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**(ALL TIMES IN THIS BULLETIN ARE UTC)**

## **AAIB Field Investigation Reports**

A Field Investigation is an independent investigation in which AAIB investigators collect, record and analyse evidence.

The process may include, attending the scene of the accident or serious incident; interviewing witnesses; reviewing documents, procedures and practices; examining aircraft wreckage or components; and analysing recorded data.

The investigation, which can take a number of months to complete, will conclude with a published report.



## ACCIDENT

<b>Aircraft Type and Registration:</b>	DA 40 Diamond Star, G-CBFA	
<b>No &amp; Type of Engines:</b>	1 Lycoming IO-360-M1A piston engine	
<b>Year of Manufacture:</b>	2001 (Serial no: 40.063)	
<b>Date &amp; Time (UTC):</b>	16 July 2016 at 1546 hrs	
<b>Location:</b>	Old Warden Aerodrome, Bedfordshire	
<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>	Nose landing gear leg, nose wheel, propeller and possible damage to engine	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	42 years	
<b>Commander's Flying Experience:</b>	269 hours (of which 38 were on type) Last 90 days - 26 hours Last 28 days - 21 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

The nose gear leg failed whilst the aircraft was taxiing. Detailed examination of the failed leg concluded the failure was due to a fatigue fracture. Because of previous similar failures, this part number nose gear leg was subject to an Airworthiness Directive that required regular inspection for cracks. This inspection had been completed 33 flying hours earlier, with no defect found. Since then the aircraft had been used for basic training, which involved a large number of takeoffs and landings from grass runways.

## History of the flight

The pilot of G-CBFA had hired the aircraft from a flying training organisation based at Redhill Aerodrome, which has three grass runways.

The pilot and two passengers had flown to Compton Abbas Airfield before flying to Old Warden Aerodrome, where they had landed on grass Runway 21, which was dry. The pilot reported that the landing was uneventful, but as the aircraft was taxied from the runway towards the parking area, it "felt very sluggish as though taxiing across long grass or soft ground". The aircraft then came to almost a complete stop and the pilot applied engine power, at which point the nose landing gear wheel detached and the aircraft tipped forward. The propeller struck the ground and the engine stopped. The pilot and passengers were uninjured and vacated the aircraft unaided.

The pilot inspected the ground around the aircraft, and could find no cause for the aircraft stopping. The pilot later commented that the aircraft had also felt “slightly unusual” when taxiing on the ground at Compton Abbas, but had assumed that this was due to the grass surface. Subsequently, he considered that this may have been the “first signs” of a problem with the nose gear.

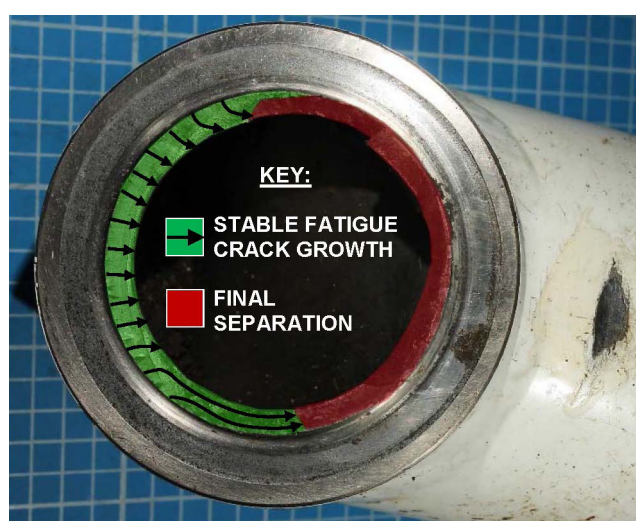
### Relevant technical information

In 2005, Airworthiness Directive (AD) A-2005-005 was issued to inspect for cracks on the nose landing gear leg (part number D41-3223-10-00) fitted to DA 40 aircraft. The AD was issued following the failure of the nose gear leg fitted to an aircraft that had been mainly operated on grass runways and for the purposes of training. The AD required that aircraft predominantly (more than 50% of the time) operated on grass runways be inspected at intervals not exceeding 100 flight hours, and those operated for more than 50% of the time from paved runways not more than every 200 flight hours. In 2009, AD A-2005-005 was superseded by AD 2009-0016, which retained the previous inspection limits unless the nose gear leg had been replaced with a modified leg, for which no further inspections were required.

The nose landing gear leg fitted to G-CBFA was part number D41-3223-10-00, and therefore routine inspection was required. As the aircraft was predominantly operated from the grass runways at Redhill Aerodrome, the inspection limit of no more than 100 flight hours was applicable.

### Technical examination of the failed nose gear leg

The fracture surfaces were examined by a metallurgical consultant, who concluded that the failure was due to a fatigue fracture which had progressed approximately half way across the part, Figure 1. At this point the nose leg had failed in overload, resulting in separation of the nosewheel assembly.



*Image courtesy ms4i*

**Figure 1**

Failed part of nose gear leg, view looking up with forward to the left showing fatigued area (green) and crack growth



Photographs of the failed parts were also sent to the aircraft manufacturer. Its materials expert reached similar conclusions, adding:

*'It is difficult to tell something about the number of landings, the distance the aircraft has to taxi on ground that a fatigue fracture can propagate as shown in the pictures. It is also possible that the propagation of fatigue or forced fracture was favored by one or more hard landings.'*

### **Relevant maintenance history**

The nose gear leg had last been inspected in accordance with AD A-2005-005 on 27 May 2016 and no defect was found. The aircraft had at that time flown 1,558.5 hours. Since then it had been used mainly for basic training and had operated for approximately 33 flight hours, during which it had made 85 takeoffs and landings. These included touch-and-gos; the majority were on grass runways.

### **Discussion**

AD A-2005-005 was issued after failures of a similar nose gear legs and requires regular use of a dye penetrant inspection to identify the formation of cracks. The successful use of dye penetrant relies on thorough cleaning of the part so that the dye is able to penetrate a crack. The inspection is conducted with the leg installed and the area being inspected is greased. Although it is straightforward to remove grease from the general inspection area, it may be more difficult to sufficiently clean the grease from inside a crack to allow the dye to penetrate. However, in this case, there was no evidence that the maintenance organisation had incorrectly carried out the inspection.

It is also possible that the nose gear leg may have been inadvertently subjected to frequent and possibly excessive loads whilst operating from grass runways, particularly in the basic training environment where more time is spent practising takeoffs and landings.

### **Conclusion**

The failure of the leg is similar to previously known failures and the crack occurred in the area highlighted for inspection by AD A-2005-005. The failure occurred 33 flight hours after the last inspection and there was no evidence that the maintenance organisation had incorrectly carried out the inspection.

