AAIB
Air Accidents Investigation Branch

AAIB Bulletin 12/2014

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(ALL TIMES IN THIS BULLETIN ARE UTC)

AAIB Field Investigation reports

ACCIDENT

Aircraft Type and Registration:	Sikorsky S-76C, G-WIWI	
No & Type of Engines:	2 Turbomeca Arriel 2S2 turboshaft engines	
Year of Manufacture:	2007 (Serial No. 760684)	
Date & Time (UTC):	3 May 2012 at 2155 hrs	
Location:	Peasmarsh, East Sussex	
Type of Flight:	Public Transport	
Persons on Board:	Crew - 2	Passengers - 2
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None	
Commander's Licence:	Airline Transport Pilot's Licence (Helicopters)	
Commander's Age:	55 years	
Commander's Flying Experience:	10,250 hours (of which 4,800 were on type) Last 90 days - 11 hours Last 28 days - 4 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The helicopter descended towards the tops of trees following a discontinued night approach to a private landing site in conditions of reduced visibility and low cloud, when no go-around procedure or routing was available or briefed. One Safety Recommendation is made.

History of the flight

Pre-flight preparation

The helicopter was chartered to fly passengers on a return flight from a private landing site at Peasmarsh, East Sussex, to Battersea Heliport. It was based at London Stansted and therefore had to position empty from its base to Peasmarsh before flying the passengers to Battersea. It was required to remain on the ground until the passengers returned and fly them back to Peasmarsh, before returning to its base. The passengers were regular clients of the operator, and both pilots had visited the site at Peasmarsh regularly[1], in S-76C helicopters, prior to the incident flight.

The commander arrived at Stansted around lunchtime, to carry out some office work prior to flying. The co-pilot (who was also a qualified commander) reported shortly before the proposed flying duty.

Footnote

[1] The co-pilot commented that he had not done so by night.

The commander had discussed the weather with his Chief Pilot and the operations team at Stansted the day before. Arrangements were made for Lydd Airport, which was only a short distance from the landing site at Peasmarsh and would otherwise have been closed in the evening, to be available as an alternate for the flight from Battersea to Peasmarsh.

The commander studied NOTAMs and meteorological forecasts and reports before the co-pilot's arrival, and then discussed these, and the planned fuel loads, with him; they agreed that the co-pilot would be pilot flying on the first two sectors, with the commander flying the third and fourth.

The first sector to Peasmarsh was uneventful. For the approach to Peasmarsh, the co-pilot briefed that the minimum safe altitude (MSA) was 1,250 ft amsl, and that he intended to descend to this altitude slightly north-west of the landing site to gain visual contact with the ground. If contact were gained, he would continue with a visual approach to the site and land.

The approach was executed as briefed, visual contact was gained, and the helicopter landed safely. The passengers boarded, and the helicopter flew to Battersea, landing at 1725 hrs, where the passengers disembarked.

The flight crew arranged for the helicopter to be refuelled to a total of 1,650 lbs on board, giving an endurance of between two and three hours depending upon power settings; the approximate hourly burn used for planning purposes was 700 lbs/hr. With refuelling complete, the flight crew relaxed and ate dinner in the heliport.

Whilst waiting, the commander monitored weather reports, including those from Lydd and Southend. The last report he obtained from Lydd was the 2050 hrs observation. The surface wind was from 290° at 3 kt, visibility was 7 km in slight drizzle with one or two octas of cloud at 900 ft aal and five to seven octas at 1,400 ft aal. There was a one degree split between temperature and dew point. Southend's 2050 hrs observation reported a northerly wind at 3 kt, 8 km visibility and overcast cloud 900 ft aal. Southend's ILS approach was serviceable.

The commander assessed from the available information that the chances of being able to make a successful approach at Peasmarsh were good, but he retained Lydd as an alternate destination.

The two pilots agreed that they would follow the same routine for the arrival at Peasmarsh as they had done earlier, but no formal briefing for the approach and landing was conducted, either on the ground or during the subsequent flight.

In due course, the passengers arrived for their return to Peasmarsh. The co-pilot carried out pre-flight actions in the flight deck whilst the commander accompanied the passengers to the helicopter and gave them a safety brief, during which he recalled reminding them that Lydd was available as an alternate should poor weather preclude an approach to Peasmarsh.

The helicopter was serviceable with no deferred defects, and its mass and balance were within the applicable limits.

The flight from Battersea towards Peasmarsh

For the third and fourth sectors of the evening, the commander was to be pilot flying, in the right seat of the helicopter; the co-pilot was pilot not flying, in the left.

The helicopter departed Battersea at 2135 hrs, and after leaving the Heathrow control zone, recorded data showed that it climbed to cruise at 2,100 ft amsl, beneath the London TMA[2], towards Biggin Hill. The flight crew recalled that this portion of the flight was conducted in IMC, although they had intermittent visual contact with the ground below the helicopter.

During the cruise the commander asked the co-pilot to obtain the latest METAR from Lydd, and to inform the air traffic control service there that the helicopter was en route to Peasmarsh. The co-pilot did not record the METAR but both pilots set the Lydd QNH on their altimeters. The co-pilot carried out the approach checklist and stated that the minimum sector altitude (MSA) for their approach was 1,250 ft. He then asked the commander for his intentions. The commander replied that he intended to descend to 500 ft with the aim of achieving visual contact with the landing site. The co-pilot did not enquire upon what datum the 500 ft value was to be based, but assumed that it would be above the highest obstacle near the site.

A waypoint had been stored in the flight management system (FMS), 3 nm west of the landing site, to aid their arrival as an approach from the west would give them the best visual perspective of both the lit helipad and three lights in the middle of the field in which the helipad was sited. The FMS route from that point was to Peasmarsh, and then, according to the commander's recollection, to Lydd. The waypoint was coded so that the helicopter would turn prior to the waypoint to establish on the outbound track from the waypoint, rather than overflying it.

Approaching the FMS position, the commander found that forward visibility was "limited" and that he was flying on instruments, The commander however, recalled that the co-pilot stated he had visual contact with the ground beneath. The commander recalled selecting 600 ft[3] on the altitude pre-select and began a descent using the flight director and autopilot to establish on the track towards Peasmarsh. He switched the landing lights on, but the glare from falling rain in front of the helicopter prompted him to switch them off again. The landing gear was selected down.

When interviewed by the AAIB, the co-pilot recalled informing the commander of his concerns that the helicopter was below the safety altitude without sufficient visual references. However, the co-pilot believed that, rather than pressing this point, his better option was to support the commander as effectively as he could, even though he believed that the commander's actions were flawed.

As the descent continued, the co-pilot provided a commentary to the commander on his visual references; he recalled being able to see the ground intermittently, but that the

Footnote

[2] The lower limit of the TMA was 2,500 ft amsl in the vicinity of Biggin Hill.
[3] The co-pilot recalled the value set was 800 ft.

forward visibility was "not good". The co-pilot then paid attention to his flight instruments and moving map display, giving a commentary of the distance to run to the landing site, height, and speed. The co-pilot became aware that the helicopter was now about 30 seconds flying time from the landing site, and at approximately 350 ft agl. He recalled during interview that the helicopter was still "in the bottom of the cloud" and considered calling for the commander to go around, or taking control of the helicopter to execute a go-around himself.

In due course, the commander saw the landing site but assessed that the helicopter was too high and too fast to continue the approach straight in; the co-pilot recalled concurring with this assessment but did not recall a discussion about it. The commander decided to fly over the site, noting that the driver, who was to take the passengers onwards, had parked his car near the helipad.

The commander elected to carry out an orbit to the right to make a further approach He chose a right-hand turn rather than left for a better view and because he was aware of pylons to the north-west of the field. He recalled a brief conversation with the co-pilot during which he stated his intention to complete the right-hand orbit to make a further approach, and believed that the co-pilot had understood and agreed with this course of action. The commander decoupled the flight director and took manual control of the helicopter. The helicopter overflew the landing site at approximately 300 ft agl and 35 KIAS.

The commander observed the lights of Rye and other habitation towards Lydd, over the descending terrain to the south-east of the landing site; it was apparent that the visibility was somewhat better and the cloudbase higher in that direction.

As he commenced the right-hand orbit, the commander had a clear view of the lights in the centre of the field, but stated that problems began at that point. He was flying both by reference to the instruments and outside cues, intending to maintain height, and decelerate. He had lost sight of the helipad lights in the corner of the field and as the turn continued found himself relying upon the lights in the centre of the field as his only visual reference[4].

As the turn progressed through a westerly heading, the helicopter descended for a short time at up to 500 fpm. The EGPWS recorded issuing 'CAUTION TERRAIN' and then 'WARNING TERRAIN' alerts, as the helicopter's height reduced towards 100 ft agl. Neither pilot recalled being aware of these alerts at the time.

A slight climb towards 400 ft amsl occurred. The commander recalled beginning a further descent, and seeing the lights in the middle of the field begin to flicker. The co-pilot, who was monitoring the instruments, saw that the helicopter was descending and began to speak to highlight this to the commander when he saw the radio altimeter "winding down towards zero extremely quickly". The co-pilot found himself momentarily unable to continue speaking, expecting the helicopter to crash.

Footnote

[4] See '*Aerodrome information*' below.

Simultaneously, the commander assessed that the lights were not, in fact, flickering on and off, but appeared to be doing so because his view of them was becoming obstructed intermittently by the treetops. Recognising that the helicopter was approaching the treetops, he began an aggressive go-around, flaring the helicopter and increasing power. The commander considered that although the go-around was aggressive, the applied torque did not enter the "blow-away" range[5]. He later stated during interview that he felt uncomfortable about the situation at that time, and assessed subsequently that he had become disorientated very quickly. During the go-around, both pilots heard the EGPWS 'TAIL TOO LOW' warning.

The minimum radio altitude recorded in this portion of the flight was 2 ft[6].

The commander decided not to make a further approach to the site, but climbed the helicopter into IMC and diverted to Lydd where an uneventful visual approach and landing was carried out.

The passengers disembarked and continued their journey by car.

The flight crew discussed the weather at Stansted, which was close to the minima for an instrument approach, and the fact that the weather at Luton was much better, and then flew the aircraft back to its base at Stansted.

On arrival they went into an office, carried out post-flight paperwork and the co-pilot initiated a conversation about the events at Peasmarsh. The commander annotated the voyage report and left it on the chief pilot's desk. No entry was made in the aircraft's technical log relating to the go-around and no air safety report or MOR was raised.

Damage to aircraft

The helicopter was subjected to routine inspection over subsequent days. When the incident came to the attention of the company's management some time later, it was inspected by engineers. No damage was found.

Personnel information

Commander

Age:	55 years
Licence:	Airline Transport Pilot's Licence (Helicopters)
LPC/OPC renewed:	5 February 2012
Line check:	Valid to 30 November 2012
Medical certificate:	Class One

Footnote

[5] See '*Blowaway power*' below.

[6] The manufacturer reported that this may not be a reliable indication of the '*aircraft's actual altitude*', and that the accuracy of the radar altimeter was ± 2 ft.

Flying experience:	Total all types:	10,250 hours
	Total on type:	4,800 hours
	Last 90 days:	11 hours
	Last 28 days:	4 hours
	Last 24 hours	2 hours
Previous rest period:	49 hours	

Co-pilot

Age:	42 years	
Licence:	Airline Transport Pilot's Licence (Helicopters)	
LPC/OPC renewed:	LPC: 7 May 2012; OPC: 10 November 2011	
Line check:	Valid to 30 June 2012	
Medical certificate:	Class One	
Flying experience:	Total all types:	5,000 hours
	Total on type:	185 hours
	Last 90 days:	19 hours
	Last 28 days:	5 hours
	Last 24 hours	2 hours
Previous rest period:	22 hrs 30 mins	

Aircraft information

General

Manufacturer:	Sikorsky Aircraft
Type:	Sikorsky S-76C[7]
Aircraft Serial No:	760684
Year of manufacture:	2007
Certificate of Registration:	Valid, United Kingdom
Certificate of Airworthiness:	EASA Certificate of Airworthiness
Engines:	2 Turbomeca Arriel 2S2 turboshaft engines
Total airframe hours:	995
Maximum Takeoff weight:	5,307 kg

Aircraft description

The Sikorsky S-76C++ is a twin-turbine engine helicopter. The minimum flight crew is one pilot, for VFR or IFR operations, though the operator habitually operated the helicopter with two pilots. The helicopter was certified for flight by day and night and under VFR and IFR.

Engines, Digital Engine Control Units (DECUs), and rotor rpm

The helicopter was fitted with two Turbomeca Arriel 2S2 turboshaft engines equipped with DECUs. DECUs control the engines to ensure that various parameters did not exceed their maximum values in normal flight.

Footnote

[7] This model of the S-76 is known in the industry as the C++.

Rotor rpm (Nr) is normally governed to 107% of the nominal value, though the rotor disc is at its most efficient at 100%. Thus, if the rotor rpm falls below the normal value, the rotor disc gains, rather than loses, efficiency and produces more lift until Nr falls below 100%, when efficiency reduces.

