence but of greater intensity. Changes in altitude and/or attitude occur but the aircraft remains in positive control at all times. IAS fluctuates 15-25 kt. (0.5-1.0g at the aircraft's centre of gravity). Report as 'Moderate Turbulence'. or;</i></p> <p><i>turbulence that is similar to Light Chop but of greater intensity. It causes rapid bumps or jolts without appreciable changes in altitude or attitude. IAS may fluctuate slightly. Report as 'Moderate Chop'.</i></p>	<p><i>Occupants feel definite strains against seat belts or shoulder straps. Unsecured objects are dislodged. Food service and walking are difficult.</i></p>
<b>Severe</b>	<p><i>Turbulence that causes large, abrupt changes in altitude and/or attitude. Aircraft may be momentarily out of control. IAS fluctuates more than 25 kt. (&gt; 1.0 g at the aircraft's centre of gravity). Report as 'Severe Turbulence'</i></p>	<p><i>Occupants are forced violently against seat belts or shoulder straps. Unsecured objects are tossed about. Food service and walking impossible.</i></p>
<p><i>Note: Pilots should report location(s), time(s) (UTC), incidence, intensity, whether in or near clouds, altitude(s) and type of aircraft. All locations should be readily identifiable. Turbulence reports should be made on request, or in accordance with paragraph 6.2. Example: (a) Over Pole Hill 1230 intermittent Severe Turbulence in cloud, FL 310, B747. (b) From 50 nm north of Glasgow to 30 nm west of Heathrow 1210 to 1250, occasional Moderate Chop TURB, FL 330, MD80. Note: The UK does not use the term 'Extreme' in relation to turbulence.</i></p>		

### **Safety action**

After this event, the operator conducted an internal investigation. This resulted in changes to the Part A of their Operations Manual and the inclusion of an instruction that pilots must inform ATC, immediately, of any unauthorised vertical deviation of more than 300 ft (200 ft when within reduced vertical separation minima airspace). The detailed guidance from the UK AIP, regarding special air reports and turbulence levels, was also placed into the Part A.

Additionally, the operator intended to enhance the training package given to pilots on the use of weather radar and to review its guidance concerning serious incidents.

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	BN2A Mk.III-2 Trislander, G-RLON
<b>No &amp; Type of Engines:</b>	3 Lycoming O-540-E4C5 piston engines
<b>Year of Manufacture:</b>	1975 (Serial no: 1008)
<b>Date &amp; Time (UTC):</b>	12 January 2014 at 1800 hrs
<b>Location:</b>	Alderney Airport, Channel Islands
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 1                      Passengers - 5
<b>Injuries:</b>	Crew - None                      Passengers - None
<b>Nature of Damage:</b>	None (Damage to 3 runway lights)
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	54 years
<b>Commander's Flying Experience:</b>	6,304 hours (of which 1,133 were on type) Last 90 days - 50 hours Last 28 days - 24 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

**Synopsis**

During a landing in heavy rain and with a strong crosswind the aircraft was blown from the asphalt runway surface onto the grass edge of the runway, damaging three runway lights. The aircraft was undamaged.

**History of the flight**

The aircraft was making an approach into Alderney Airport after a routine flight from Guernsey. The pilot stated that, during the latter stages of the approach, there was a strong, gusting southerly crosswind and that the rain suddenly intensified. The pilot also stated that, during the landing roll, a very strong gust of wind was felt from the left such that the right main landing gear lost grip in a large area of standing water. The aircraft veered to the right, off the asphalt surface and onto the grass area at the side of the runway. The pilot was able to steer it back onto the asphalt section of the runway. The aircraft was undamaged but ATC subsequently discovered that the right main wheels had run over and damaged three runway edge lights.

**Meteorological information**

The Alderney Airport weather report for 1750 hrs indicated surface wind from 190° at 19 kt gusting 30 kt, visibility 5,000 m, rain, broken cloud at 500 ft, temperature 9°C, dewpoint 9°C and sea level pressure 1007 hectopascals.