The potential for unpredictably harsh and abrupt loads when operating from grass runways can have a detrimental effect on landing gear life. The aircraft manufacturer, which is aware of this failure, had previously modified the original nose gear leg design as a result of in service experience. Pre-modified nose gear legs to the original design, similar to this, remain subject to regular inspections under AD A-2005-005.



## **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 A319-131, G-DBCB
<b>No &amp; Type of Engines:</b>	2 International Aero Engine V2522-A5 turbofan engines
<b>Year of Manufacture:</b>	2004 (Serial no: 2188)
<b>Date &amp; Time (UTC):</b>	21 October 2016 at 2130 hrs
<b>Location:</b>	On approach to London Gatwick Airport
<b>Type of Flight:</b>	Commercial Air Transport (Non-Revenue)
<b>Persons on Board:</b>	Crew - 5                      Passengers - None
<b>Injuries:</b>	Crew - None                      Passengers - N/A
<b>Nature of Damage:</b>	None
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	35 years
<b>Commander's Flying Experience:</b>	8,340 hours (of which 605 were on type) Last 90 days - 190 hours Last 28 days - 12 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and safety report by the operator

The day before the incident, during a cross-bleed engine start, the co-pilot noticed a brief acidic smell that returned just before takeoff and twice during the climb. The commander was unable to detect anything unusual until they were in the cruise, when the smell returned with increasing intensity. The smell was strongest in the area of the co-pilot's rudder pedals and side-stick controller but there were no symptoms in the passenger cabin. The crew initiated the Smoke/Fire/Fumes emergency checklist and with the smell becoming stronger, they diverted to Bordeaux, where the landing was uneventful.

The smell could not be reproduced on the ground but the avionics blower fan was inhibited before the aircraft departed the following day on a re-positioning flight to London Gatwick. The smell returned when the crew initiated their descent and they donned their oxygen masks and declared a PAN.

Investigation by the operator did not identify the definitive source of the smell, although a number of components were replaced. These included the right brake master cylinder which was found to be leaking hydraulic oil. The aircraft has completed over 30 flights since the incident without recurrence.

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Airbus A319-111, G-EZMH	
<b>No &amp; Type of Engines:</b>	2 CFM CFM56-5B5/P turbofan engines	
<b>Year of Manufacture:</b>	2003 (Serial no: 2053)	
<b>Date &amp; Time (UTC):</b>	31 December 2016 at 1600 hrs	
<b>Location:</b>	London Gatwick Airport	
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 5	Passengers - 144
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	None	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	42 years	
<b>Commander's Flying Experience:</b>	7,497 hours (of which 5,297 were on type) Last 90 days - 188 hours Last 28 days - 80 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

Excessive cabin heat was reported on the left side of the rear galley approximately 20 minutes from the top of descent into London Gatwick, but no obvious cause was identified. At about ten miles from the threshold of Runway 26R, cabin crew reported that smoke could be smelt in the rear galley; this was described as a "strong, sweet, hot, dusty electrical smell".

The flight crew transmitted a PAN call to inform ATC, stating their intention to stop on the taxiway after landing in order to gain further information from the cabin. Attendance of the Airport Fire Service (AFS) was requested as a precaution. The initial actions of the 'Smoke/Fumes' QRH checklist were completed and the aircraft landed uneventfully and stopped on Taxiway J. The AFS examined the exterior of the aircraft before following it to the parking stand. Firefighters boarded the aircraft and checked the rear galley, but no source of heat or smell was found.

During subsequent maintenance checks the only finding was an inoperative beverage maker in the rear galley. This was replaced and the aircraft has since operated satisfactorily.

**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>	10 November 2016 at 0800 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 - 9
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	None	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	50 years	
<b>Commander's Flying Experience:</b>	6,340 hours (of which 3,100 were on type) Last 90 days - 48 hours Last 28 days - 15 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

While vacating Runway 26 at Alderney Airport following a rejected takeoff, G-RLON trampled a runway edge light. The pilot reported that he was made aware of the damage to the light but, because he could see no corresponding damage to his aircraft, particularly to the tyres, he decided to continue with the flight. After the aircraft took off, the Airport Fire Service found a "gouge" on the grass which, it was thought, might have been caused by a flat tyre. ATC relayed this information to the pilot who decided to fly past the ATC tower at Guernsey Airport for a visual inspection. No damage was seen during this inspection and the pilot landed without further incident. The pilot reported that, following the flight, engineers inspected the aircraft and found nothing which they considered to have been caused by the incident before departure.

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Boeing 737-8K5, G-FDZY
<b>No &amp; Type of Engines:</b>	2 CFM56-7B27E turbofan engines
<b>Year of Manufacture:</b>	2011 (Serial no: 37261)
<b>Date &amp; Time (UTC):</b>	10 January 2017 at 0821 hrs
<b>Location:</b>	Bournemouth Airport, Dorset
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 7                      Passengers - 177
<b>Injuries:</b>	Crew - None                Passengers - None
<b>Nature of Damage:</b>	Three fan blades damaged
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	42 years
<b>Commander's Flying Experience:</b>	11,672 hours (of which 7,868 were on type) Last 90 days - 168 hours Last 28 days - 54 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

**Synopsis**

The left engine ingested a bird as the aircraft took off and the crew diverted to London Gatwick for an uneventful, overweight precautionary landing.

**History of the flight**

As the aircraft was rotated for takeoff the left engine ingested a bird, which was later identified as a seagull. A change to the engine sound was heard and the indicated engine vibration increased, accompanied by light airframe vibration. Takeoff thrust was maintained without engine limits being exceeded.

The crew levelled the aircraft at 4,000 ft amsl to assess the situation and requested a return to Bournemouth to hold. They informed ATC of the birdstrike and asked for the runway to be inspected.

With the aircraft in level flight, the vibration reduced and the engine was operating within allowable parameters. The crew liaised with the aircraft operator by radio and decided to divert to London Gatwick, which has a longer runway than Bournemouth. The time in the hold was used to brief the crew and passengers, burn fuel to reduce the landing weight and consult the Quick Reference Handbook; the '*High Engine Vibration*' checklist was reviewed to pre-empt an increase in vibration in the event of a go-around. It was apparent that engine vibration worsened if power was increased, so the crew decided to perform a precautionary



overweight landing using FLAP 15. Landing performance was confirmed satisfactory and the crew briefed on flare technique, stopping and selecting non-standard FLAP 1 in the event of a go-around.

A PAN call was made when the diversion was initiated and the crew briefed Gatwick ATC that they intended to vacate the runway and stop to allow the fire service to examine the engine and brakes. The crew informed the cabin crew and passengers that they were diverting to Gatwick and explained the expected order of events on the ground.