Blowaway power

The DECUs incorporate a 'blowaway' function to provide for occasions when pilots might wish to apply more than takeoff power, for example to avoid an unforeseen or extraordinary situation.

The blowaway logic is triggered either by:

- A slow to moderate decay in Nr, to 100%, or
- A decay rate of 5% per second or greater at 104% Nr or less

With blowaway logic active, the engines provide up to the single-engine limit of 100.5% N_1 or 115% torque (whichever is sensed first). A reduction in power demanded by the pilots prompts the DECUs to revert from blowaway logic to their normal state.

Meteorological information

General situation

The Met Office provided an aftercast of weather conditions at and near Peasmarsh around the time of the incident. The summary of their findings stated:

> *'The weather during the period in question was influenced by an area of weak low pressure. Satellite imagery and surface observations show that cloud bases were generally low, around 700-1800ft, but also as low as 200ft at times during drizzle. Over high ground, it is highly likely that hill fog was present. Visibilities in the area were around 7000m towards the east and 2500m to the north. Although the rainfall radar is showing very little precipitation, it is a known limitation with this instrument that drizzle is not well represented. The numerous surface observations of light drizzle in the area confirm its presence, which at times could have easily brought the visibility down to 2000m. You would also expect to see the much lower cloud bases in association with areas of drizzle.*
>
> *The surface winds remained light throughout the period (2-5kt), between westerly and north-easterly, varying considerably due to the slack flow over the differing terrain. In these conditions it is also possible that any hills or ridges in the terrain would suffer from an 'upslope effect' – conditions on the windward side of the hill would be much poorer than elsewhere. As such any mainly north or north west facing slopes may well have experienced particularly poor visibility and low cloud bases.'*

Forecasts

Relevant terminal areas forecasts (TAFs) were as follows:

London Gatwick (elevation 203 ft amsl)

EGKK 0315/0418 03006KT 2500 BR BKN003 BECMG 0315/0317 6000 NSW BKN008 PROB 40 0317/0407 2000 DZ BKN003=

EGKK 0318/0424 03006KT 2500 DZ BR BKN003 BECMG 0318/0320 7000 NSW OVC010 TEMPO 0320/0407 1800 DZ BKN003 PROB40 0410/0417 4000 -DZ BKN005 BECMG 0417/0420 3000 BR OVC003=

Lydd (elevation 13 ft amsl)

EGMD 0315/0319 36008KT 7000 BKN008 TEMPO 0315/0319 4000 –DZ BR BKN004=[8]

Meteorological reports

Relevant Meteorological Actual Reports (METARs) were:

London Gatwick:

2120Z 03/05/12 EGKK 032120Z 32005KT 1800 -DZ BKN003 OVC007 08/07 Q1009 REDZ=

2150Z 03/05/12 EGKK 032150Z 34004KT 2500 -DZ SCT003 BKN005 08/07 Q1009=

2220Z 03/05/12 EGKK 032220Z 32004KT 2500 HZ FEW004 BKN006 08/07 Q1008=

Lydd:

2120Z 03/05/12 EGMD 032120Z 26003KT 7000 -DZ BKN012 09/08 Q1009=

2150Z 03/05/12 EGMD 032150Z 26002KT 7000 FEW009 BKN012 09/08 Q1009=

2220Z 03/05/12 EGMD 032220Z 25002KT 5000 BKN009 09/08 Q1008=

Herstmonceaux

Observations were also made at a meteorological observing station at Herstmonceaux, some 13 nm west-south-west of Peasmarsh. These were observations used within the meterological community and not routinely accessed by pilots. They are included here because they provide further insight into the meteorological conditions which the helicopter encountered near Peasmarsh:

Footnote

[8] This TAF expired at 1900 hrs, slightly less than three hours prior to the incident; no further TAF was issued.

2050Z Wind - 20002KT. Visibility - 3500M. Cloud – few 100FT, broken 1600FT

2150Z Wind - 10001KT. Visibility - 3300M. Cloud – scattered 500FT, broken 1100FT

2250Z Wind - 35002KT. Visibility - 2400M. Cloud – scattered 300FT, broken 1000FT

Communications and aids to navigation

No air/ground communications were made at Peasmarsh. Communications with other agencies were apparently without difficulty and unremarkable.

No aids to navigation were sited at or near to Peasmarsh.

The helicopter was equipped with a flight management system (FMS), which derived position information from the global positioning system (GPS). The FMS contained a database of waypoints, some defined by the flight crew, and was capable of storing routes.

Aerodrome information

A satellite image of the site near Peasmarsh is shown below.

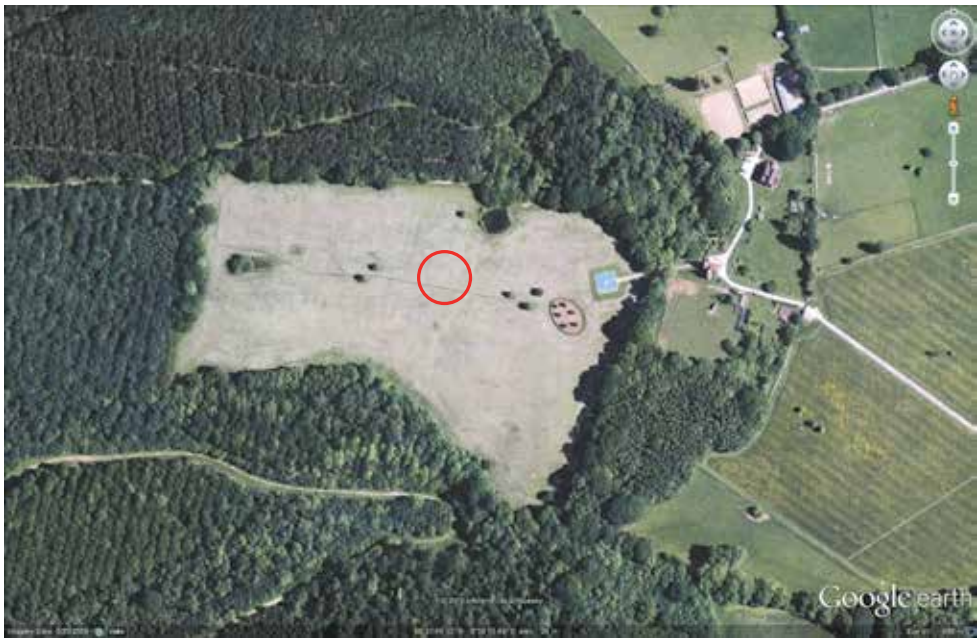

Figure 1

The field containing the landing site near Peasmarsh;
the red circle indicates the position of the triangle of lights

The helipad was sited in the north-eastern corner of a large field. A series of lights marked the perimeter of the helipad for night operations. A further group of three lights, approximately in the centre of the field, had been installed to aid helicopters making approaches, especially from directions other than the west. All these lights were illuminated for the arrival of G-WIWI.

The landing site was relatively isolated, with little cultural lighting in the vicinity. To the east and south, some miles from the site, more cultural lighting was present, but to the north and west, the surroundings were sparsely-populated and largely unlit.

The elevation of the site was approximately 115 ft amsl.

Recorded information

Following the serious incident the combined flight data and cockpit voice recorder fitted to the helicopter was downloaded by the operator. This was several weeks after the incident by which time the voice recordings for the incident had been overwritten by subsequent operations. However, flight data for the incident was available and a copy was provided by the operator to the AAIB. Data for the incident was also recovered from the EGPWS. The helicopter had a DVRS (Digital Video Recording System) fitted to record the EFIS and other instrument displays in the cockpit - information that is not recorded by the flight data recorder - but DVRS recordings for the incident had been overwritten by subsequent operations.

Parameters of valuable assistance to the investigation, such as position over and above the ground (latitude, longitude and height) were recorded by the EGPWS[9].

Salient parameters from the flight data and EGPWS recordings are presented in Figure 2. Figure 3 shows the ground track detected and recorded by the radar head at Pease Pottage, 40 miles to the west and north, and the GPS track recorded by the EGPWS. (The helicopter's altitude was near the radar's lower limit at that range and acquiring a fix in azimuth and recording a track was imprecise.) Also indicated on the ground track are the positions at which EGPWS caution and warning alerts were made.

Figure 2 starts with the helicopter decelerating though 52 KIAS at 324 ft amsl[10] (about 204 ft aal) on the approach to the helipad from the west. It passed over the helipad 12 seconds later (time 21:55:22 hrs) at 32 KIAS, at about the same altitude.

Footnote

[9] The Honeywell MK XXII Helicopter Enhanced Ground Proximity Warning System (EGPWS) records a number of parameters each time caution or warning is given. The record rate is 1 Hz for a period of 30 seconds, beginning 20 seconds before the caution or warning.

[10] The pressure altitude recorded by the FDR has been converted from 1013.25 hPa to the QNH of 1009 hPa to give amsl.

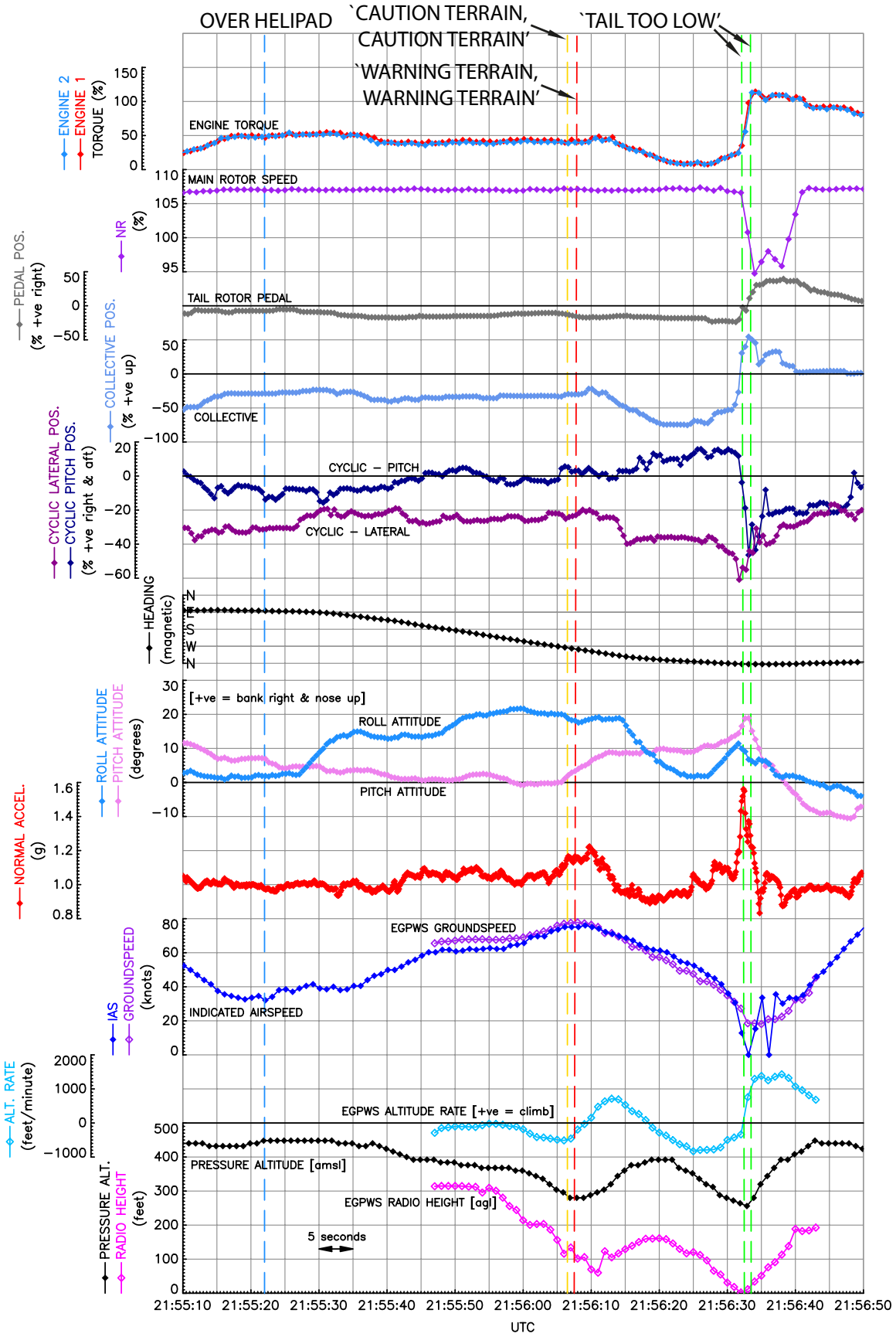

Figure 2

G-WIWI salient flight data from flight recorder and EGPWS

UTC	Event
21:55:27	Helicopter commences right turn from easterly heading. During the turn the helicopter descends and decelerates.
21:56:06	EGPWS recorded issuing a 'CAUTION TERRAIN, CAUTION TERRAIN' audio alert[11]. Helicopter is on a westerly heading, 116 ft radio height and 75 kt indicated airspeed.
21:56:07	EGPWS recorded issuing a 'WARNING TERRAIN, WARNING TERRAIN' audio alert[12]. Helicopter continues right turn, decelerates and climbs.
21:56:20	Helicopter climbs to 161 ft radio height before descending again. Airspeed continues to reduce.
21:56:32	EGPWS recorded issuing a 'TAIL TOO LOW' warning[13]. Helicopter is on a northerly heading, radio height 2 ft and 18.5 kt groundspeed (indicated airspeed below reliable range). Collective input immediately made, engine torque rises and helicopter climbs.
21:56:33	EGPWS recorded issuing another 'TAIL TOO LOW' warning. Total engine torque of 241.5%[14] recorded before reducing as aircraft climbs and accelerates away, departing to the north.