The weather forecast for the period of the incident was surface wind from 160° at 24 kt, visibility 9,000 m, rain, scattered cloud at 800 ft, broken cloud at 1,200 ft, becoming between 1700 hrs and 1900 hrs, surface wind from 160° at 27 kt gusting 40 kt, visibility 5,000 m, rain, broken cloud at 500 ft. While the aircraft was on the approach, Alderney ATC reported surface wind from 170° at 20 kt and subsequently 180° at 19 kt.

### **Alderney Airport**

Alderney Airport has a mixture of grass and asphalt runways. The main Runway 26/08, other than its thresholds, is 23 m wide comprising an 18 m asphalt centre section with 2.5 m of grass each side. The thresholds are asphalt over the full width. The runway is equipped with high intensity edge lighting located just outside the declared width of the runway. There are no other markings denoting the edge of the runway. At the time of the incident, a NOTAM was in force stating '*RWY 08/26 WIDTH REDUCED TO 18M DUE SFC CONDITION*'.

### **Analysis**

The aircraft encountered heavy rain shortly before touchdown and a strong crosswind gust shortly after touchdown. The strong gust and loss of the main landing gear grip in standing water caused the aircraft to veer to the right, off the asphalt surface and onto the grass area to the side of the runway.

#### **Safety action**

As a result of this incident, the operator reviewed its operation into Alderney and reduced the crosswind limit for its Trislander aircraft to 20 kt while the runway declared width is reduced.

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Boeing 747-436, G-BNLV
<b>No &amp; Type of Engines:</b>	4 Rolls-Royce RB211-524G2-T-19 turbofan engines
<b>Year of Manufacture:</b>	1992 (Serial no: 25427)
<b>Date &amp; Time (UTC):</b>	22 August 2013 at 2045 hrs
<b>Location:</b>	London Heathrow Airport
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 17                      Passengers - 257
<b>Injuries:</b>	Crew - None                      Passengers - None
<b>Nature of Damage:</b>	Damage to APU and starter motor
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	57 years
<b>Commander's Flying Experience:</b>	25,000 hours (of which 10,000 were on type) Last 90 days - 240 hours Last 28 days - 80 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

**Synopsis**

Shortly after the APU was started on the ground, the APU starter motor suffered a catastrophic failure causing it to shear from its gearbox mounting flange. The failure allowed hot oil to be released; the oil ignited and caused a fire in the APU bay. The flight crew shut down the APU, discharged the fire extinguisher bottle and ordered a precautionary passenger disembarkation.

**History of the flight**

The aircraft was parked on stand at London Heathrow Airport and the APU had been running for about 5 minutes when the flight crew received an APU fire warning on the EICAS<sup>1</sup> display. The crew carried out the 'APU Fire' checklist actions which involved shutting down the APU and discharging the fire extinguisher bottle into the APU bay. A 'Precautionary Rapid Disembarkation' announcement was made and the passengers vacated the aircraft via the jetty to the terminal. The Airport Rescue and Fire Fighting Service were called to the aircraft and although there was no indication of fire at the rear of the aircraft, they sprayed water into the APU exhaust as a precautionary measure.

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**Footnote**

<sup>1</sup> Engine Indication and Crew Alerting System.

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### **Examination of the aircraft**

When the APU bay doors were opened the APU starter motor was hanging from the starter feeder cables because its gearbox mating flange had sheared. Some internal parts of the starter motor, including the sprag clutch, had separated and were found on the APU bay doors. There was damage to the APU oil filter cluster mounts, some charring to instrument lines and blistered paint.

The starter motor and APU were removed for strip examination. The damage to the APU was found to have been caused by a catastrophic failure of the starter motor. The start contactor was examined and although an internal component had broken, the contactor was determined to have been fully functional and not a cause of the starter motor failure. A strip examination of the starter motor revealed that the shear neck between the motor and the sprag clutch had failed; in the operator's experience it would normally be the shear neck on the driveshaft that would fail. However, due to excessive internal damage the cause of the starter motor failure could not be determined, although this shear neck failure would be consistent with a seizure of the sprag clutch.