The landing was uneventful and, after the fire service had completed an external check of the aircraft, it was taxied to a parking stand with the left engine shut down. Three fan blades were damaged by the birdstrike. The engine was subsequently repaired on-wing.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Flitzer Z-1S, G-ECVZ	
<b>No &amp; Type of Engines:</b>	1 Ulpower UL260I piston engine	
<b>Year of Manufacture:</b>	2015 (Serial no: LAA 342-14817)	
<b>Date &amp; Time (UTC):</b>	29 October 2016 at 1530 hrs	
<b>Location:</b>	Priory Farm, Tibenham, Norfolk	
<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>	Fuselage structural damage, bent landing gear and upper right wing spar broken	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	61 years	
<b>Commander's Flying Experience:</b>	6,100 hours (of which 19 were on type) Last 90 days - 86 hours Last 28 days - 22 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

Following a normal touchdown the pilot applied "a blast of power and left rudder" to counter a gentle swing to the right. The swing continued and full power was applied to initiate a go-around. The pilot reported that the left main wheel clipped the top of a ditch and the aircraft came to rest inverted. He was uninjured and exited the aircraft without assistance.

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Pioneer 300, G-CEIX	
<b>No &amp; Type of Engines:</b>	1 Rotax 912 ULS piston engine	
<b>Year of Manufacture:</b>	2007 (Serial no: PFA 330-14656)	
<b>Date &amp; Time (UTC):</b>	6 September 2016 at 1513 hrs	
<b>Location:</b>	Wellesbourne Mountford Airfield, Warwickshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 2	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Main landing gear failed	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	68 years	
<b>Commander's Flying Experience:</b>	16,000 hours (of which 210 were on type) Last 90 days - 13 hours Last 28 days - 3 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and additional enquiries by the AAIB	

## Synopsis

The pilot reported a "jolt" during the takeoff roll and was subsequently unable to obtain a safe landing gear configuration when he arrived at his destination. He diverted to an airfield with a grass runway and emergency services and the landing gear collapsed on touchdown. Examination of the right main landing gear identified a structural failure and there was evidence that a crack had been progressing for some time.

The Light Aircraft Association is reviewing the landing gear maintenance procedures and inspection requirements for this aircraft type.

## History of the flight

On approach to Bidford Airfield, the pilot selected the landing gear DOWN but the right main landing gear light did not indicate down and locked. The circuit breaker tripped when he tried recycling the system and the indications remained the same when he reset the circuit breaker after manually retracting and extending the landing gear.

He diverted to Wellesbourne where there is a grass runway and fire cover. Air Traffic Control confirmed that the landing gear configuration was abnormal and another manual retraction resulted in the right main landing gear remaining partially extended, with the wheel offset by approximately 45°.

The pilot extended the landing gear as far as possible and declared an emergency. Preparations were made for a probable landing gear collapse and the pilot used landing flap to reduce the approach speed. The magnetos and fuel were switched off during the flare and the landing gear collapsed before the aircraft came to a halt. The occupants were uninjured and exited without assistance.

### **Additional information**

Examination of the right main landing gear identified a structural failure and corrosion on the fracture faces showed that a crack had been progressing for some time. The pilot reported a “jolt” during the takeoff roll from a farm strip and it is possible that this was associated with the final failure.

The Light Aircraft Association is working with the manufacturer to review the landing gear maintenance practices and inspection requirements for this aircraft type.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	1) Piper PA-28-151 Cherokee Warrior, G-CCZV 2) Piper PA-28-161 Cherokee Warrior III, G-BZBS
<b>No &amp; Type of Engines:</b>	1) 1 Lycoming O-320-D3G (MODIFIED) piston engine 2) 1 Lycoming O-320-D3G piston engine
<b>Year of Manufacture:</b>	1) 1977 (Serial no: 28-7715089) 2) 2000 (Serial no: 2842080)
<b>Date &amp; Time (UTC):</b>	30 September 2016 at 1443 hrs
<b>Location:</b>	Near Elstree Aerodrome, Hertfordshire
<b>Type of Flight:</b>	1) Training 2) Private
<b>Persons on Board:</b>	1) Crew - 1                      Passengers - None 2) Crew - 1                      Passengers -1
<b>Injuries:</b>	1) Crew - None                  Passengers - N/A 2) Crew - None                  Passengers - None
<b>Nature of Damage:</b>	1) Damaged left landing gear wheel, tyre and fairing 2) One propeller blade bent, tyre marks on left wing
<b>Commander's Licence:</b>	1) Student 2) Private Pilot's Licence
<b>Commander's Age:</b>	1) 57 years 2) 72 years
<b>Commander's Flying Experience:</b>	1) 136 hours (of which all were on type) Last 90 days - 21 hours Last 28 days - 8 hours  2) 127 hours (of which all were on type) Last 90 days - 12 hours Last 28 days - 6 hours
<b>Information Source:</b>	Aircraft Accident Report Forms submitted by the pilots

**Synopsis**

G-CCZV and G-BZBS were approaching each other on a collision course. Neither pilot saw the other aircraft in time to take avoiding action. Each pilot's attention was inside the cockpit immediately before the collision.

**History of the flight**

The pilot of G-CCZV was a student on a navigation exercise flying from Leicester Airport to Elstree Aerodrome. He was heading towards Elstree Aerodrome which he could see in

what he described as excellent visibility<sup>1</sup>. Near the junction of the M1 and M25 motorways, at approximately 2,000 ft (using a pressure setting of 1010 hPa), he contacted Elstree Information on the radio and, after receiving instructions to join for Runway 26, looked inside the cockpit to set the QFE (999 hPa) on the altimeter. While his attention was inside the cockpit he heard a “substantial thump” to the left wing of his aircraft and saw a “flash” of an aircraft passing by. He realised that he had been involved in a collision but the aircraft and engine appeared to be performing normally and he continued to Elstree and landed. After landing, damage was observed to the left landing gear, wheel and tyre as shown in Figures 1 and 2.



**Figure 1**

G-CCZV left landing gear



**Figure 2**

G-CCZV left wheel and tyre

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**Footnote**

<sup>1</sup> The track from the M1/M25 junction to Elstree Aerodrome is 148°M.

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G-BZBS was flying from Stapleford Aerodrome to White Waltham Aerodrome, and was on a track from abeam Banbury Reservoir VRP<sup>2</sup> to Bovingdon VOR<sup>3</sup> at 2,200 ft on a pressure setting of 1021 hPa. The pilot reported that he was flying towards a “bright sun” which was low in the sky and reducing visibility in the direction of flight. He looked at his map to verify his position before calling Farnborough LARS on the radio when he saw a “flash” overhead and felt an impact. Although aircraft controllability was not affected, he declared a PAN on the Farnborough LARS frequency and stated his intention to divert to Elstree Aerodrome where he landed without further incident. After landing, damage was observed to the aircraft’s propeller blade and left wing upper surface as shown in Figures 3 and 4.