Use of flight data

AAIB Special Bulletin S4/2012, published on 9 October 2012, reported on the routine analysis of the flight data for maintenance action by operators showed that the conversion of engine torque and engine free turbine speed data into engineering units was incorrect. In particular, the conversion factor for engine torque was such that the calculated values were about 6% lower than they should have been. Consequently, the operator of G-WIWI was initially unaware that the helicopter had exceeded the manufacturer's stated torque limit during the go-around manoeuvre, and so delayed carrying out necessary maintenance actions.

As a result, the helicopter manufacturer sent a letter[15], dated 5 October 2012 (and re-issued 9 October 2012), to all S-76 operators, S-76 centres and field service representatives advising them of the issues identified in the Special Bulletin and the correct conversions to be used.

Footnote

[11] The 'CAUTION TERRAIN, CAUTION TERRAIN' alert is a Honeywell MK XXII EGPWS 'Look-Ahead' alert that compares the aircraft flight path to terrain and obstacle databases, and issues the caution alert if it detects a terrain or obstacle threat approximately 30 seconds ahead of the aircraft. However, below 100 kt, the "Look-Ahead" threat envelope is reduced until completely inhibited at 70 kt or less. The pilot can activate the 'Audio Inhibit' cockpit switch that turns off all MK XXII audio warnings for 5 minutes; however, the software version of the EGPWS fitted to G-WIWI does not record the position of this. The 'Terrain Inhibit' cockpit switch, used by the pilot to inhibit Terrain and Obstacle alerts and warnings, is recorded and had not been engaged during the incident.

[12] For this 'Look-Ahead' alert, if the aircraft flight path approaches to within approximately 20 seconds of a threat area, the voice message "WARNING TERRAIN, WARNING TERRAIN" is given.

[13] The "TAIL TOO LOW" warning is Honeywell MK XXII EGPWS Mode 6 tail strike warning function based upon radio height, pitch attitude, pitch rate and barometric altitude rate.

[14] Manufacturer's stated torque limit is 240%.

[15] Sikorsky Aircraft Corporation letter – S-76C+ and S-76C++ FDR Data, Interpretation of – CCS-76-AOL-12-0005.

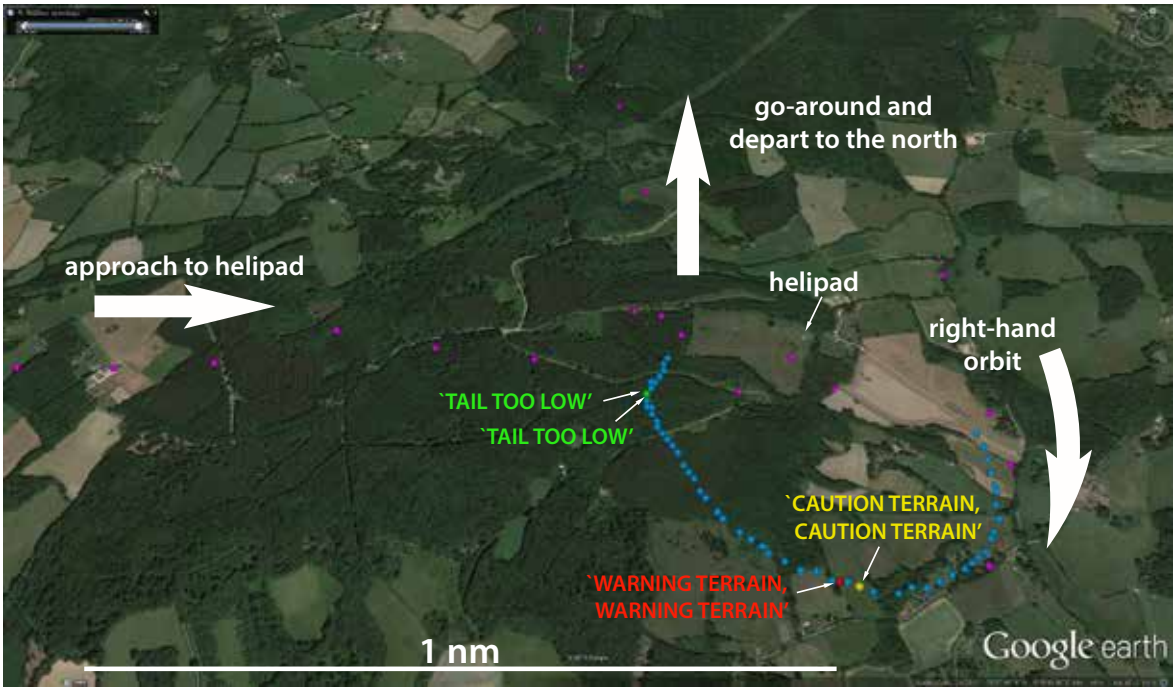

Figure 3

Radar ground track (dark pink) and EGPWS GPS ground track (light blue)

The Special Bulletin also highlighted that information about the conversions was spread over a number of documents. This lack of clear and accurate guidance for the flight data recorder, which is fundamental to an air safety investigation, resulted in the following Safety Recommendation:

Safety Recommendation 2012-033

It is recommended that the Sikorsky Aircraft Corporation issues, in a single document, correct flight data recorder engineering unit conversion information for S-76C++ helicopters equipped with a Teledyne Control Flight Data Acquisition Unit part number 2231230-10-A-1. This document should follow the guidance given in Federal Aviation Administration Advisory Circular 20-141B and UK Civil Aviation Publication 731.

Manufacturer's response to Safety Recommendation 2012-033

The Sikorsky Aircraft Corporation accepted this recommendation and published document SER-761985 (ENGINEERING UNITS CONVERSION (EUC) DOCUMENT FOR 2231230-10/-10A-1 FLIGHT DATA ACQUISITION UNIT (FDAU) ON S76B/C/C+/C++ AIRCRAFT), dated 8 April 2013.

Medical and pathological information

Both pilots held Class One medical certificates and stated that they were in good health and well-rested prior to the flight.

Tests and research

A series of flight profiles were flown in S-76C++ and EC225 (for comparison and context) simulators to observe the functionality of the EGPWS installations, and the manner in which alerts were presented. EGPWS visual cues appeared not to be especially attention-getting, being small and presented only as illuminated script in small lit push-buttons (see Figure 4).

Figure 4

The right hand instrument panel in G-WIWI showing the 'GPWS visual alert (amber, right of the EADI - circled red)

Organisational and management information

The helicopter was owned by one company (HO) but operated, on this occasion, under an Air Operator's Certificate (AOC) held by another (OC).

Helicopter owner (HO)

HO, based at London Stansted, operated a fleet of Agusta 109, and Sikorsky S-76 and S-92 helicopters. It owned some helicopters, and managed others on behalf of their owners. Because it was a company registered outside the United Kingdom, HO was not eligible to hold a United Kingdom Air Operator's Certificate. Instead, it had made a series of arrangements with other UK registered companies, holding AOCs, to enable its helicopters to fly commercially. HO, however, retained an in-house capability to operate its helicopters on private flights.

The incident flight was being operated under commercial arrangements such that OC was responsible for the oversight of operations.

Operating company (OC)

OC had its main base at Oxford Airport and operated a smaller fleet of Eurocopter EC135, EC155 and Sikorsky S-76 helicopters at various bases in England.

An arrangement between HO and OC permitted HO to offer its helicopters for commercial air transport provided that the management of all operations-related activities was undertaken by OC.

OC operations manual

The OC operations manual, accepted by the CAA, did not contain specific procedures for operations at private landing sites.

However, a senior company official confirmed that the recognised procedure, for landing at a private landing site from a flight conducted in IMC above the MSA, is to descend to MSA approaching the site and only continue to land if sufficient visual references can be identified. If visual contact is not gained, the crew should either continue to their alternate (normally a licensed airfield with instrument approach aids) and make an instrument approach or remain at or above MSA until visual conditions prevail and a visual descent and approach can be carried out.

OC's flight safety functions

OC published flight safety notices (FSN) to its staff from time to time. A FSN published in September 2011 stated:

> *'Although we are still coming into Autumn season and temperatures are still relatively high, conditions of poor visibility and low cloudbase can become more frequent.*
>
> *It is essential that great care is taken during the planning of flights when the weather forecast shows less than clement conditions and that adequate provision is made with regard to diversion and the fuel carried for the task.*
>
> *Under no circumstances should any pilot be put under pressure to continue to any site that he regards as less than completely safe in all respects.'*

The operator also held regular flight safety meetings. The minutes of the meeting held in December 2011 stated:

> *'Private landing sites at night:*
>
> *It was pointed out to the pilots that our most hazardous operation is probably making night approaches to private landing sites. The company will support any pilot who has concerns about the safety/suitability of any site and will provide ground support or lighting as required…'*

Regulation of the operation

The operation was regulated principally according to the Air Navigation Order (ANO), JAR-OPS 3, and OC's operations manual.

Regulations relevant to the visual approach to Peasmarsh

Relevant definitions within the Rules of the Air Regulations 2007 were as follows:

> *"IFR flight' means a flight conducted in accordance with the Instrument Flight Rules in Section 6 of these Rules;*
>
> *'Visual Flight Rules' means Visual Flight Rules prescribed by Section 5 of the Rules of the Air Regulations 2007(b);*
>
> *'Visual Meteorological Conditions' means weather permitting flight in accordance with the Visual Flight Rules;*
>
> *'With the surface in sight' means with the flight crew being able to see sufficient surface features or surface illumination to enable the flight crew to maintain the aircraft in a desired attitude without reference to any flight instrument and 'when the surface is not in sight' is to be construed accordingly.'*

Rule 20 was pertinent to the choice of the flight rules under which the flight was conducted:

> *'Choice of VFR or IFR*
>
> *20 (1) Subject to paragraph (2) an aircraft shall always be flown in accordance with the Visual Flight Rules or the Instrument Flight Rules.*
>
> *(2) In the United Kingdom an aircraft flying at night shall:*
>
> *(a) be flown in accordance with the Instrument Flight Rules outside a control zone;*
>
> *(b) be flown in accordance with the Instrument Flight Rules in a control zone unless it is flying on a special VFR flight.'*

Rules 33 (minimum height) and 34 (quadrantal rule and semi-circular rule) were the applicable instrument flight rules; rule 34 was not relevant below 3,000 ft amsl:

> *'Minimum height*
>
> *33.—(1) Subject to paragraphs (2) and (3), an aircraft shall not fly at a height of less than 1,000 feet above the highest obstacle within a distance of 5 nautical miles of the aircraft unless—*
>
> *(a) it is necessary for the aircraft to do so in order to take off or land;*
>
> *(b) the aircraft flies on a route notified for the purposes of this rule;*
>
> *(c) the aircraft has been otherwise authorised by the competent authority in relation to the area over which the aircraft is flying; or*

> *(d) the aircraft flies at an altitude not exceeding 3,000 feet above mean sea level and remains clear of cloud and with the surface in sight and in a flight visibility of at least 800 metres.*
>
> *(2) The aircraft shall comply with rule 5.*
>
> *(3) Paragraph (1) shall not apply to a helicopter that is air-taxiing or conducting manoeuvres in accordance with rule 6(i).'*

Article 107 of the ANO requires operators to specify and observe Aerodrome Operating Minima (AOM) and the Order defines 'aerodrome' to include areas (such as Peasmarsh) set apart for the landing and departure of helicopters. The UK AIP, in Section AD1.1, states that helicopter operations are to be conducted with AOM no lower than calculated using JAR-OPS 3. JAR-OPS 3.430 and its Appendix give details of minimum AOM in relation to instrument approach procedures (IAP). There are no AOM given in relation to approaches not made in accordance with an IAP.

JAR-OPS 3.365 stated the following concerning minimum flight altitudes:

> *'The pilot flying shall not descend below specified minimum altitudes except when necessary for take-off or landing, or when descending in accordance with procedures approved by the Authority.'*

Additional information

TAWS and TAWS II (GPWS and EGPWS) - background

Ground proximity warning systems (GPWS) were first developed in the 1970s in response to the significant number of controlled flight into terrain (CFIT) incidents and accidents then affecting aviation operations. As they were introduced and refined, and especially since the development of enhanced ground proximity warning systems (EGPWS), the rate of CFIT accidents in the sphere of fixed-wing commercial air transport has reduced dramatically.