### **Operator's assessment of the cause**

The operator determined that the starter motor had not disengaged after the start cycle, and this caused the catastrophic failure of the clutch housing and flange mount. The failure allowed hot oil to be released from the starter; the oil ignited and caused a fire. The cause of the starter motor's failure to disengage could not be determined. The start contactor was determined to have operated normally, but had been the cause of previous starter motor failures, therefore, as a safety precaution, the operator decided to embody the Boeing Start Contactor Service Bulletins applicable to all Boeing fleets. This is an optional modification which replaces the start contactors with a new design.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Cessna 340A, N340DW
<b>No &amp; Type of Engines:</b>	2 Continental Motors Corp TSIO 520SER piston engines
<b>Year of Manufacture:</b>	1978 (Serial no: 340A-0497)
<b>Date &amp; Time (UTC):</b>	23 October 2013 at 0518 hrs
<b>Location:</b>	Grand Turk International Airport, Turks & Caicos
<b>Type of Flight:</b>	Private
<b>Persons on Board:</b>	Crew - 1                      Passengers - 2
<b>Injuries:</b>	Crew - None                      Passengers - None
<b>Nature of Damage:</b>	Damage to left propeller and left wing
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	74 years
<b>Commander's Flying Experience:</b>	Total hours not known Last 90 days - 40 hours Last 28 days - 10 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

On the approach to land with the landing gear extended, the pilot noticed that the left main gear green 'down and locked' light was intermittent. He executed a missed approach and, on the downwind leg of the next approach, the pilot reported that he managed to obtain a continuous 'three greens' indication. However, on touchdown the left main landing gear collapsed and the aircraft slewed to the left through about 230° before coming to rest off the side of the runway.

Although a representative of the aircraft's maintenance company has examined the aircraft, they report that they were unable to determine the reason for the failure.

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Auster J5G Cirrus Autocar, G-ARKG	
<b>No &amp; Type of Engines:</b>	1 Blackburn Cirrus Major III piston engine	
<b>Year of Manufacture:</b>	1952 (Serial no: 3061)	
<b>Date &amp; Time (UTC):</b>	30 November 2013 at 1030 hrs	
<b>Location:</b>	Near Oakham, East Midlands	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Aileron cable broken	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	44 years	
<b>Commander's Flying Experience:</b>	177 hours (of which 9 were on type) Last 90 days - 5 hours Last 28 days - 0 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

**Synopsis**

The aircraft was engaged in practising steep turns when the right aileron cable broke. After a safe landing, it was found that the cable had failed because it had short-circuited the contacts of a wind-driven generator in the right wing leading edge. The generator had moved rearwards because of slackening of the grip of its mounting clamp.

**History of the flight**

The pilot and a friend had been airborne for about 55 minutes when they decided to practise some steep turns at a height of 2,000 ft. The plan was to complete one turn to the right first and then reverse the turn. The first turn, at 45° angle of bank, was normal but when the pilot applied left aileron to commence the second turn, he felt the right aileron cable break and could see it hanging slack outside the cockpit window. He discontinued the turn and recovered to wings level.

After a discussion with his passenger, who was an experienced pilot, he performed a test which confirmed that he could move the left aileron but not the right. The pilot was reluctant to use the ailerons for fear of entering an irrecoverable spiral dive. The aircraft was about 8 miles from its home field and he was able to perform a gentle, flat turn using the rudder to line up for a straight-in approach to the runway. A normal three-point landing was performed and no damage was incurred.

After landing, investigation revealed that the cable had broken at a point behind a wind-driven generator located in the right wing leading edge. Closer inspection showed that the cable strands had melted and that the generator itself was loose in its clamp and could be moved backwards and forwards. It was surmised that the generator had moved rearwards until its positive terminal touched the aileron cable. Subsequent tests by the Light Aircraft Association (LAA) suggested that the burning damage had occurred over a number of contacts rather than a single event.

The generator was loose in its clamp because a cork gasket between the clamp and the generator body was missing. An Auster Service Bulletin, Issue 22, published in 1951 had alerted owners to the potential problems of mounting the generator too far back, fouling the aileron cable and causing shorting. It advised that the company was '*drawing up a modification to obviate this trouble*', details of which would be given in a subsequent Bulletin. In the event, a redesigned generator was specified and the promised modification did not materialise. G-ARKG is one of the few thought to be still fitted with the earlier type of generator.

A fuller account of this incident can be found in the February 2014 issue of the LAA's magazine *Light Aviation*.