### Assessment of cause

Figures 2 and 3 show that G-BZBS’s propeller blade struck G-CCZV’s left wheel and tyre and Figure 4 shows that G-CCZV’s left tyre then struck the upper surface of G-BZBS’s wing. The tracks of the aircraft were approximately 148°M (G-CCZV) and 274°M (G-BZBS) giving a closing angle of approximately 54° which, given that the aircraft were flying straight and level at constant speed and altitude, would have remained constant in the lead-up to the collision. Neither pilot saw the other aircraft in time to take avoiding action. It is likely that the poor into-sun visibility, the constant angle between the tracks of the aircraft, and the fact that the attention of both pilots was inside their respective cockpits before the collision, contributed to the breakdown of the see-and-avoid principle for flight in Class G (uncontrolled) airspace<sup>45</sup>.



**Figure 3**  
G-BZBS propeller blade

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#### Footnote

<sup>2</sup> VRP: Visual reporting point.

<sup>3</sup> The track from north-abeam Banbury Reservoir VRP to Bovingdon VOR is 274°M.

<sup>4</sup> For a full discussion on limitations of the see-and-avoid principle, see the following Australian Transport Safety Bureau document: [https://www.atsb.gov.au/media/4050593/see\\_and\\_avoid\\_report\\_print.pdf](https://www.atsb.gov.au/media/4050593/see_and_avoid_report_print.pdf)

<sup>5</sup> For the Civil Aviation Authority report on its project to develop a new industry standard for a low-cost conspicuity device for use on light aircraft, see Civil Aviation Publication (CAP) 1391. Available: <http://publicapps.caa.co.uk/docs/33/CAP1391%20DEC16.pdf>



**Figure 4**  
G-BZBS left wing



**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Piper PA-28-180 Cherokee, G-AVSB	
<b>No &amp; Type of Engines:</b>	1 Lycoming O-360-A4A piston engine	
<b>Year of Manufacture:</b>	1967 (Serial no: 28-4191)	
<b>Date &amp; Time (UTC):</b>	19 October 2016 at 1128 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>	Forward fuselage, propeller and landing gear	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	34 years	
<b>Commander's Flying Experience:</b>	80 hours (of which 52 were on type) Last 90 days - 1 hour Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The aircraft touched down on Runway 26 and, during the landing roll, the pilot retracted the flaps and applied toe-brakes, intending to come to a complete stop. However, the aircraft "swerved" to the left and departed the paved surface. The pilot then applied power, with the intention of becoming airborne, in an attempt to reposition the aircraft towards the runway. However, the aircraft's nose landing gear collapsed and it came to a stop off the runway surface. The pilot and passenger were uninjured.

The pilot subsequently commented that he may have applied asymmetric braking when attempting to stop on the runway.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Piper PA-32R-300 Lance, N83VK	
<b>No &amp; Type of Engines:</b>	1 Lycoming IO-540-K1G5D piston engine	
<b>Year of Manufacture:</b>	1977	
<b>Date &amp; Time (UTC):</b>	28 October 2016 at 1017 hrs	
<b>Location:</b>	Stapleford Aerodrome, Essex	
<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>	Damage to nose landing gear, propeller and possible shock-loading to engine	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	39 years	
<b>Commander's Flying Experience:</b>	75 hours (of which 14 were on type) Last 90 days - 3 hours Last 28 days - 0 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and additional enquiries made by the AAIB	

The pilot made a normal approach to Runway 21L at Stapleford, a predominantly grass runway 1,077 m long with a 600 m long, but less than half-width, asphalt insert situated at the north-east end of the runway. The wind was from 260° at 9 kt and the runway condition was dry.

The pilot reported that touchdown on the asphalt surface was normal but, during the landing roll, the aircraft began to drift slowly to the left side of the asphalt. He did not attempt to arrest this drift, thinking that, as the aircraft was slowing normally, he would leave the paved surface at a low speed. However, as the aircraft crossed onto the grass surface, the nose landing gear fractured and the propeller struck the ground. The pilot suffered no injuries during the accident and was able to exit the aircraft normally.

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Piper PA-44-180 Seminole, G-BGCO	
<b>No &amp; Type of Engines:</b>	2 Lycoming O-360-E1A6D piston engines	
<b>Year of Manufacture:</b>	1978 (Serial no: 44-7995128)	
<b>Date &amp; Time (UTC):</b>	19 October 2016 at 1255 hrs	
<b>Location:</b>	Warton Aerodrome, Lancashire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 2	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Right propeller	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	63 years	
<b>Commander's Flying Experience:</b>	N/K Last 90 days - N/K Last 28 days - N/K	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

**Synopsis**

The pilot lost directional control on landing and the aircraft departed the runway as a result of the emergency landing gear lowering cable fouling one of the brake pedals. The right propeller was damaged when it struck the ground as the pilot attempted to taxi from the grass back onto the paved surface.

**History of the flight**

The handling pilot reported that, following an uneventful flight from Cranfield and a base leg join, he carried out an approach to Runway 25. The surface was dry and the wind was light and from the north-west. The intention was to execute a 'touch-and-go' landing. Having confirmed that the other occupant had his feet clear of the rudder pedals, the touchdown was carried out on the mainwheels. Immediately afterwards, the nosewheel came down very sharply onto the runway surface and the aircraft began diverging to the left. Observers noted a small puff of smoke from beneath the aircraft as it touched down. The pilot had difficulty in bringing the aircraft back to the centreline. It continued to pull strongly to the left and, as the speed reduced to a fast walking pace, it ran onto the adjacent grass.

It was decided that the final position of the aircraft would cause difficulties in the continued operation of the airfield and so an attempt was made to taxi the aircraft toward the nearby Taxiway C. During this manoeuvre the right propeller struck the ground, damaging one of the blade tips.

### **Aircraft examination**

Subsequent examination of the aircraft revealed that the cable operating the emergency landing gear lowering system was in contact with the left brake pedal on the right hand pilot's rudder pedals. Whilst forward movement of the right hand rudder pedal in either pilot position would cause both left rudder pedals to move aft in the normal way, the aft movement of the left rudder pedal in the right pilot's position would cause the cable to tighten and drive the left brake pedal forward relative to the rudder pedal on which it was mounted. Consequently, operation of the rudder pedal system in attempts to steer the aircraft to the right would result in the inadvertent application of the left brake.