However, although such systems have also been introduced in some helicopters, CFIT accidents, and serious incidents indicating that CFIT was avoided by narrow margins, have continued to take place.

This is explained to some extent by the very differing operational environments:

- fixed-wing aircraft typically only come close to terrain when approaching and departing from airports and under the protection of instrument flight procedures which assure safe heights are maintained;
- rotary-wing aircraft operate at lower heights, and often to and from locations without formal instrument flight procedures, such as private landing sites and oil and gas installations.

Enhanced Ground Proximity Warning System (EGPWS)

The aircraft was fitted with a Honeywell Mk XXII EGPWS, including a database of airports and terrain. The system was designed to provide warnings of unsafe flight conditions including approach to terrain and unusual helicopter attitude or configuration close to the ground.

The helicopter was fitted with an audio inhibit switch, which was described in the EGPWS manufacturer's pilot guide:

> *'… an **"Audio Inhibit"** switch can be installed. This momentary activated switch allows the pilot to turn off all MK XXII audio warnings for 5 minutes. Resetting the switch will also restore the audio immediately. The Audio Inhibit switch is intended for EMS and SAR operations where the aircraft may be operating very close to terrain. Under normal operations this switch **should never be needed**. The visual warnings are not inhibited. If you find that you need to use this switch during your normal operations please contact [the manufacturer]'*

The manufacturer had no record of a request from the operator to use the switch during normal operations.

Although EGPWS in fixed-wing and rotary-wing aircraft incorporates a database of runways, and thus inhibits alerts when an approach is made within predetermined parameters to a runway, the systems in helicopters are not coded with private landing sites at which they operate.

EGPWS activation - OC procedures

The OC operations manual contained the following instructions in relation to EGPWS warnings:

> *When operating in IMC or at night or in conditions of impaired visibility, in aircraft equipped with EGPWS, pilots are to be familiar with the corrective actions to be taken in the case of an audio warning:*

Mode	***Indications***	***Actions***
Mode 1 Excessive Rate of Descent	*"Sink Rate, Sink Rate"*	*Reduce Rate of Descent*
	"Pull Up, Pull Up"	*Reduce Rate of Descent*
Mode 2 Excessive Terrain Closure	*"Pull Up, Pull Up"*	*Adjust flight path away from Terrain until alert ceases*
	"Terrain, Terrain"	
Mode 3 Inadvertent Descent/Loss of Altitude after Take Off	*"Don't Sink"*	*Positive Rate of Climb*

Mode 4 Unsafe Terrain Clearance	*"Too Low Terrain" (above 100 KIAS)*	*Adjust Flight Path to recover Safe Terrain Clearance*
	"Too Low Gear" (below 100 KIAS	
Mode 5 Below Glideslope	*"Glideslope"*	*Execute Missed Approach per SOP*
Mode 6 Selectable Callouts	*"Bank Angle"*	*Keep Nose Up*
	"Bank Angle, Bank Angle"	*Decrease Bank Angle*
	"Tail Too Low, Tail Too Low"	*Lower Nose or Increase Height*

The manual did not refer to the visual warnings presented by the EGPWS, or the 'look ahead' alerts such as 'CAUTION TERRAIN' and 'WARNING TERRAIN'.

Helicopter Terrain Awareness Warning System (HTAWS)

The CAA commissioned research which, at the time of publication, had resulted in the publication of an interim report[16] on *'Class A Terrain Awareness Warning System[17] (TAWS) for Offshore Helicopter Operations'*. The executive summary of the report stated:

> *'Controlled flight into terrain is a major cause of accidents in helicopter operations which Terrain Awareness Warning Systems (TAWS) could help to address. However, existing helicopter TAWS are not considered to be optimised for the offshore operations undertaken by the majority of the UK's medium/large helicopter fleet, and would have offered little or no protection in the case of the accident scenarios that have been experienced in that environment. The objective of the research was therefore to seek to identify improvements to helicopter TAWS to improve warning times for offshore operations without incurring an undue number of nuisance alerts. At the time of conducting the study, the Honeywell MKXXII Enhanced Ground Proximity Warning System (EGPWS) represented the only Class A helicopter TAWS in operational use. Due to the nature of the offshore obstacle environment, only the 'Classic' or non-database EGPWS modes are universally effective and this is therefore where the work was focussed.*
>
> *Eurocopter EC225 flight data from Bristow Helicopters' Flight Data Monitoring programme was used to establish the limits of normal operations. This enabled the Classic Mode warning envelopes and their associated input parameters to be refined and also allowed new warning envelopes to be developed. The revised and new warning envelopes were tested using the available data from four accidents and demonstrated a worthwhile improvement in performance in*

Footnote

[16] Proposal reference FDP-CAA-Report 121019.
[17] The expressions TAWS and GPWS are interchangeable in the context of this report.

terms of warning time, while maintaining an acceptably low nuisance alert rate of less than 1 in 100. A lower nuisance alert rate might be achieved in practice, but a larger sample of the database of normal operations would be required to demonstrate this.

The EC225 analysis exercise was repeated for the Bristow Helicopters' Sikorsky S-76A+ fleet in order to evaluate the proposed new warning envelopes on an older, less sophisticated helicopter type and a different style of operation. Although the flight path variability inherent in normal operations was greater for the S-76A+ as expected, only minor adjustments to the proposed new warning envelopes were required to maintain a nuisance alert rate of less than 1 in 100. The consequent effect on the warning times generated for the four example accidents was minimal. The two helicopter types and associated styles of operation are considered to represent a broad spectrum of offshore operations, indicating that a single set of warning envelopes would have general applicability, avoiding the need to tailor warning envelopes for individual helicopter types and/or types of operation.'

Previous accidents and incidents

Accident to an Agusta A109A II helicopter on 23 October 2010

The AAIB report on the fatal accident to Agusta A109A II helicopter, registration N2NR, in the Mourne Mountains, Northern Ireland on 23 October 2010 included the following relating to the EGPWS fitted to the helicopter:

'Enhanced Ground Proximity Warning System (EGPWS)

The helicopter was equipped with an EGPWS but it had not been in use at least since the replacement unit was fitted in 2009. An EGPWS has significant safety benefits when operating under Instrument Meteorological Conditions (IMC), particularly overland. However, the EGPWS is not a requirement for helicopter operation and the alerts it provides in VMC can become considered as 'nuisance' alerts, as the system will frequently initiate "terrain" alerts due to the proximity of ground which is already visible to the pilot. For this reason the EGPWS may be selected off and examination of the data by the manufacturer showed that the system in N2NR had not been powered up since the particular unit had been installed in late 2009. Had the system been in use on the accident flight, the presence of the high ground ahead of the helicopter should have initiated a "terrain" alert...'

Accident to a Eurocopter EC225 LP Super Puma on 18 February 2009

The AAIB report on the accident to Eurocopter EC225 LP Super Puma helicopter, G-REDU, near the Eastern Trough Area Project (ETAP) in the North Sea on 18 February 2009, was published on 17 September 2011. It examined why the EGPWS fitted to the helicopter did not alert the flight crew to the situation which ultimately led to the helicopter's impact with the sea. The report stated:

> *'TAWS*
>
> *The data recorded…, together with the lack of any height warnings or alerts in the CVFDR recordings, indicated that the TAWS was inoperative at the time of the accident. The CVFDR recordings and crew interviews indicated that the crew were not aware of this. This raised three questions of concern:*
>
> - *why was the system not operational?*
> - *why was this not noticed by the crew?*
> - *how would the system have performed had it been fully operational?'*

The investigation identified that the absence of TAWS functionality was associated with the (mal)functioning of the ACAS.

The report stated:

> *'The EC225 TAWS installation provides the crew with an ON /TEST /OFF switch on the control panel. This is contrary to typical fixed wing aircraft installations that permanently power TAWS. The ability for the helicopter crew to switch the system OFF introduces the possibility of inadvertent system loss…'*

The report continued:

> *'The HTAWS MOPS (Helicopter Terrain Awareness and Warning System Minimum Operational Performance Standards) states:*
>
> > *'An inhibited, failed, or inoperative HTAWS shall be indicated to the flight crew in a manner consistent with the flight deck design philosophy.'*
>
> *The lack of a visual cue, in the crew's normal field of view, that TAWS has been switched OFF is in line with the 'dark cockpit' philosophy applied to the EC225. The concept is that the crew does not need an indication in these circumstances as they should already be aware of the lack of TAWS because it requires positive crew action to switch the system OFF. There are limitations to this approach, associated with multiple crews not communicating a switch selection, the wrong switch being actioned and exposure to hidden failure modes mimicking the OFF status of the system. Given the implications of the loss of this system, which also fulfills the AVAD function, this concept would appear to be inappropriate in this case. This could equally apply to other TAWS installations that use the same 'dark cockpit' philosophy.'*

The following Safety Recommendation was made:

> **Safety Recommendation 2011-058**
>
> It is recommended that the European Aviation Safety Agency requires that crews of helicopters, fitted with a Terrain Awareness and Warning System, be provided with an immediate indication when the system becomes inoperative, fails, is inhibited or selected OFF.

The EASA responded to this Safety Recommendation on 26 March 2013 as follows:

> *'In the course of certification and approval of aircraft and/or installed systems, the proposed normal operation of each system is assessed against the applicable airworthiness requirements or certification specifications (CS 29.1309). Additionally, failures and emergencies directly and indirectly related to the use of the system are evaluated. This includes the acceptability of a means to disable a mandatory system, if proposed.*
>
> *As a general principle, it is acceptable to have a means of deselecting such a system, but only if the pilot is at all times aware of the degraded status of the aircraft and there is mitigation to ensure that the aircraft continues to meet an acceptable airworthiness standard. There are many examples of the satisfactory application of this principle.'*

The EASA stated that the Safety Recommendation was considered *'Closed – Partial agreement'*.

The report explained that, if the system were switched off, mandatory height callouts would be disabled, and made the following Safety Recommendation:

> **Safety Recommendation 2011-059**
>
> It is recommended that the European Aviation Safety Agency reviews the acceptability of crew-operated ON/OFF controls which can disable mandatory helicopter audio voice warnings.

The EASA responded to this safety recommendation on 30 September 2013 as follows:

> *'EASA is awaiting results from studies which may allow redefining the Helicopter Terrain Awareness and Warning System (HTAWS) standards, especially for offshore operation, as the report FDP-CAA-Report 121019 "Report for UK Civil Aviation Authority on Class A Terrain Awareness Warning System (TAWS) for Offshore Helicopter Operations", which is currently interim and hence subject to change.'*

Civil Aviation Publication (CAP) 1122

CAA CAP 1122 - '*Application for Instrument Approach Procedures to Aerodromes without an Instrument Runway and/or Approach Control',* is a document proposing the wider use of IAPs at UK aerodromes which it defines to include helicopter landing sites. The objective is to:

> *'recommend a way forward which would allow wider deployment of IAPs at UK aerodromes whilst providing continuing assurance regarding acceptable levels of safety…'*

The CAA recognises the potential offered by satellite-based navigation systems to help enable the use of IAPs to small, less well-equipped aerodromes. Using a risk-based approach, the guidance aims to improve safety at such aerodromes where the publication of IAPs is currently not possible. Only approved procedures will be designed, published and used operationally. The CAA plans a staged process of implementation and applications for IAPs to helicopter landing sites such as the one in this incident would not be considered initially.

Analysis

Background to the flight

The helicopter was serviceable for flight. The pilots were appropriately qualified and reportedly rested and fit for the duty. The flights leading up to the incident flight were routine and both pilots were familiar with the landing site at Peasmarsh. The investigation did not identify any unusual pressure placed upon the flight crew by their employer, passengers or others, to complete the proposed series of flights should conditions prove unfavourable.

Meteorology

Both pilots, and their colleagues at their base, were aware that the weather conditions affecting south-east England were not ideal for visual flight at low altitudes. The commander took the lead in gathering weather reports and forecasts from relevant aerodromes, and shared these with the co-pilot.

Forecasts showed that, during the evening, winds would be light throughout south-east England. The visibility was forecast to be between 1,800 m and 7 km at Gatwick. The Lydd forecast predicated visibility of between 4,000 m and 7 km at the end of the forecast period; no further forecast was issued with validity at the time of the helicopter's planned arrival. The cloudbase at the two aerodromes was predicted to be at between 300 and 800 ft aal.

The last reports available to the flight crew for Lydd and Southend indicated better conditions; visibilities of 7 and 8 km and cloudbases of 1,200 ft and 900 ft aal were reported. At Herstmonceaux, the visibility was measured at 3,500 m at 2050 hrs and 3,300 m an hour later; the lowest cloud was 100 ft and 500 ft agl respectively.

The available information therefore indicated that the site at Peasmarsh would be affected by low cloud and poor visibility and the crew made arrangements with Lydd to use it as a diversion if required.