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Mooney M20J, I-IJMW	
<b>No &amp; Type of Engines:</b>	1 Lycoming IO-360-A3B6D piston engine	
<b>Year of Manufacture:</b>	1987 (Serial no: 24-1633)	
<b>Date &amp; Time (UTC):</b>	11 January 2014 at 1155 hrs	
<b>Location:</b>	Dunkeswell Airfield, Devon	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to propeller, engine, left wingtip, right flap, and landing gear	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	56 years	
<b>Commander's Flying Experience:</b>	385 hours (of which 22 were on type) Last 90 days - 22 hours Last 28 days - 3 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

While landing, the left wingtip contacted the runway and the aircraft veered to the left. The pilot was unable to prevent a runway excursion, during which the propeller made ground contact and the nose leg and the right main landing gear collapsed.

## History of the flight

An into wind approach was flown to Runway 04 at Dunkeswell Airfield after a flight from Manston Airport. It was a fine day, with visibility of around 30 km, and the wind was reported as being from 040° at 5 to 10 kt. Full flap was selected and a stable final approach was achieved at 80 KIAS. About three feet above the runway the aircraft ballooned, so the pilot increased power and made a nose-down control input. The left wing dropped suddenly and the left wingtip and the left wheel contacted the runway before the other two wheels touched down. The aircraft veered left and the pilot was unable to prevent it departing the paved surface. After travelling a short distance, the nose leg sank into the soft ground and the propeller made contact with the surface. The aircraft pivoted anti-clockwise and the nose leg and the right main landing gear leg collapsed. The aircraft came to a halt nose-down, resting on its right wing and left main landing gear.

The pilot noted that there was some light turbulence as he approached the runway but he did not believe that this affected his control of the aircraft. He concluded that he had

inadvertently allowed the airspeed to reduce until the left wing stalled and this was why it dropped suddenly. There was a stall warning vane on the left wing but the pilot could not remember hearing it operate.

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Piper L18C (Modified) Super Cub, G-RCUB
<b>No &amp; Type of Engines:</b>	1 Continental Motors Corp C90-14F piston engine
<b>Year of Manufacture:</b>	1952 (Serial no: 18-1980)
<b>Date &amp; Time (UTC):</b>	25 December 2013 at 1600 hrs
<b>Location:</b>	Tandragee Airfield, County Armagh
<b>Type of Flight:</b>	Private
<b>Persons on Board:</b>	Crew - 1                      Passengers - 1
<b>Injuries:</b>	Crew - 1 (Serious)      Passengers - 1 (Serious)
<b>Nature of Damage:</b>	Severe damage to wings, forward fuselage and tailplane
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	44 years
<b>Commander's Flying Experience:</b>	5,762 hours (of which 1,810 were on type) Last 90 days - 158 hours Last 28 days - 28 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

## Synopsis

The aircraft was returning following a short local flight. The pilot noted that the wind conditions were such that the normal landing direction would incur a small tailwind component but he believed that this was preferable to an approach over trees at the other end of the runway. He stated that just before touchdown, the tailwind increased and he decided to go around. During the go-around, the aircraft struck the trees and crashed just beyond them.

## History of the flight

The aircraft was returning to Tandragee Airfield after a short local flight of 15-20 minutes with the pilot and a passenger on board. The single gravel runway is oriented 180°/360° and is about 400 metres long. The pilot of G-RCUB advised that takeoffs are normally made to the south and landings to the north unless strong southerly winds prevail. This is because of the presence of two lines of trees running at right angles to the runway along the northern boundary of the airfield. On departure, he saw that the windsock was indicating that the wind was between 220° and 240° at 5 kt.

As he returned to Tandragee, the pilot saw that the windsock was indicating substantially the same conditions as when he had taken off, with a tailwind of about 4 kt along the northerly runway. He joined downwind and proceeded through base leg to finals. However, just before touchdown, the tailwind component appeared to increase and he decided to

go around. A video taken by the passenger shows that the aircraft touched down and commenced a landing roll before the pilot advanced the throttle to full power. The aircraft lifted off but can be seen and heard to brush the lower line of trees which was closest to the runway. Three to four seconds later, it collided bodily with the second line of taller trees which brought it almost to a halt in the air before dropping to the ground in a nose-down attitude. Both occupants suffered serious injuries but there was no fire.