The possibility of the emergency release cable coming into contact with a brake pedal on this aircraft type was identified many years ago. Consequently, a service bulletin was issued by the manufacturer to install a fitting which located the cable more positively, preventing mutual contact. An Airworthiness Directive was subsequently raised to mandate the installation of this fitting. Examination of the aircraft confirmed that the fitting had been installed; unfortunately installation had been carried out incorrectly and the fitting was orientated such that the risk of hazardous contact between the cable and the brake pedal was increased, rather than eliminated.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Pitts S-1S Special, G-BXTI	
<b>No &amp; Type of Engines:</b>	1 Lycoming O-360-A4A piston engine	
<b>Year of Manufacture:</b>	1971 (Serial no: NP1)	
<b>Date &amp; Time (UTC):</b>	12 October 2016 at 1500 hrs	
<b>Location:</b>	Southernness, Dumfries	
<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>	Damage to tail section, landing gear, fuselage, engine and propeller	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	51 years	
<b>Commander's Flying Experience:</b>	418 hours (of which 89 were on type) Last 90 days - 34 hours Last 28 days - 11 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

G-BXTI and another aircraft departed from a local private farm strip with the intention of performing some practice precautionary landings on an isolated sandbar on the coast. The pilot had landed there on previous occasions.

The other aircraft landed first and then marked an appropriate area of hard sand, while G-BXTI circled overhead. The pilot of G-BXTI then performed a low-level circuit with go-around, followed by an approach to land. During the flare, the pilot reported that the "holding off felt longer" than he was expecting, which he attributed to a headwind of approximately 10 kt. During this stage, the aircraft drifted to the left by 15-20 m which the pilot did not notice. As the aircraft settled on the sand, the pilot reported a significant deceleration and the aircraft tipped onto its nose before he could react.

Subsequent examination of the tyre tracks revealed that the aircraft had drifted far enough to the left to miss the area of hard sand which had previously been marked. Touchdown was in an area of softer sand into which the tyres sank, leading to the abrupt deceleration.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Socata TB10 Tobago, G-MRTN	
<b>No &amp; Type of Engines:</b>	1 Lycoming O-360-A1AD piston engine	
<b>Year of Manufacture:</b>	1980 (Serial no: 62)	
<b>Date &amp; Time (UTC):</b>	27 August 2016 at 1500 hrs	
<b>Location:</b>	Approximately 1 km east of Henstridge Airfield, Somerset	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 3
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Fire damage to the engine bay and lower fuselage	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	44 years	
<b>Commander's Flying Experience:</b>	1,147 hours (of which 50 were on type) Last 90 days - 71 hours Last 28 days - 24 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The pilot reported that the power checks were normal; however the takeoff roll was a little longer than expected and the rate of climb was less than 400 ft/min, so the decision was made to return to the airfield. A smell of burning was then noticed in the cockpit, with white smoke emanating from the cowling. At around 500 ft agl, the engine started to lose power and the smoke increased in intensity. The pilot made a MAYDAY call, switched the fuel off and completed a successful forced landing in a field. The occupants exited through the two doors, and the pilot returned to the aircraft and used a fire extinguisher to fight the flames in the engine bay.

The pilot believes that the exhaust had become detached and the hot gases had started a fire in the engine bay, which also caused damage to the lower fuselage.

The pilot had an instructor rating and hence had good recency in practice forced landings. This, and the fairly low height when the fire started, were probably factors that resulted in a successful forced landing.

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Vans RV-9A, G-RPRV
<b>No &amp; Type of Engines:</b>	1 Lycoming O-320-B2C piston engine
<b>Year of Manufacture:</b>	2003
<b>Date &amp; Time (UTC):</b>	23 August 2016 at 1200 hrs
<b>Location:</b>	Nympsfield Airfield, Gloucestershire
<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>	Substantial damage to nose landing gear, propeller, canopy, upper fin/rudder assembly and right wingtip
<b>Commander's Licence:</b>	Private Pilot's Licence
<b>Commander's Age:</b>	66 years
<b>Commander's Flying Experience:</b>	727 hours (of which 10 were on type) Last 90 days - 28 hours Last 28 days - 22 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries made by the AAIB

## Synopsis

The aircraft landed on an undulating grass runway and had slowed down to an estimated groundspeed of 20 kt when the nose landing gear collapsed and the aircraft inverted. The pilot exited the aircraft through a hole he cut in the damaged canopy, using a fire axe.

## History of the flight

Before flying to Nympsesfield from Kemble Airfield, the pilot viewed a briefing document on the resident gliding club's website, noting it '*is a less than smooth grass field with various slopes along its length and width...*' The document includes an aerial photograph marked with an '*unlandable*' area, adjacent to a track used by glider winch vehicles, and the club recommends that landings are made midway between the track and the northern airfield boundary.

Weather conditions were good and the surface appeared dry when the pilot touched down normally and reduced speed, on a north-easterly heading. There were no markings to indicate the extent of the '*unlandable*' area but the pilot assessed he remained clear, to the north of it. However, he was aware of going over a hump on the runway surface and he believes it is possible that he instinctively moved the stick forward at the top of the hump, rather than keeping it fully back, while moving on rough ground. He estimated his ground speed had reduced to approximately 20 kt by this stage.

Without warning, the nose of the aircraft dropped, the propeller hit the ground and the aircraft flipped upside down. The pilot was uninjured and turned off the electric master switch before reaching for the fire axe. The canopy had been damaged and the pilot used the axe to cut a hole, through which he was able to crawl out of the aircraft.

A check of the landing surface did not reveal any specific holes or troughs which might have been encountered but it was apparent the nose landing gear leg had failed and bent back on itself, reducing the propeller's ground clearance.

### **Gliding club comment**

The gliding club explained that, along a portion of the airfield, the grass slopes steeply either side of the track used by glider winch vehicles, which is why this area is marked as 'unlandable.' This area extends approximately 10 metres to the north of the track but might appear more extensive on the photograph in the club's document. The club confirmed that the accident aircraft did not encroach the 'unlandable' area and updated its briefing information for visiting pilots following this accident.

### **Previous AAIB investigations**

The AAIB has published reports on 13<sup>1</sup> previous occasions where the nose landing gear of a Vans RV-6A, 7A, 8A or 9A has failed. Seven of these occurred while landing on soft or undulating grass and one occurred during takeoff from a sloping grass runway. Of these, three of the aircraft also flipped inverted. The remaining five incidents occurred while landing on asphalt runways, with four from bounced or heavy landings.