For the first arrival at Peasmarsh the co-pilot briefed for a descent to the minimum safe altitude (MSA) for flight under IFR, which he had calculated to be 1,250 ft amsl, and for a route towards a GPS position 3 nm west of the landing site. This was not an instrument approach procedure, but a portion of en-route flight at or above the MSA during which it was intended that, weather permitting, sufficient visual reference would be gained to carry out a visual approach to the landing site.

The incident flight

The crew shared a similar plan for the return flight to Peasmarsh except that the commander briefed for a descent to 500 ft. In the event, no reference to 500 ft was made by either pilot during the descent and the helicopter continued descending to approximately 350 ft agl.

It was not possible to determine what visual reference, if any, the flight crew had during the latter part of their approach to Peasmarsh until the commander gained sight of the landing site. There was relatively little cultural lighting other than that on the coastal plane to the south-east and flights approaching from the north-west would be provided with few visual references.

A route planned to descend over the lower-lying coastal plain to the south and east of Peasmarsh, where considerably better cultural lighting was present, might have presented a better opportunity for the crew to gain visual contact with the ground. However, such a descent would have necessitated continuing the flight at low height towards the progressively poorer-lit area of the landing site in order for an approach and landing to be made.

Having gained sight of the landing site, the pilots concurred that the helicopter was too high and fast to make a straight-in. This indicates that the visibility beneath cloud and/or the cloud itself restricted the distance from which the landing site was visible.

With the crew now in visual contact with the ground around the landing site, the denser cultural lighting to the south-east offered better visual references; the visibility there was also reportedly better, and the cloudbase higher.

During the orbit for a second approach, the helicopter turned towards higher ground, worse weather, and less cultural lighting. As the orbit continued and the commander's visual references reduced to the triangle of lights in the centre of the field, maintaining orientation and situational awareness would have become challenging.

The helicopter's descent as it turned through a westerly heading may have been a result of intentional control inputs by the commander, perhaps endeavouring to remain visual below lowering cloud, or the result of degraded spatial awareness. Neither pilot recalled hearing the 'CAUTION TERRAIN' and then 'WARNING TERRAIN' alerts registered by the EGPWS computer, or seeing the accompanying visual indication.

The orbit continued, at between 100 ft agl and 170 ft agl, with speed reducing. The co-pilot's recollection of seeing the radio altimeter *'winding down towards zero extremely quickly'* accords with the data. The helicopter was descending over rising terrain; in fact, the tops of trees.

The commander's observation of the 'flickering' lights and his rapid deduction that he was in fact seeing steady lights obscured intermittently by the tops of the trees, led to an aggressive manoeuvre which began just before the radio altimeter recorded its lowest value of 2 ft.

The recovery began with the helicopter pitched 14° nose-up with approximately 12° right roll, radio height 20 ft, rate of descent 400 fpm, speed 32 KIAS, groundspeed 32 kt, 25% torque, and main rotor rpm at its nominal value, 107%.

The commander's control inputs were swift, aggressive, and co-ordinated. He applied cyclic control inputs to arrest the helicopter's rate of descent, flaring to a pitch attitude of 20° nose-up and rolling level, and raised the collective lever, applying blowaway power. The rotor speed reduced to a minimum of 95% Nr as total (combined) engine torque reached its peak value of 241.5%. The aircraft entered a climb, achieving a vertical speed of 1,300 fpm within approximately six seconds of the first recovery action.

During the recovery, the EGPWS issued two 'TAIL TOO LOW' warnings, due to the low radio height and pitch attitude of the helicopter.

EGPWS

No technical reason was identified for EGPWS warnings to be recorded without being presented to the pilots. If the audio inhibit switch had been selected prior to the approach, the audible warnings would not have been announced to the pilots, but neither pilot recalled that the inhibit switch had been selected.

Both pilots recalled hearing the 'TAIL TOO LOW' warning, issued slightly more than 20 seconds after the 'WARNING TERRAIN'. The earlier audible alerts may have also been announced, but not 'heard' by the pilots, because of inattentional deafness or the effects of overload on the pilots' capacity to process auditory cues.

The visual cues appeared not to be especially attention-getting, being small and presented only as illuminated script in small lit push-buttons.

The pilot actions specified in OC's operations manual were the same for both the 'CAUTION TERRAIN' and 'WARNING TERRAIN' alerts: *'Adjust flight path away from Terrain until alert ceases'*. The warnings might have prompted the commander to recognise that the planned orbit was proving more challenging than anticipated, and therefore to abandon the manoeuvre.

Two previous events were identified in which EGPWS-equipped helicopters were involved in situations in which the EGPWS might have provided warnings which could have prevented an accident, but did not: the fatal accident to N2NR and the accident to G-REDU. In the former case, the EGPWS had been left switched off during flight since its installation. In the latter, the investigation determined that the EGPWS was not functioning but did not establish why. In the case of G-WIWI, the system was fitted and functioning, but the flight crew did not react to the warnings presented.

The 'WARNING TERRAIN' warning triggered when the helicopter was flying at slightly less than 80 KIAS and descending at approximately 500 fpm. The helicopter's descent ceased and

it entered a climb over the eight seconds following the 'WARNING TERRAIN'. It is possible either that the flight crew did assimilate and react to the EGPWS warnings, but later did not recall doing so, or that the commander became aware of the close approach to terrain and reacted to avoid it at the same time the warning was issued.

Flight safety functions

Both the FSN published in September 2011 and the minutes of the flight safety meeting two months later showed that the company had identified *'our most hazardous operation is probably making night approaches to private landing sites'*. The commander's decision-making during the approach to Peasmarsh suggests that the contents of these documents had not resulted in effective measures to enhance the safety of such operations. However, the crew's briefing for the first approach to Peasmarsh, which formed the framework for the subsequent approach, was in accordance with the recognised procedures required by OC.

Regulations concerning descent from above minimum safe altitude (MSA)

This incident arose following a descent from flight in instrument meteorological conditions (IMC) towards an attempted visual approach.

The plan for the first arrival at the landing site was to descend to the MSA calculated in accordance with Rule 33 (1) and, should the meteorological conditions encountered meet the criteria of Rule 33 (1) (d), an approach and landing would be made at the landing site using visual references. This plan was in accordance with the interpretation of the rules by the operator's senior management.

During the return flight to the landing site, the co-pilot stated that the MSA would be 1,250 ft amsl and the commander briefed that the descent would be continued to 500 ft with the aim of making visual contact with the landing site. It was not specified whether this was an altitude of 500 ft (ie amsl), an altitude that ensured 500 ft vertical separation (height) above relevant obstacles or a height above the ground.

During the final leg towards the landing site, in-flight visibility was reported by the commander as being "limited", such that he had to turn off the landing lights because of the glare from the rain and fly with reference to flight instruments. The co-pilot assessed the conditions as being "not good". The commander recalled that the co-pilot had visual contact with the ground, which the co-pilot reported as being "intermittent". The co-pilot also reported that he had been uneasy that the helicopter was below MSA without the required visual references. In circumstances such as these, aircraft are permitted to descend below MSA in order to land. As it continued towards the landing site, the helicopter descended to approximately 350 ft agl at which time it was still "in the bottom of the cloud".

Such an approach to a landing site has none of the procedural safeguards inherent in properly constructed IAPs. These safeguards minimise the risks of collision with the ground or obstacles during descent in IMC below MSA. In this incident, there were no procedures to follow and there were different recollections by the crew about what target descent

altitude was actually set. There were no defined visual references for the approach which, if not achieved, would prompt a go-around, and the helicopter levelled off at approximately 350 ft agl in a position from which a landing could not be made.

Properly constructed instrument approaches have missed approach procedures and routes which minimise the risks of collision with the ground and obstacles during a go-around and climb to a safe altitude. In this case, go-around procedures and routing were not available or briefed and, during unplanned manoeuvring to re-position for landing, the pilot became disorientated and the helicopter nearly collided with trees and the ground.

A crew descending below MSA in IMC without following a properly designed IAP is exposing the helicopter's occupants to a higher level of risk of collision with obstacles or the ground than would be present while descending on a published IAP towards a runway. Public transport operations, for example, experience different levels of safety when making an approach to land in poor weather depending on whether or not a particular flight terminates at a runway with an IAP. It is doubtful that passengers are aware that the risk to their safety varies in this way. Implementation of CAP 1122 might address this difference in level of safety by allowing IAPs to be published in relation to small landing sites used by helicopters undertaking public transport operations. However, the staged implementation is unlikely to lead to safety improvements in this regard in the near future, and does not address the circumstances of descents to land other than on published approach procedures. Therefore, the following Safety Recommendation is made:

Safety Recommendation 2014-35

It is recommended that the Civil Aviation Authority review the regulations that permit a helicopter engaged in public transport operations to descend below MSA for the purpose of landing, when flying in instrument meteorological conditions but not on a published approach procedure.

Conclusion

The descent from above the minimum safe altitude was conducted in reduced visibility and low cloud conditions into an area with limited visual references. The helicopter was therefore brought close to terrain in an environment in which situational awareness could become degraded easily.

The decision to execute an orbit around the landing site, in the circumstances pertaining, further increased the chances of situational awareness becoming degraded, whilst the helicopter was at low height above unlit and undulating terrain.

In the course of the orbit, the commander became spatially disorientated and the helicopter descended towards the tops of trees.

Although the EGPWS issued warnings that the helicopter was approaching contact with the ground, the flight crew were not aware of these warnings.

BULLETIN CORRECTION

AAIB File:	EW/C2012/05/05
Aircraft Type and Registration:	Sikorsky S-76C, G-WIWI
Date & Time (UTC):	3 May 2012 at 2155 hrs
Location:	Peasmarsh, East Sussex
Information Source:	AAIB Field Investigation

AAIB Bulletin No 12/2014, page 23 refers

In this report it was incorrectly stated that the accident to G-REDU on 18 February 2009 was fatal. It was not.

The sentence at the top of page 23 should read:

> The AAIB report on the accident to Eurocopter EC225 LP Super Puma helicopter, G-REDU, near the Eastern Trough Area Project (ETAP) in the North Sea on 18 February 2009, was published on 17 September 2011.

The online version of this report was amended prior to publication and a copy of this correction will appear in the February 2015 Bulletin

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ACCIDENT

Aircraft Type and Registration:	CZAW Sportcruiser, G-MELL
No & Type of Engines:	1 Rotax 912ULS piston engine
Year of Manufacture:	2010 (Serial no: LAA 338-14866)
Date & Time (UTC):	17 May 2014 at 1230 hrs
Location:	3 miles south-east of Westcott, Hertfordshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Minor) Passengers - N/A
Nature of Damage:	Damage to canopy, tailplane, elevator and flaps
Commander's Licence:	Private Pilot's Licence
Commander's Age:	63 years
Commander's Flying Experience:	517 hours (of which 156 were on type) Last 90 days - 9 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB and Light Aircraft Association

Synopsis

The aircraft was engaged on an air test to check its handling at the Never Exceed airspeed (V_{NE}). Some 13 kt below this speed, there was a bang and the aircraft started to oscillate violently in pitch. The pilot noticed that the canopy had fractured and a fire extinguisher had become loose in the cockpit. With the speed reduced considerably, the pilot regained control and he continued to his destination.

After an uneventful landing, it was found that the tailplane had buckled on both sides and appeared close to complete failure. The Light Aircraft Association (LAA) is conducting a structural review of the tailplane.

History of the flight

The aircraft was being flown from Chilsfold Farm, West Sussex, to the area of Westcott in Hertfordshire where completion of an air test would be carried out before it landed at its home airfield of Elstree. About 2-3 miles from Westcott, the pilot climbed the aircraft to 3,000 ft agl to accomplish the last part of the air test, which was a dive to V_{NE} (in this case 138 kt) to check both the aircraft's handling and that the propeller did not overspeed.

He dived from 3,000 ft, keeping a careful watch on the airspeed indicator, altimeter and engine tachometer whilst keeping his hand on the throttle to prevent overspeed of the engine and propeller. At an IAS of 125 kt and height of 1,700 ft, there was a loud bang and

the aircraft started to oscillate in pitch violently. The pilot was also aware that the canopy had fractured and that papers and other small objects were flying around the cockpit. His attention was focussed on trying to overcome the pitch oscillations and restore the aircraft to level flight but he recalls an object striking his right shin and, looking down, saw that the fire extinguisher had come out of its stowage beneath the armrest on the centre console and was hanging by its trigger from wiring behind the instrument panel in the pilot's footwell. He was also aware that his headset had been pulled from his head.

The pilot regained controlled flight at about 1,000 ft altitude with an indicated airspeed of 47 kt. He advanced the throttle slowly to increase speed and looked for fields in which to force land, finding two which were suitable. He scanned the flight and engine instruments but found nothing abnormal. Wishing to alert Air Traffic control to his situation, he located his headset, which was partially out of the fractured canopy but had been damaged. He therefore plugged in his spare headset and, whilst doing so, noticed that the powder-type fire extinguisher had partially discharged and was now lodged in the footwell behind the rudder pedals. Although the extinguisher was partially restricting pedal movement, the pilot considered that this was acceptable in the calm conditions.