The pilot was of the opinion that the windsock had indicated that the conditions were suitable for a downwind landing but must have changed unpredictably just before touchdown. It was also noted that the aircraft was only some 20 kg below its maximum takeoff weight and that Runway 36 has a slight upslope.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Taylor Titch, G-BABE	
<b>No &amp; Type of Engines:</b>	1 Continental Motors Corp O-200-A piston engine	
<b>Year of Manufacture:</b>	1973 (Serial no: PFA 1394)	
<b>Date &amp; Time (UTC):</b>	15 December 2013 at 1205 hrs	
<b>Location:</b>	Netherthorpe Airfield, Nottinghamshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - 1 (Minor)	Passengers - N/A
<b>Nature of Damage:</b>	Aircraft destroyed	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	53 years	
<b>Commander's Flying Experience:</b>	271 hours (of which 33 were on type) Last 90 days - 3 hours Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The pilot was taking off on Runway 24 at Netherthorpe, which is grass and has a Take Off Run Available (TORA) of 490 m. The pilot states that the wind was from 200° at 4 kt, although other observers estimated that the wind strength was closer to 10 kt. The aircraft became airborne just after the Runway 18/36 intersection (about 1/3 of its length) and started to climb away. The pilot reported that at a height of about 12 ft, a gust of wind from the left caused the aircraft to roll to the right and the right wingtip struck the ground. It 'cartwheeled' and came to rest in a field some 20 yards to the right of the runway. Despite severe damage to the aircraft, the pilot, who suffered only minor injury, was able to evacuate through a hole in the lower fuselage made when the wings had detached.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	EV-97 Teameurostar UK, G-CHJG	
<b>No &amp; Type of Engines:</b>	1 Rotax 912-UL piston engine	
<b>Year of Manufacture:</b>	2012 (Serial no: 3938)	
<b>Date &amp; Time (UTC):</b>	4 December 2013 at 1140 hrs	
<b>Location:</b>	Cumbernauld Airport, North Lanarkshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to nose landing gear, propeller, left wing tip and aileron	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	42 years	
<b>Commander's Flying Experience:</b>	209 hours (of which 29 were on type) Last 90 days - 4 hours Last 28 days - 0 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The aircraft was landing on Runway 26 at Cumbernauld Airport; the wind was from 275° at 11 kt. The pilot reported that at approximately 100 ft over the runway threshold, at an airspeed of 55 kt, the nose of the aircraft "suddenly veered up and to the left". He applied nose-down elevator control and right rudder to correct the aircraft's attitude whilst attempting to flare for touchdown. The aircraft impacted the grass beside the runway left wing and nose first, damaging the nose landing gear, left wingtip and aileron. The pilot assessed the cause as a gust resulting in a momentary stall.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Mainair Rapier, G-CCHV
<b>No &amp; Type of Engines:</b>	1 Rotax 503-2V piston engine
<b>Year of Manufacture:</b>	2003 (Serial no: 1353-0403-7-W1148)
<b>Date &amp; Time (UTC):</b>	30 October 2013 at 1215 hrs
<b>Location:</b>	Sywell Airfield, Northamptonshire
<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>	Wing pivot bracket bent
<b>Commander's Licence:</b>	Private Pilot's Licence
<b>Commander's Age:</b>	53 years
<b>Commander's Flying Experience:</b>	312 hours (of which 43 were on type) Last 90 days - 6 hours Last 28 days - 2 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