### **Light Aircraft Association (LAA) oversight**

The aircraft involved in this accident was being flown on a Permit to Fly administered by the LAA, which is aware of historical nose landing gear issues on certain aircraft types, including the Vans RV series. It is also aware of research which suggests that, under some circumstances, rough ground can cause the nose landing gear leg to resonate, inducing a harmonic resonance that can lead to failure. This can, in turn, lead to a situation where the nosewheel fork assembly can impact the runway surface.

One modification aimed at overcoming this resonance is an 'Anti Splat' kit, which has been designed to alter the harmonics of the nose landing gear leg and restrain it from tucking under. This modification is approved by the LAA and is detailed in its Type Acceptance Data Sheet (TADS) for applicable Vans types, including the RV-9A<sup>2</sup>. The LAA has also approved the fitment of a modified fork assembly to facilitate an increase in tyre size which, when fitted, increases the distance from the fork to the runway surface. According to the LAA's records, the Vans RV-6A, G-RVSA which inverted on 30 August 2008 (AAIB Bulletin 12/2008) was fitted with both these modifications.

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#### **Footnote**

<sup>1</sup> G-IIRV AAIB Bulletin 9/2014, G-CGXR AAIB Bulletin 10/2013, G-RVCH AAIB Bulletin 1/2013, G-RVPW AAIB Bulletin 9/08, G-RVSA AAIB Bulletin 11/2006, G-CCZY AAIB Bulletin 5/2007, G-EDRV AAIB Bulletin 2/2007, G-RVCG AAIB Bulletin 2/2005, G-BVRE AAIB Bulletin 8/2001, G-HOPY AAIB Bulletin 12/1999, G-RVSA AAIB Bulletin 12/2008, G-CDMF AAIB Bulletin 1/2008 and G-CDRM AAIB Bulletin 10/2007.

<sup>2</sup> See <http://www.lightaircraftassociation.co.uk/engineering/TADs/320%20VANS%20RV9-9A.pdf>



The TADS for the Vans RV-9A includes the following,

*Problems have been experienced with the RV-9A noseleg, especially when operating off grass, with instances of the nosewheel bending back and the strut digging into the ground, causing a rapid stop and further damage. In order to avoid this risk, it is important to maintain the correct nosewheel tyre pressure, and to trim the spat to ensure generous clearance between the tyre and the wheel aperture in the spat (circa half an inch). It is also important to maintain suitable preload on the nosewheel axle bearings, torquing up the axle nut gently as required in the absence of a conventional spacer between the bearings. It is also important to land the aircraft on the mainwheels first and hold the nosewheel off the ground during the initial part of the landing roll, rather than landing on all three wheels together which encourages wheelbarrowing and overloading the nosewheel.*

The final sentence reflects a programme initiated a few years ago by the LAA, to educate pilots of types which might be susceptible to this phenomena, to delay nosewheel contact as long as possible when landing. The LAA believes this has led to a reduction in the number of nose landing gear failures on light aircraft in recent years.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Cyclone AX2000, G-CBGS	
<b>No &amp; Type of Engines:</b>	1 HKS 700E piston engine	
<b>Year of Manufacture:</b>	2001 (Serial no: 7866)	
<b>Date &amp; Time (UTC):</b>	9 October 2016 at 1205 hrs	
<b>Location:</b>	Longside Airfield, Peterhead, Aberdeenshire	
<b>Type of Flight:</b>	Training	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Substantial	
<b>Commander's Licence:</b>	Student	
<b>Commander's Age:</b>	52 years	
<b>Commander's Flying Experience:</b>	49 hours (of which 27 were on type) Last 90 days - n/k hours Last 28 days - n/k hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The student pilot was carrying out his first solo flight. The weather conditions were suitable, with a calm wind and good visibility. The circuit and approach were uneventful but, during the landing, the aircraft yawed to the left just before touchdown and the pilot did not correct quickly enough. The main wheels contacted the surface but, with the aircraft now running towards the edge of the runway, he decided to go around. The aircraft started to lift off but the wheels caught the longer grass next to the runway and it tipped over, coming to rest inverted. The pilot, who was wearing a four-point harness, was able to exit through his side door without external assistance. He was uninjured but the aircraft was substantially damaged.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Gemini Flash IIA, G-MVMZ	
<b>No &amp; Type of Engines:</b>	1 Rotax 503 piston engine	
<b>Year of Manufacture:</b>	1988 (Serial no: 723-189-6-W515)	
<b>Date &amp; Time (UTC):</b>	23 July 2016 at 1535 hrs	
<b>Location:</b>	Private airstrip, Mitton, Penkridge, Staffordshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - None	Passengers - 1 (Minor)
<b>Nature of Damage:</b>	Damage to wing structure and wing attachment fittings	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	63 years	
<b>Commander's Flying Experience:</b>	349 hours (of which 159 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 pilot reported that, whilst landing from a local flight, a gust of wind caught the wing and he was unable to prevent a wingtip from contacting the ground. Although the aircraft was travelling slowly (approximately 15 mph), the ground contact caused the aircraft to "spin around" the wingtip. The weather was good and the wind was light, but variable and gusty.

## ACCIDENT

<b>Aircraft Type and Registration:</b>	HAV Airlander 10, G-PHRG	
<b>No &amp; Type of Engines:</b>	4 Technify Centurion C4.0 piston engines	
<b>Year of Manufacture:</b>	2012 (Serial no: 1)	
<b>Date &amp; Time (UTC):</b>	24 August 2016 at 1024 hrs	
<b>Location:</b>	Cardington Airfield, Bedfordshire	
<b>Type of Flight:</b>	Flight test	
<b>Persons on Board:</b>	Crew - 2	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Damage to cabin flight deck area	
<b>Commander's Licence:</b>	Commercial Pilot's Licence	
<b>Commander's Age:</b>	61 years	
<b>Commander's Flying Experience:</b>	12,700 hours (of which 4 were on type) Last 90 days - 3 hours Last 28 days - 3 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot, event investigation report supplied by the operator/manufacturer, and further AAIB enquiries	

## Synopsis

At the end of a test flight the aircraft could not be secured to its mooring mast because of a fault in winching apparatus at the mast. The aircraft departed again while the issue was investigated. As it did so the mooring line, which had been secured temporarily, fell free until it hung to its full length below the aircraft. The second approach therefore had to be higher than ideal, which resulted in the aircraft arriving over the landing site at an excessive height.

The test pilot attempted to manoeuvre the aircraft in order to bring the mooring line within reach of the ground crew, but in so doing, it unexpectedly adopted an exaggerated nose-down attitude and began to descend. The pilot was unable to affect a recovery before the aircraft struck the ground, causing damage to the cabin flight deck area.

## History of the flight

The aircraft was being flown on its second test flight, with the test pilot and a flight test engineer on board. The flight was supported by a ground-based flight test team and a ground handling team. The aircraft un-masted at 0812 hrs. The weather was fine, with a variable wind of about 2 kt.