In view of the fact that the aircraft appeared to be under control with all indications normal, the pilot decided that he would continue to Elstree, with all its available facilities, rather than force land in a field. He informed Farnborough North ATC of his decision, whilst climbing the aircraft and gradually increasing speed. He found that, at about 77 kt, the broken canopy pieces started to flap in the airflow and the pitch oscillations recommenced, so he continued at 70 kt and at an altitude of 1,400 ft.

He was given directions to join directly downwind for Runway 26; the wind was less than 5 kt and virtually straight down the runway. A normal approach and landing followed and the pilot was able to taxi to his normal parking spot, disembark and inspect the damage to the aircraft. He found, in addition to the broken canopy, that the tailplane was severely buckled with ruptures on both sides and with consequent damage to the elevator. It was evident that the tailplane had been very close to complete failure (Figure 1).

Figure 1

Right side tailplane from G-MELL, showing severe buckling damage. Left side similar. (Photo courtesy LAA)

Analysis

The pilot of G-MELL could not be precise about the sequence of events; his original notification of the accident to the AAIB mentioned the possibility that the chain of events may have started with a birdstrike on the canopy. No evidence of bird remains was found and that theory has been discounted. As the origin of the canopy rupture was directly above the pilot's head, and with his recollection of finding his headset lodged in the hole, it would suggest that his head(set) had struck the canopy under significant negative 'g'. A test overseen by the (LAA) showed that there was sufficient movement, even with the seat harness fastened, to allow this to happen.

The most likely scenario, and the one being explored by the LAA, is that a sharp vertical gust of wind (perhaps the result of the aircraft's speed being abnormally high at low level) overstressed the tailplane and the 'g' spike caused the unsecured fire extinguisher to rise out of its stowage and the pilot's head to strike the canopy.

Safety action taken

On 12 June 2014, the LAA issued Airworthiness Information Leaflet LAA MOD/338/018 Issue 1 to all existing and potential owners of homebuilt Sportcruisers. This reduced the V_{NE} of the aircraft from 138 kt to 120 kt. They followed it up on 13 June with Airworthiness Alert LAA/AWA/14/09 which gave a brief summary of the incident, highlighting the potential dangers posed by the unsecured fire extinguisher.

The LAA also published an article in the July 2014 edition of their journal *Light Aviation*. This gave a verbatim account of the pilot's experiences, illustrated with photographs of the damage.

The LAA has initiated a design and certification review of the Sportcruiser tailplane structure with a view to eventually relaxing the V_{NE} restriction, which is seen as a temporary mitigation measure.

ACCIDENT

Aircraft Type and Registration:	Gemini Flash IIA, G-MVKC	
No & Type of Engines:	1 Rotax 503 piston engine	
Year of Manufacture:	1988 (Serial no: 709-1188-6-W499)	
Date & Time (UTC):	15 May 2014 at 1650 hrs	
Location:	Caernarfon Airport, Gwynedd, Wales	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Student pilot	
Commander's Age:	61	
Commander's Flying Experience:	26 hours (of which 10 were on type) Last 90 days - 5 hours Last 28 days - 2 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft was seen to depart from Runway 25 at Caernarfon Airport and make a normal climb to a height of about 200 ft. It then entered a left turn during which, the angle of bank was observed to steadily increase until the nose dropped and the aircraft descended, turning through some 180° before striking the ground in the area of the taxiway. The pilot was fatally injured.

History of the flight

The student pilot arrived at the airport to carry out a flight in the local area. The weather was good with a light westerly wind of about 4 kt, visibility in excess of 10 km, cloud FEW at 3,000 ft, QNH 1036 hPa and with a fog bank visible offshore to the north-west but not affecting the airport. The Chief Flying Instructor (CFI) briefed the student to remain in the airport circuit which was right-hand, using Runway 25 with a circuit height of 800 ft.

The aircraft had been flown that morning on its Permit to Fly check flight and was found to be in a fully serviceable condition. The student pilot involved in the accident was seen to carry out the pre-flight inspection of his aircraft and get dressed in his flying clothing and helmet. The accident flight was to be his eighth solo flight having accumulated 5.4 hours of solo flying in the last seven flights. He contacted the air-ground radio operator and was given airfield information of the runway in use as Runway 25 and the QFE/QNH 1036 hPa. The aircraft was taxied to the holding point where the pilot was seen to carry out the pre-takeoff checks before transmitting that he was ready for departure. The radio operator,

in the tower, passed the wind as “light and variable” which was acknowledged by the pilot. The aircraft entered the runway and was seen to line up; the engine power was heard to increase normally with no misfiring or other unusual sounds. Witnesses saw the aircraft accelerate along the runway and become airborne adopting a normal climb. At a height, estimated at between 160 ft and 250 ft, the aircraft commenced a left turn with the angle of bank increasing steadily until the nose began to drop. The aircraft descended and struck the ground in an area of grass adjacent to the bulk fuel storage installation before sliding along the taxiway and coming to rest. The engine was heard to remain at the constant high power setting throughout the flight to the impact.

The CFI and another witness who saw the accident manoeuvre considered that the entry into the left turn appeared to be consistent with a control input by the pilot, but that no attempt to correct the increasing angle of bank or the nose drop was observed.

Various people ran or drove to the aircraft, amongst them was the duty paramedic from the Helicopter Emergency Medical Service (HEMS) helicopter based at the airfield. The pilot was given first aid before being transported to the local hospital in the HEMS helicopter. Despite the best effort of the paramedics the pilot was declared deceased on arrival at the hospital.

Medical and pathological information

A post-mortem examination of the pilot was carried out and the findings summarised by an aviation pathologist were as follows:

> *‘In summary, the pilot died of the effects of traumatic injuries which he sustained when the aircraft struck the ground. While he survived the initial impact for a short period, the crash forces were such as to produce fatal injuries, and the provision of alternative or additional personal safety equipment would have been unlikely to affect the outcome. The medical investigation has revealed no evidence of any medical or toxicological factors which are likely to have played a role in the cause of the accident, although the possibility that the pilot may have sustained an incapacitating event which has left no evidence at the autopsy cannot be entirely ruled out. No recommendations arise from the medical investigation of this accident.’*

Engineering

Aircraft description

The Gemini Flash IIA is a tandem two-seat microlight aircraft, powered by a Rotax 503 piston engine, driving a three-bladed composite propeller. G-MVKC’s Permit to Fly maintenance inspection had been completed on 14 May 2014. The Permit to Fly check flight had been conducted, to the satisfaction of the Check Pilot (who was also the CFI), on the morning of the 15 May 2014, following which the aircraft remained assembled in a hangar prior to the accident flight in the afternoon of 15 May 2014. The aircraft had accumulated 531 hours since manufacture.

Accident site and wreckage examination

The aircraft had stuck the ground on an area of grass adjacent to the bulk fuel storage facility, approximately 130 m to the south of Runway 25, before sliding along a tarmac taxiway. The wreckage trail was 30 m in length and was aligned on a heading of 105°M. All components of the aircraft were accounted for at the accident site and inspection of the wreckage revealed that the aircraft had initially struck the ground with the left mainwheel, which had detached on impact. The left side of the trike and the left wing were damaged by the ground impact, whilst the right side of the trike, the right mainwheel and the right wing were largely undamaged. The damage to the aircraft and distribution of the wreckage were consistent with the aircraft striking the ground in a shallow, left wing low attitude, with moderate forward speed.

All three propeller blades had failed in overload at their root ends, indicating that significant engine power was being developed at the point of impact. The aircraft's flying wires, which connect the control bar to the wing, were found to be continuous and all failures of the aircraft's load-bearing structural components were consistent with the ground impact. A significant fuel spill had occurred due to abrasion of the aircraft's plastic fuel tank on the tarmac surface of the taxiway, and only traces of fuel remained in the fuel tank. Fuel was present in the carburettor bowl, consistent with engine operation at impact.

The wreckage was recovered to the AAIB's facility at Farnborough for detailed examination. The wing hang-point mounting at the top of the pylon was fixed in the forward of the three available hole positions; an approved condition that maximises the trimmed speed in flight. Both wingtip-mounted wing washout trim adjusters were set to the normal 'N' position, and the configuration of the leech lines'[1] rigging adjuster was found to be in accordance with approved maintenance data[2].

An unapproved hand throttle had been installed on the seat frame's upper left tube; its throttle handle had been deformed and pushed to the rearmost, idle throttle, position during the ground impact. Whilst this particular hand throttle was not approved by the BMAA, an optional approved hand throttle is available for the Gemini Flash IIA that would normally be mounted approximately 12 cm further forward on the front seat frame's upper left tube. The hand throttle is intended for use in cruising flight, not for takeoff and landing.

Due to its disruption, the operation of the hand throttle could not be checked, although the throttle cable was mechanically continuous between the throttle lever and the engine's carburettor. The aircraft's foot throttle, fitted above the right nosewheel steering pedal, was tested for operation and determined to function correctly.

Analysis

When the student pilot arrived at the airfield he appeared to be in good health and carried out the normal pre-flight preparations and checks. The CFI had discussed the weather with

Footnote

[1] The leech lines connect the trailing edge of the wing's upper surface to the top of the king post.
[2] Mainair Sports Service Bulletin 43.

him and due to the presence of fog offshore had required him to remain within the airfield circuit. His takeoff appeared to be normal with no turbulence upsetting the aircraft. The turn to the left appeared to be smooth and controlled but was early for a normal circuit and was in the wrong direction for a right hand circuit. The CFI and another pilot were watching the takeoff and both described that there appeared to be no attempt to correct the left turn or to control the aircraft as it continued to increase the bank angle to the left with the nose dropping before striking the ground. It was also observed that there appeared to be no attempt to reduce the engine power. It is not known whether the fog offshore caused the pilot to make the early left turn.

The pilot had demonstrated previously to have a good standard in controlling the aircraft and to correct the developing situation should have been within his capability. Consideration was given to his moving the control bar in the wrong direction, but he had not exhibited any such tendency previously. Such an action would have been immediately apparent to the witnesses.

The Aviation Pathology report identified no incapacitating condition but stated that:

> *'the possibility that the pilot may have sustained an incapacitating event which has left no evidence at the autopsy cannot be entirely ruled out.'*

In the absence of any conclusive evidence, the investigation considered that the accident occurred due to the pilot not intervening in correcting the increasing left bank.

ACCIDENT

Aircraft Type and Registration:	Pegasus Quik, G-CCWR	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2004 (Serial no: 8053)	
Date & Time (UTC):	18 April 2014 at 0843 hrs	
Location:	Farway Common Airfield, near Honiton, Devon	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - 1 (Fatal)	Passengers - 1 (Serious)
Nature of Damage:	Destroyed	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	50 years	
Commander's Flying Experience:	162 hours (of which 100 were on type) Last 90 days - 2 hours Last 28 days - 2 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft was on final approach to land on a grass runway when it veered right and struck the tops of trees a short distance before the runway threshold. It then descended steeply and hit the ground on its left side. The pilot was fatally injured and the passenger suffered serious injuries. No pre-impact faults with the aircraft or engine were identified; it was probable that turbulence and downdraughts contributed to the aircraft's descent into trees.

History of the flight

The pilot planned to fly, with his nine year old son as a passenger, from Westonzoyland Airfield, near Bridgewater, Somerset to Farway Common Airfield, near Honiton, Devon, before continuing to Salcombe, Devon. The pilot carried with him notes about the landing procedures at Farway Common for in-flight reference. There was no record of the pilot having visited this airfield previously.

According to the passenger, the trike of G-CCWR had a full tank of fuel and was loaded with sleeping bags and inflatable beds. A tent, packed in a large circular bag, was stowed inside the wing. The passenger, who had, during the preceding five years, flown several times in this flex-wing aircraft, occupied the rear seat.

After departing Westonzoyland, G-CCWR routed in a southerly direction. Weather conditions were good and the route was flown with the aid of a tablet computer, using SkyDemon navigation software, that was attached to the instrument panel. The pilot had a radio and

this was used while departing Westonzoyland and during the approach to Farway Common. He tried unsuccessfully to establish two-way contact with Farway Common and then transmitted messages to advise his position to any other aircraft listening on the frequency.

A windsock near the eastern airfield boundary should have been visible to the pilot as he overflew at 550 ft aal. There was a choice of an easterly or northerly runway (10/28 or 18/36) and the pilot positioned on the downwind leg for a right-hand circuit to Runway 36. It is estimated that the wind was from 040º at around 10 kt (11.5 mph) with possible gusts to 14 kt (16 mph).