The pilot was taxiing the aircraft, preparing to take off from Runway 21. Prior to entering the runway, he lifted the wing to make a visual check that it was clear of traffic but an unexpected gust of wind caught the wing at that moment and the aircraft tipped onto its side, damaging the wing pivot. The control tower noted that the wind was from the south/southwest at 5 to 10 kt, gusting 15 kt, at the time.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Savannah Jabiru(5), G-CECK	
<b>No &amp; Type of Engines:</b>	1 Jabiru 2200 piston engine	
<b>Year of Manufacture:</b>	2006 (Serial no: BMAA/HB/495)	
<b>Date &amp; Time (UTC):</b>	24 November 2013 at 1500 hrs	
<b>Location:</b>	Palmer Moor Farm, Ashbourne, Derbyshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to the left wing, landing gear and propeller	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	66 years	
<b>Commander's Flying Experience:</b>	286 hours (of which 60 were on type) Last 90 days - 10 hours Last 28 days - 2 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The aircraft was departing from Runway 27 at a private strip which was about 290 metres in length. The pilot reported that the wind was from the northwest and, with all checks completed and one stage of flap selected, he applied full power. At about 40 kt, the pilot eased back on the control stick and, responding normally, the aircraft lifted off. He then noted that it was not responding in roll and was drifting to the right side of the runway. He applied left rudder and lowered the nose. However, the aircraft stalled and the left wing struck the ground, damaging that wing, the landing gear and the propeller.

The pilot considered that, as he took off, the wind veered to the north, resulting in a loss of airspeed and the subsequent stall. The BMAA Homebuilt Aircraft Data Sheet (HADS) for the MXP-740 Savannah states that the type's stalling speed varies from 28 kt to 35 kt depending on the position of the centre of gravity.



## **Miscellaneous**

This section contains Addenda, Corrections and a list of the ten most recent Aircraft Accident ('Formal') Reports published by the AAIB.

The complete reports can be downloaded from the AAIB website ([www.aaib.gov.uk](http://www.aaib.gov.uk)).



## **TEN MOST RECENTLY PUBLISHED FORMAL REPORTS ISSUED BY THE AIR ACCIDENTS INVESTIGATION BRANCH**

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| <p>2/2010 Beech 200C Super King Air, VQ-TIU at 1 nm south-east of North Caicos Airport, Turks and Caicos Islands, British West Indies on 6 February 2007.<br/>Published May 2010.</p> <p>3/2010 Cessna Citation 500, VP-BGE 2 nm NNE of Biggin Hill Airport on 30 March 2008.<br/>Published May 2010.</p> <p>4/2010 Boeing 777-236, G-VIIR at Robert L Bradshaw Int Airport St Kitts, West Indies on 26 September 2009.<br/>Published September 2010.</p> <p>5/2010 Grob G115E (Tutor), G-BYXR and Standard Cirrus Glider, G-CKHT Drayton, Oxfordshire on 14 June 2009.<br/>Published September 2010.</p> <p>6/2010 Grob G115E Tutor, G-BYUT and Grob G115E Tutor, G-BYVN near Porthcawl, South Wales on 11 February 2009.<br/>Published November 2010.</p> <p>7/2010 Aerospatiale (Eurocopter) AS 332L Super Puma, G-PUMI at Aberdeen Airport, Scotland on 13 October 2006.<br/>Published November 2010.</p> | <p>8/2010 Cessna 402C, G-EYES and Rand KR-2, G-BOLZ near Coventry Airport on 17 August 2008.<br/>Published December 2010.</p> <p>1/2011 Eurocopter EC225 LP Super Puma, G-REDU near the Eastern Trough Area Project Central Production Facility Platform in the North Sea on 18 February 2009.<br/>Published September 2011.</p> <p>2/2011 Aerospatiale (Eurocopter) AS332 L2 Super Puma, G-REDL 11 nm NE of Peterhead, Scotland on 1 April 2009.<br/>Published November 2011.</p> <p>1/2014 Airbus A330-343, G-VSXY at London Gatwick Airport on 16 April 2012.<br/>Published February 2014.</p> |
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Unabridged versions of all AAIB Formal Reports, published back to and including 1971, are available in full on the AAIB Website