Nearing the end of the test flight, 98 minutes after un-masting, the aircraft made a successful approach back to its mooring mast. The mooring line was extracted from its stowage by the ground crew for feeding onto a winch at the mooring mast assembly. However, a diesel engine that powered hydraulic pumps driving the winch could not be started, meaning that there would be a delay in securing the aircraft. Rather than loitering on the ground for a prolonged period, the pilot decided to take the aircraft airborne again. The mooring line was temporarily stowed through a small access panel in the cabin door but, after the aircraft left the ground, the rope fell out under its own weight until its full length was hanging free.

The pilot liaised with the ground team to establish the length of mooring line below the aircraft, but was incorrectly informed that it was about 50 ft (it was actually 47 m / 155 ft long). Once the problem with the ground equipment had been resolved, the pilot flew a further approach, although it had to be steeper to ensure the mooring line did not become entangled in trees or on the perimeter fence. Despite this precaution, at a height of about 120 ft on the approach, the line became entangled in wires which crossed the approach path about 200 m outside the airfield boundary.

Although the line was freed from the wires, the encounter contributed to a high final approach. Consequently a descent to ground level was not possible in the landing distance available and the aircraft arrived over the landing area at about 180 ft. The aircraft was reluctant to descend naturally and, with no forward airspeed, the pilot had limited control. He attempted to trim the aircraft nose-down by management of the centre of gravity, so that the mooring line would come within reach of the ground crew but, with the aircraft at about 10° nose-down pitch angle, it suddenly pitched further down to about 18° and started to descend.

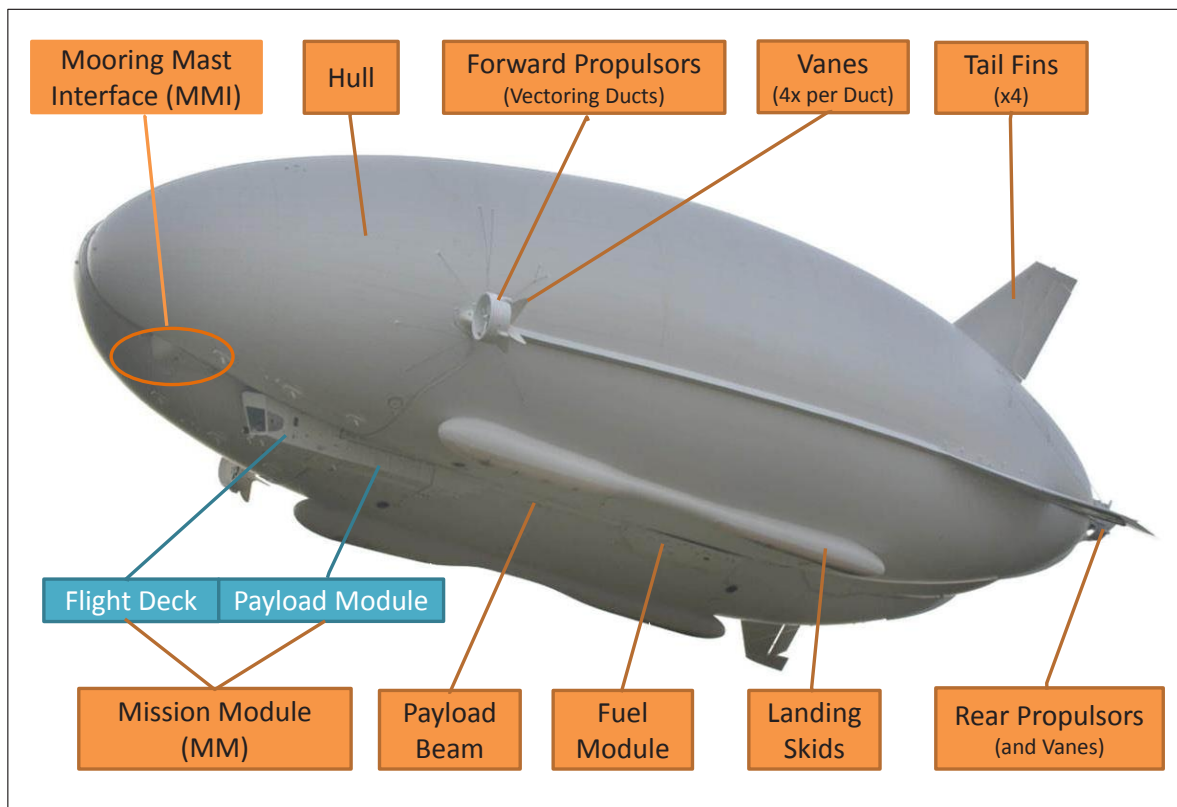
The pilot attempted to arrest the descent with the control available and was partly successful in that the aircraft's nose-down attitude started to reduce. However, there was insufficient height in which to affect a full recovery and the aircraft struck the ground still in an excessive nose-down attitude, causing structural damage to the flight deck area. The accident occurred 2 hours 12 minutes after un-masting.

Although the aircraft's systems appeared to remain fully functional after the impact, the crew was exposed to the open air through the damaged cabin sides, so the decision was made to evacuate. The aircraft's systems were secured and the pilot and engineer vacated to the left and right, through gaps in the damaged structure. There were no injuries to flight or ground crew, and the aircraft was subsequently attached to the mooring mast and secured.

## **Aircraft information**

### *General*

The Airlander 10 (Figure 1) is a development of the HAV 304 hybrid aircraft which was designed and produced as a long-endurance surveillance platform for the US military. The hull is a large pressure-stabilised fabric structure containing helium and air in separate compartments. Its aerodynamic shape contributes up to 40% of the vehicle's total lift. The Airlander 10 made its first test flight on 17 August 2016.



**Figure 1**

Main assemblies of the Airlander 10 (*Courtesy Ivor Pope / HAV*)

The 92 m long aircraft is powered by four turbocharged diesel engines, two mounted forward and two at the stern. The engines are configured to provide an element of vectored thrust for takeoff, landing and ground handling operations.

The flight deck is mounted at the forward end of the mission module, a structure suspended under the centreline of the hull.

The buoyancy of the aircraft is expressed in terms of static heaviness. A static heaviness of zero would equate to neutral buoyancy, such that the aircraft would neither rise nor fall unless acted on by other forces. In normal operation the aircraft has positive static heaviness, being overall heavier than air. Generally, static heaviness reduces as fuel is burned and it may also be affected by precipitation and by environmental warming of the helium gas.

#### *Landing and mooring procedures*

The intended normal landing profile involves a touchdown with some forward airspeed, followed by a short landing roll as the aircraft naturally slows to a stop. Without the means of providing significant vertical thrust, the aircraft is not capable of true vertical landings (in calm or very light wind conditions).