The passenger had the impression that the aircraft lost altitude in the turn onto final approach but no problems were mentioned by the pilot at this stage. Recorded data recovered from the tablet computer indicated that the aircraft established on final approach approximately 0.5 nm from the runway and 400 ft above it. A witness working in a field slightly to the west of the approach path saw an aircraft fitting the description of G-CCWR at about this time. He thought that the aircraft was very low and the engine sounded normal as it began the turn. However, the engine started to sound as if it was running roughly while he was watching it. He lost sight of the aircraft as it descended towards Farway Common.

The passenger said that he believed that the engine ran normally throughout the flight and that it responded to the pilot's inputs during the approach. The pilot told the passenger that he was flying at a speed of 60 mph as he turned towards the airfield. As they neared the runway, the passenger said that the aircraft "dipped down" and he likened this to his experience of being affected by turbulence earlier in the flight. He recalled that the pilot increased power and appeared to push the control bar as far forward as he could, but this did not prevent the aircraft from hitting trees. The aircraft fell to the ground and the next thing the passenger remembered was sitting in the wrecked aircraft, which was lying on its left side. He could see the pilot on the ground a few feet in front of the aircraft. Despite a pain in his left arm, the passenger was able to undo his four-point harness but the left arm of his flying suit was trapped and he could not get out.

A witness, who was driving his car in a southerly direction along the road adjacent to the runway, observed the aircraft approaching the airfield at low level and saw it crash into some trees. He then spotted the wreckage in a field, about 10 m from the road, and he got out of his car and phoned the emergency services. A number of other people also stopped nearby and two men made their way into the field. Neither of them had witnessed the crash but they could see the pilot lying close to the wreckage and, as they approached, one of these men reported seeing the pilot attempt to lift his head. This witness went first to the passenger and helped him get out of the aircraft before joining the other man who was attempting to administer first aid to the pilot. They continued until the first paramedic arrived about 20 minutes after the aircraft crashed.

A doctor later pronounced the pilot to be dead at the scene. It appeared that the pilot had managed to undo his lap strap, remove his helmet and vacate the aircraft before collapsing. He had not used the third strap of his harness which would have been worn diagonally over his right shoulder.

Meteorological information

On the morning of 18 April 2014 a large ridge of high pressure dominated the region, bringing a stable, light to moderate north-easterly flow to the area. Satellite images and surface observations show that conditions were good with little cloud (the cloud base was generally 1,500 ft to 2,000 ft), and visibilities greater than 15 km. Winds at the surface were north-easterly around 10 kt, gradually increasing with height. The Met Office's computer model suggested that the 2,000 ft wind could have been from 040º at 14 kt and that the strength of this wind could provide a good estimate of what the maximum gust at the surface might have been.

The 0850 hrs METAR from Exeter Airport, 9 nm west of Farway Common, showed a surface wind from 060º at 9 kt, visibility 10 km or greater, FEW cloud at 2,000 ft, temperature 10ºC and dewpoint 5ºC. Exeter Airport is situated at 102 ft amsl, 669 ft lower than Farway Common and consequently a meteorological expert stated it was reasonable to assume that the wind at Farway Common would have been stronger than that at Exeter Airport.

Medical and pathological information

The pilot had made a Medical Declaration which was current and had been countersigned by his General Practioner on 11 March 2014.

A post-mortem examination found that the pilot had suffered internal abdominal injuries as well as severe chest injuries. However, the passenger's injuries were less severe and limited to cuts, bruises and a broken arm. Differences in the body weights and sizes, seating positions and use of harness restraints of the two occupants could provide some explanation for this variance but, if the injuries had been caused principally by the impact with the ground, as opposed to the impact with the trees, a higher degree of similarity could be expected.

The pilot's chest injuries may have occurred when the wing of the aircraft was arrested by the trees, causing the control bar to move rearwards, whilst the trike continued forwards, driving the control bar into the pilot's chest. The pathologist stated that while the pilot had no definitive external chest injuries to confirm that this had happened, their absence did not preclude such an occurrence. The investigation noted similarities between this pilot's injuries and those seen on pilots from two previous flex-wing microlight accidents[1]. In all three accidents the wing or A-frame had impacted a fixed structure during the accident sequence and this could have caused an interaction between the control bar and the pilot's chest. It was also noted that in all three cases the diagonal shoulder strap was not used by the pilot.

The pathologist's report indicated that the injuries sustained by the pilot of G-CCWR were consistent with evidence that he had freed himself from the wreckage before collapsing. The pilot's weight, plus that of the clothing worn for the flight, totalled 128 kg. The pathologist found no evidence of any medical condition that might have impaired the pilot's performance prior to the accident and toxicological tests for drugs and alcohol were negative.

Footnote

[1] G-MWSH on 6 April 2007 (AAIB Bulletin 10/2007) and G-MVKM on 6 October 2013 (AAIB Bulletin 05/2014).

Pilot information

The pilot gained a UK National Private Pilot's Licence after completing a course of flying training on flex-wing microlight aircraft between April 2008 and May 2009. His flying logbook indicated that all his subsequent flying experience was on flex-wing microlights. He acquired G-CCWR in March 2011 and, according to his logbook, he had accumulated almost 65 flying hours in this aircraft up until late July 2013. On 16 February 2013 a Certificate of Revalidation on Microlight (land) aircraft had been signed by an examiner after a flight with the pilot in G-CCWR. This was valid until 6 March 2015.

The last recorded flight in the pilot's logbook was on 17 July 2013. However, the Westonzoyland Airfield movement log included an incomplete entry for 26 August 2013 which indicated he flew G-CCWR that day, on a local flight of unknown duration. There was no evidence to indicate that the aircraft flew again before being moved, during the winter, to the manufacturer's facility at Marlborough, Wiltshire, for repairs. On completion of the work, witness reports indicated that the pilot flew G-CCWR from Yatesbury Airfield, near Marlborough back to Westonzoyland (approx 43 nm) on 15 March 2014. The Westonzoyland movement log also indicated that the pilot had made a local flight lasting 1 hr 15 min on 12 April 2014, six days before the accident flight.

Farway Common Airfield

Farway Common Airfield is situated at 771 ft amsl, around 5 nm south of Honiton, Devon and has two grass runways. Airfield information was available in guides produced for pilots and on a dedicated website. The circuit height was given as 800 ft aal and the website asked pilots to make blind radio calls as they joined the circuit. A copy of the entry from Pooleys Flight Guide and a photograph of the runways, downloaded from the website[2], were carried by the pilot on the accident flight.

Runway 36 was identified in Pooleys as a grass strip 550 m long and 18 m wide, with the numerals 36 etched in the ground at the southern end. The white paint on the numbers had faded (Figure 1) and on either side of the strip there were cultivated areas which did not form part of the aircraft operating area. There were no runway edge markers and it appeared that grass cutting of the cultivated areas had encroached the runway, leaving a visual impression that the runway was narrower than it actually was. In Figure 1 the runway appears as a dark band, in contrast to the lighter coloured strips where the grass had been cut to either side.

Along the southern boundary of the field there was a hedge approximately 2.5 m (8 ft) high which was depicted in the Pooleys Flight Guide for pilots as a '*High Hedge Bank*'. This can be seen in Figure 1, along with a line of trees perpendicular to the approach path that were approximately 50 m further south. The trees on the extended centreline of the runway, were approximately 10 m (33 ft) high but the adjacent trees, immediately to the east of the approach path, measured around 15 m (50 ft) high. G-CCWR impacted two of these trees,

Footnote

[2] The photographs on the website had been taken around five years previously but they were undated and there was no statement to suggest that the trees may have grown taller since the photographs were taken.

as indicated on Figure 1. Parallel to the approach track there were lines of taller trees along both sides of a road which ran south from the eastern airfield perimeter.

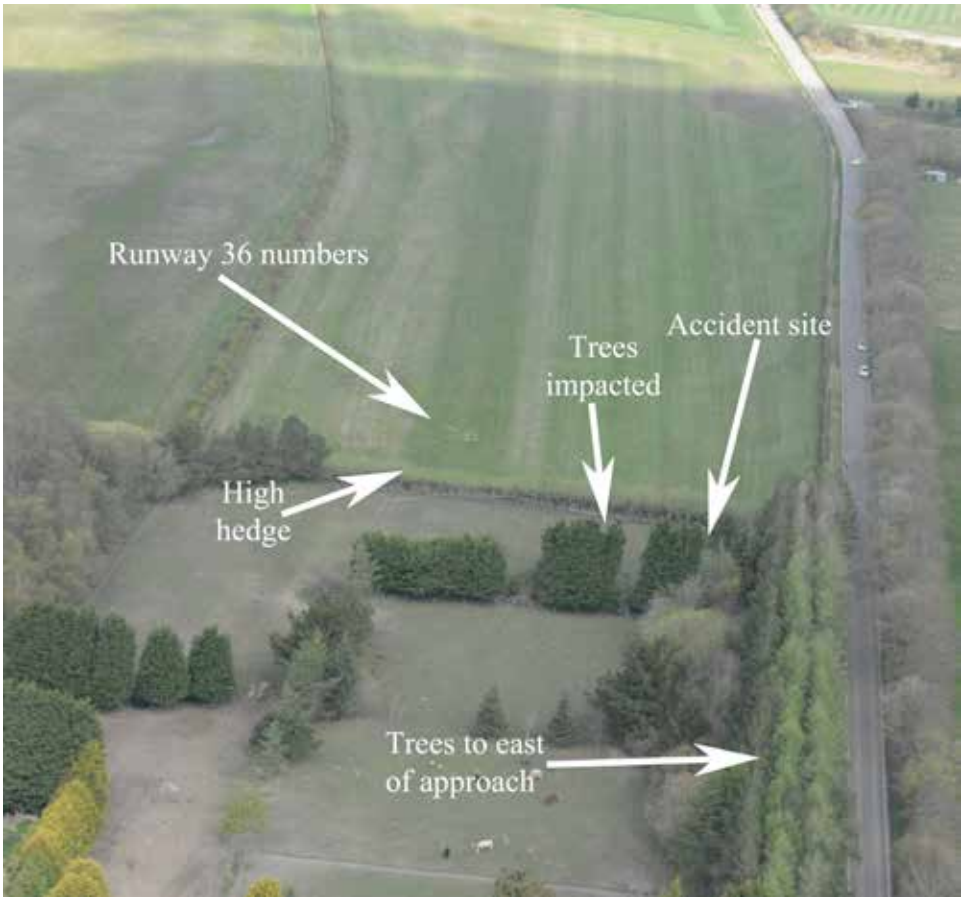

Figure 1

View of the approach to Runway 36
(photograph courtesy of the National Police Air Service, taken on 18 April 2014)

Recorded flight data

GPS derived data for the accident flight, recorded by the SkyDemon navigation software, was recovered from the pilot's tablet computer. The recording comprised GPS positional data (latitude, longitude and altitude amsl) together with groundspeed, track angle and a number of satellite signal quality metrics. There was no radar data for the accident flight.

The GPS data indicated that G-CCWR departed Westonzoyland at 0815 hrs. During the climb out, the average climb rate between 200 and 500 ft was about 1,050 ft/min. The highest altitude reached during the flight to Farway Common Airfield was 1,775 ft amsl.

The data indicated that G-CCWR approached Farway Common from the east and turned directly toward the airfield on a north westerly track with about 2 nm to go. The aircraft overflew the numbers of Runway 36 at about 550 ft aal, turned downwind at about 500 ft aal, and turned final at about 400 ft aal and 70 mph groundspeed. The ground track of the aircraft on final approach is illustrated at Figure 2 with the associated GPS data at Figure 3.

Figure 2

Ground track of G-CCWR on finals to Runway 36
(distance-to-go and height figures are relative to the airfield boundary for Runway 36)

The calculated distances to the airfield boundary for Runway 36 and descent rates are also shown. To compensate for the vertical errors present in the recorded GPS positions, in order that the recorded height of G-CCWR at the time it struck the tree matches the actual height of that tree, all references to the aircraft's altitude on final approach have been reduced by 36 ft.

Figure 3 shows that during the latter part of the approach the groundspeed reduced steadily over a 10-second period until it reached a minimum of 43 mph about 3 seconds before the aircraft struck the trees. The wind speed was about 11 mph from 040° with gusts up to 16 mph suggesting that the airspeed at this point could have been between 51 mph and 55 mph. However, in the shadow of the trees the wind speed could have been lower and consequently the airspeed could have been lower than 51 mph. The groundspeed then increased briefly to 54 mph as the aircraft turned and descended into the trees.

The flight ended at 0841:30 hrs; however, the software remained active and recording for a number of hours later until the battery of the tablet computer ran out of power.