<http://www.aaib.gov.uk>

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## GLOSSARY OF ABBREVIATIONS

aal	above airfield level	lb	pound(s)
ACAS	Airborne Collision Avoidance System	LP	low pressure
ACARS	Automatic Communications And Reporting System	LAA	Light Aircraft Association
ADF	Automatic Direction Finding equipment	LDA	Landing Distance Available
AFIS(O)	Aerodrome Flight Information Service (Officer)	LPC	Licence Proficiency Check
agl	above ground level	m	metre(s)
AIC	Aeronautical Information Circular	mb	millibar(s)
amsl	above mean sea level	MDA	Minimum Descent Altitude
AOM	Aerodrome Operating Minima	METAR	a timed aerodrome meteorological report
APU	Auxiliary Power Unit	min	minutes
ASI	airspeed indicator	mm	millimetre(s)
ATC(C)(O)	Air Traffic Control (Centre)( Officer)	mph	miles per hour
ATIS	Automatic Terminal Information System	MTWA	Maximum Total Weight Authorised
ATPL	Airline Transport Pilot's Licence	N	Newtons
BMAA	British Microlight Aircraft Association	$N_R$	Main rotor rotation speed (rotorcraft)
BGA	British Gliding Association	$N_g$	Gas generator rotation speed (rotorcraft)
BBAC	British Balloon and Airship Club	$N_i$	engine fan or LP compressor speed
BHPA	British Hang Gliding & Paragliding Association	NDB	Non-Directional radio Beacon
CAA	Civil Aviation Authority	nm	nautical mile(s)
CAVOK	Ceiling And Visibility OK (for VFR flight)	NOTAM	Notice to Airmen
CAS	calibrated airspeed	OAT	Outside Air Temperature
cc	cubic centimetres	OPC	Operator Proficiency Check
CG	Centre of Gravity	PAPI	Precision Approach Path Indicator
cm	centimetre(s)	PF	Pilot Flying
CPL	Commercial Pilot's Licence	PIC	Pilot in Command
°C,F,M,T	Celsius, Fahrenheit, magnetic, true	PNF	Pilot Not Flying
CVR	Cockpit Voice Recorder	POH	Pilot's Operating Handbook
DFDR	Digital Flight Data Recorder	PPL	Private Pilot's Licence
DME	Distance Measuring Equipment	psi	pounds per square inch
EAS	equivalent airspeed	QFE	altimeter pressure setting to indicate height above aerodrome
EASA	European Aviation Safety Agency	QNH	altimeter pressure setting to indicate elevation amsl
ECAM	Electronic Centralised Aircraft Monitoring	RA	Resolution Advisory
EGPWS	Enhanced GPWS	RFFS	Rescue and Fire Fighting Service
EGT	Exhaust Gas Temperature	rpm	revolutions per minute
EICAS	Engine Indication and Crew Alerting System	RTF	radiotelephony
EPR	Engine Pressure Ratio	RVR	Runway Visual Range
ETA	Estimated Time of Arrival	SAR	Search and Rescue
ETD	Estimated Time of Departure	SB	Service Bulletin
FAA	Federal Aviation Administration (USA)	SSR	Secondary Surveillance Radar
FIR	Flight Information Region	TA	Traffic Advisory
FL	Flight Level	TAF	Terminal Aerodrome Forecast
ft	feet	TAS	true airspeed
ft/min	feet per minute	TAWS	Terrain Awareness and Warning System
g	acceleration due to Earth's gravity	TCAS	Traffic Collision Avoidance System
GPS	Global Positioning System	TGT	Turbine Gas Temperature
GPWS	Ground Proximity Warning System	TODA	Takeoff Distance Available
hrs	hours (clock time as in 1200 hrs)	UHF	Ultra High Frequency
HP	high pressure	USG	US gallons
hPa	hectopascal (equivalent unit to mb)	UTC	Co-ordinated Universal Time (GMT)
IAS	indicated airspeed	V	Volt(s)
IFR	Instrument Flight Rules	$V_1$	Takeoff decision speed
ILS	Instrument Landing System	$V_2$	Takeoff safety speed
IMC	Instrument Meteorological Conditions	$V_R$	Rotation speed
IP	Intermediate Pressure	$V_{REF}$	Reference airspeed (approach)
IR	Instrument Rating	$V_{NE}$	Never Exceed airspeed
ISA	International Standard Atmosphere	VASI	Visual Approach Slope Indicator
kg	kilogram(s)	VFR	Visual Flight Rules
KCAS	knots calibrated airspeed	VHF	Very High Frequency
KIAS	knots indicated airspeed	VMC	Visual Meteorological Conditions
KTAS	knots true airspeed	VOR	VHF Omnidirectional radio Range
km	kilometre(s)		
kt	knot(s)		

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