The aircraft's mooring line is normally attached to, and stowed within, the Mast Mooring Interface (MMI), a structure forward of the flight deck. In the stowed configuration, the free end of the line is attached to the aircraft at a point just below the flight deck windscreens. The mooring procedure involves a ground crew member detaching the free end of the line and pulling the line out of the MMI. The free end is then fed onto a winch at the mooring mast so that the aircraft can be winched onto the mast and secured.

### **Operator's investigation findings**

An investigation was carried out by the aircraft manufacturer/operator. In summary, the investigation determined that the higher than planned approach had been necessary in order to allow sufficient clearance for the mooring line. In turn, the mooring line had come to be hanging free below the aircraft because there was no proper stowage facility for the mooring line once it has been extracted from the MMI. The high approach led to a situation that was considered outside the aircraft's normal operating regime, in that it required a controlled vertical landing in very light wind conditions. The static heaviness of the aircraft had probably reduced as a result of additional environmental heating occurring between the first and second approaches.

The investigation determined that an electrical fault had caused the winch diesel engine's starter battery to drain. The engine could not therefore be started, which rendered the winch inoperative.

The investigation made a number of recommendations intended to minimise the chance of reoccurrence, as well as a number of observations on matters peripheral to the accident. These included the need for effective stowage and control arrangements for a deployed mooring line, enhanced maintenance and fault reporting regimes for ground support equipment, and a review of relevant static heaviness issues.

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Ikarus C42 FB100, G-CEHG	
<b>No &amp; Type of Engines:</b>	1 Rotax 912ULS piston engine	
<b>Year of Manufacture:</b>	2006 (Serial no: 0612-6861)	
<b>Date &amp; Time (UTC):</b>	11 November 2016 at 1200 hrs	
<b>Location:</b>	Farm Strip, Hardwicke, Hay-on-Wye	
<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>	Damage to the propeller, spinner, windscreen, strobe light, landing light and front landing gear	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	82 years	
<b>Commander's Flying Experience:</b>	640 hours (of which 640 were on type) Last 90 days - 16 hours Last 28 days - 4 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

G-CEHG was landing on a private airstrip near Hardwicke, Hay-on-Wye, following a flight from Swansea Airport. The pilot reported that the weather at Swansea Airport was: wind from 100° at 6 kt, 10 km visibility and broken cloud at 3,500 ft amsl. The airstrip was orientated on a heading of approximately 250°M and sloped upwards by approximately 4% over the first 225 m and 10% over the remaining 250 m. He reported that, during the landing, the nose landing gear dug into the ground, the aircraft tipped forward onto its propeller and then continued to topple over onto its back. The pilot was unhurt and exited the aircraft through the left door.

The pilot believed the accident was caused by misjudging the touchdown on the sloping terrain.



**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Shadow Series DD, G-MGTW	
<b>No &amp; Type of Engines:</b>	1 Rotax 582 piston engine	
<b>Year of Manufacture:</b>	1998 (Serial no: 287-DD)	
<b>Date &amp; Time (UTC):</b>	24 October 2016 at 1400 hrs	
<b>Location:</b>	Bridge of Allan, Stirlingshire	
<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>	Distortion and cracking to the main boom, distorted nosewheel and one wooden propeller blade delaminated	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	65 years	
<b>Commander's Flying Experience:</b>	610 hours (of which 610 were on type) Last 90 days - 14 hours Last 28 days - 7 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

The aircraft is a 'pusher', configured with a rear-mounted engine and propeller. During the departure from a private field, the pilot reported that he raised the nose and the aircraft lifted off; there was then there was a loud bang, a second quieter impact sound and severe vibration. The pilot continued the climb, turned back and landed crosswind in a soft and rutted part of the departure field, using reduced power. The aircraft's g meter registered 2.7g on landing, which the pilot reported as approximately 0.7g higher than previous uneventful rough field landings.

The landing caused damage to the tail boom and nosewheel.

One of the three blades of the wooden propeller showed tip damage and delamination of the leading edge insert. The damage was likely caused by contact with an unidentified object, such as a stone, during or soon after rotation. No damage to the other blades or propeller hub was identified.



## **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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|--|---|
| 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.           | 1/2015 Airbus A319-131, G-EUOE London Heathrow Airport on 24 May 2013.<br>Published July 2015.                                  |
| 2/2011 Aerospatiale (Eurocopter) AS332 L2 Super Puma, G-REDL 11 nm NE of Peterhead, Scotland on 1 April 2009.<br>Published November 2011.  | 2/2015 Boeing B787-8, ET-AOP London Heathrow Airport on 12 July 2013.<br>Published August 2015.                                 |
| 1/2014 Airbus A330-343, G-VSXY at London Gatwick Airport on 16 April 2012.<br>Published February 2014.   | 3/2015 Eurocopter (Deutschland) EC135 T2+, G-SPAO Glasgow City Centre, Scotland on 29 November 2013.<br>Published October 2015. |
| 2/2014 Eurocopter EC225 LP Super Puma G-REDW, 34 nm east of Aberdeen, Scotland on 10 May 2012 and G-CHCN, 32 nm south-west of Sumburgh, Shetland Islands on 22 October 2012.<br>Published June 2014. | 1/2016 AS332 L2 Super Puma, G-WNSB on approach to Sumburgh Airport on 23 August 2013.<br>Published March 2016.                  |
| 3/2014 Agusta A109E, G-CRST Near Vauxhall Bridge, Central London on 16 January 2013.<br>Published September 2014.  | 2/2016 Saab 2000, G-LGNO approximately 7 nm east of Sumburgh Airport, Shetland on 15 December 2014<br>Published September 2016. |

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
DME	Distance Measuring Equipment	PPL	Private Pilot's Licence
EAS	equivalent airspeed	psi	pounds per square inch
EASA	European Aviation Safety Agency	QFE	altimeter pressure setting to indicate height above aerodrome
ECAM	Electronic Centralised Aircraft Monitoring	QNH	altimeter pressure setting to indicate elevation amsl
EGPWS	Enhanced GPWS	RA	Resolution Advisory
EGT	Exhaust Gas Temperature	RFFS	Rescue and Fire Fighting Service
EICAS	Engine Indication and Crew Alerting System	rpm	revolutions per minute
EPR	Engine Pressure Ratio	RTF	radiotelephony
ETA	Estimated Time of Arrival	RVR	Runway Visual Range
ETD	Estimated Time of Departure	SAR	Search and Rescue
FAA	Federal Aviation Administration (USA)	SB	Service Bulletin
FDR	Flight Data Recorder	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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