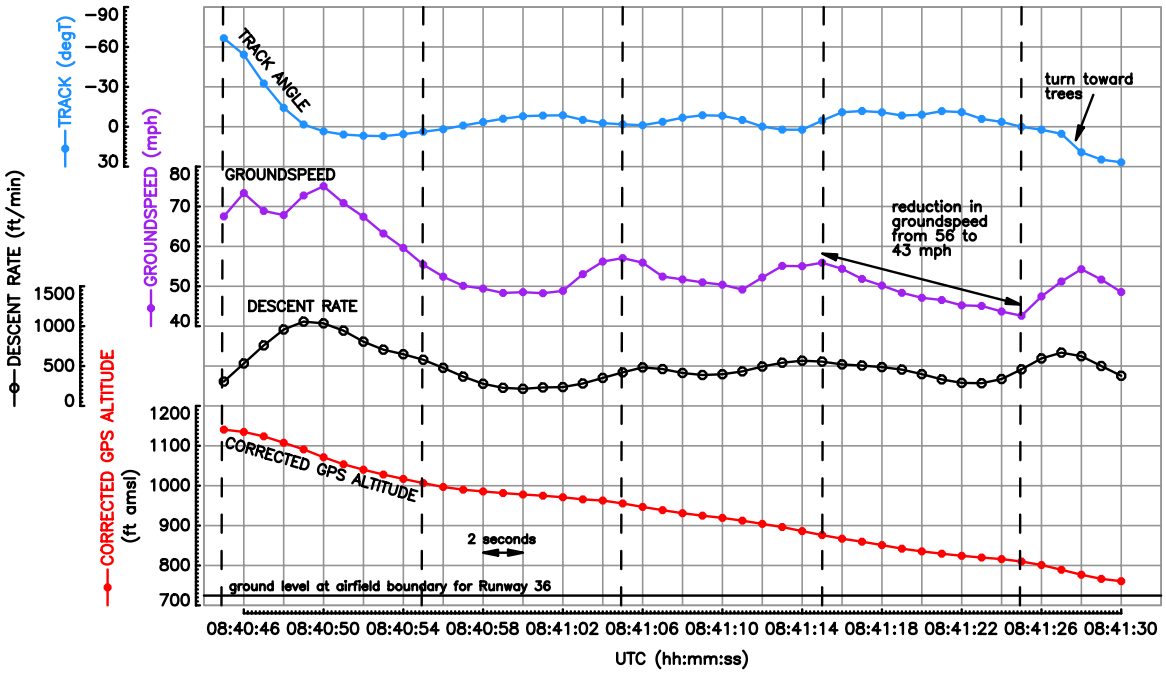

Figure 3

GPS derived data of G-CCWR on final approach to Runway 36
(with points highlighted in Figure 2 identified by dashed lines)

Approach to Runway 36

The altitude data of G-CCWR on final approach to Runway 36 is also presented in Figure 4 against distance to go to the airfield boundary to Runway 36. This indicates that G-CCWR was being flown with an approach angle of close to 6º after turning onto final approach (note that a 5.7º approach angle equates to a 10:1 slope ratio). It was calculated that an

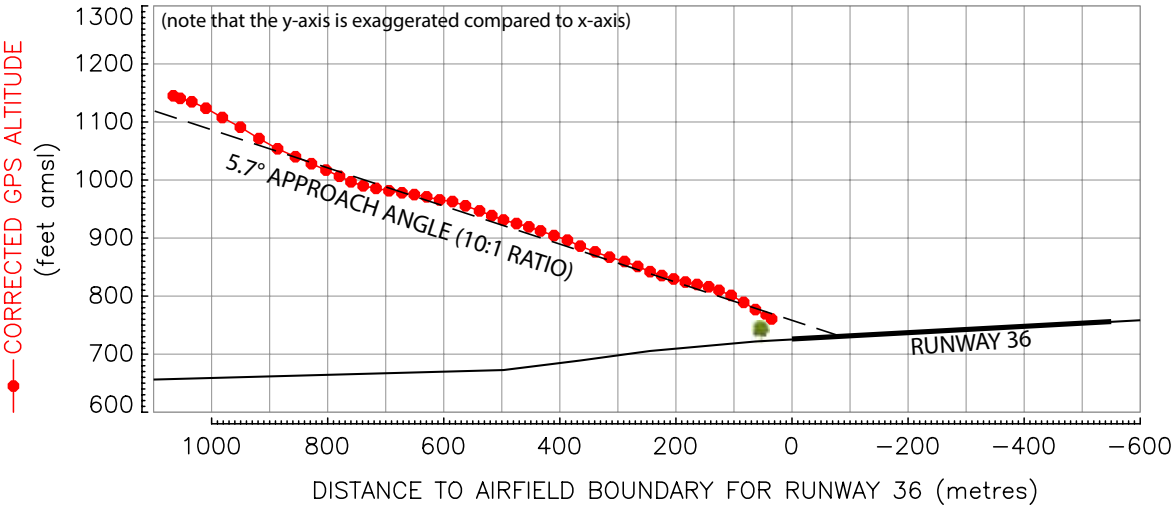

Figure 4

Vertical profile of G-CCWR on final approach to Runway 36 and a dashed line for reference depicting a 5.7° approach angle (10:1 ratio) to clear the 33 ft high trees (50 m before the airfield boundary) by 10 ft

aircraft on such an approach angle for Runway 36 would have to aim at a point around 80 m beyond the airfield boundary if it was to achieve 10 ft clearance above the 33 ft trees positioned 50 m before the boundary. For comparison, an aircraft on a steeper approach angle of 9.5º (6:1 ratio) would need to aim at a point about 30 m beyond the airfield boundary to achieve a similar clearance, while an aircraft on a shallower 3º (19:1 ratio) approach angle would have to aim at a point about 200 m beyond the boundary. The recorded data indicated that G-CCWR was being aimed at a point far enough along the runway to clear the 33 ft trees.

Aircraft information

The Pegasus Quik is a two-seat, flex-wing (weight-shift control) microlight aircraft, comprising a trike unit and wing connected by an upright monopole (Figure 5). The trike incorporates a tricycle undercarriage and G-CCWR was powered by a 100 hp Rotax 912ULS engine fitted with a 3-bladed Warp Drive propeller. Maximum engine speed is 5,800 rpm; however, with a Warp Drive propeller set to the recommended 16° pitch at the tip the maximum static engine speed is 4,800 rpm and the maximum in-flight engine speed, straight-and-level, is about 5,250 rpm.

Figure 5

Pegasus Quik (*photograph courtesy Bill Brooks*)

The wing is controlled via a control A-frame, which consists of a horizontal control bar braced by fore and aft flying wires and two uprights attached to the wing keel tube. The Quik has a tandem seating configuration for a pilot in the front and a passenger in the rear. The rear passenger seat is equipped with a four-point harness, consisting of a lap strap and two shoulder straps. The front seat is equipped with a three-point harness, consisting of a lap strap and a separate single diagonal shoulder strap. The harnesses do not incorporate an inertia reel.

The aircraft was fitted with the optional, larger 65 litre fuel tank.

G-CCWR was manufactured in 2004 and had accumulated 531 flying hours. The engine had logged 539 hours. Its last maintenance was an annual inspection which was completed on 3 March 2014. This work included replacing the wing sail as part of the 500-hour wing service. Following this work a flight test was carried out by one of the factory pilots and no anomalies were noted. The maximum engine rpm was recorded as 5,100 rpm.

Accident site and initial wreckage examination

Examination of the accident site revealed that the aircraft had struck the tops of two trees 15 m high (Figure 6), and then descended steeply. It hit the ground in a steep left bank and then bounced about 7 m before coming to rest. Figure 7 shows the trike on its left side and the wing upside down. The left main landing gear leg had failed in compression and the left wing structure had crumpled in the impact. Two of the propeller blades had separated at the root and the remaining attached blade had suffered tip damage. One of the detached blades was found next to the main wreckage; the other blade was not found. Two pieces of propeller blade tip, identified as being from the two detached blades, were recovered from the opposite (southern) side of the trees. A piece of plastic cable end shroud was found midway between the trees and the main wreckage.

There was a distinct smell of fuel at the accident site and police reported having seen fuel leaking from the engine. Approximately 23 litres of fuel remained in the tank.

Figure 6

Accident site – the white Xs highlight some of the tree strike marks

Figure 7

Main wreckage (wing upside down)

Detailed wreckage examination

The aircraft wreckage was recovered to the AAIB's facility in Farnborough for detailed examination. The two flying wires from the right side of the A-frame to the right wing had failed in overload. The aft flying wire from the right side of the A-frame had also failed in overload at a location close to the propeller arc. There was also a leading edge nick in one of the propeller blades consistent with a wire strike. The failures within the wing structure were all consistent with ground impact loads and there were no anomalies with the rigging of the wing. A circular pop-up tent weighing 3.5 kg, of diameter 78 cm and thickness 14 cm, was found tucked inside the right wing resting against the leading edge tube and the keel tube. The control bar had a slight upwards bend. The reflex trimmer wheel was found set to FAST (about 80 mph), but this could have changed in the impact sequence. The mixture control was found set to full LEAN, the forward ignition switch was ON and the aft ignition switch was OFF. The hand-operated throttle lever was set to idle.

The rear seat four-point harness and the front seat lap strap were found undone and undamaged. The upper portion of the front seat shoulder strap was found tied in a knot – this appeared to have been done deliberately to prevent it from dangling when not in use. The lower portion of the front seat shoulder strap was found to be secured in the wrong location on the base tube beneath the seat; it was in front of the vertical rod which supports the fuel tank, instead of behind it. In this location only friction between the harness and keel would have prevented it from sliding forwards. This harness was also found to be the 'short' version – later versions are 3 inches longer. Due to the pilot's size it was unlikely that the shoulder harness was long enough for it be secured around him with the lower strap secured correctly.

Examination of GoPro video

A GoPro Hero video camera, that had been mounted on the pilot's helmet, was recovered from the accident site. It contained a video recording which started 5 min before the aircraft lifted off from Westonzoyland and ended 3.5 min later. The video showed that the fuel gauge indicated full after engine start and that the takeoff had proceeded normally. Audio spectral analysis revealed that the takeoff engine speed was 5,044 ±20 rpm. The mixture selector can be seen set to the 6 o'clock position, which is a mid-mixture position, during and after the takeoff. The normal position for takeoff is full RICH – about the 8 o'clock position (full LEAN is at about the 4 o'clock position).

Powerplant examination

The engine had not suffered any impact damage apart from damage to the propeller, a small split in the lower left radiator hose and a small leak from the left side of the radiator. The aircraft was equipped with a FLYDAT engine instrument which records peak engine parameters on start-up, at 6 minute intervals and at shutdown. The maximum engine speed during the accident flight was 5,100 rpm which was recorded during the takeoff. The maximum engine speed recorded during the final period to engine shutdown was 4,970 rpm. The exhaust gas temperatures, oil temperature, oil pressure, and cylinder head temperature were all within normal ranges for the entire flight. This indicated that the leak from the radiator hose and radiator was probably a result of impact damage.

The engine was tested in situ with a different test propeller[3] and using some of the fuel remaining in the tank. The engine started normally, ran smoothly and achieved a maximum speed of 5,620 rpm with both ignition switches on and the mixture set to full RICH. With the mixture set to the 6 o'clock position, engine speed reduced to 5,580 rpm, and with it set full LEAN it reduced to 5,360 rpm. The engine ran smoothly under all three mixture conditions. This test was repeated with the aft ignition switch OFF. The maximum engine speed with full rich mixture was 5,420 rpm, mixture at 6 o'clock 5,320 rpm and full lean mixture 5,050 rpm. The engine ran smoothly on one ignition in all three mixture conditions.

The test propeller was installed on another Rotax 912ULS engine which achieved a maximum speed of 5,730 rpm with the mixture full RICH and both ignition switches ON.

Operator's manual

The Pegasus Quik Operator's Manual (OM) provides the following advice:

> *'If you have not flown within the previous 3 months, take a refresher lesson with a Qualified Instructor before flying as Pilot in Command, and do not operate the aircraft until the Instructor is satisfied with your ability.'*

The maximum authorised takeoff weight (also referred to as the *'maximum weight'*) is listed in the OM as 409 kg and the limiting weight for either seat is 110 kg. This is considered to be a structural limit for the seat. The manual provides information about aircraft weights and centre of gravity and there is a requirement to place a placard[4] in the cockpit to show how the fuel load may have to be reduced in order to avoid exceeding the maximum weight before takeoff. Pilots are instructed to calculate the combined weight of the aircraft, fuel, pilot and passenger to ensure that this never exceeds 409 kg. There is a warning that exceedance of this limit could cause structural failure or loss of control.

In a section relating to centre of gravity, there are statements that: '*The CG of the wing **is** critical*' and '*Items should not be attached to the wing which significantly change the CG*'. The OM contains no information or advice about the placement of any items inside the wing.

The OM describes the harnesses fitted to the Pegasus Quik and states that the three-point harness for the front seat pilot and the four-point harness for the rear seat passenger should be worn at all times.

Guidance is given in the OM about the criteria for selecting appropriate airstrips. It recommends that both the approach and climb out zones should be free of high obstructions such as trees, pylons and buildings. The OM then states:

Footnote

[3] The test propeller was a two-bladed 52-inch diameter GSC Tech 3. This propeller produces less drag than the 3-bladed Warp Drive propeller, and therefore allows the engine to run at a higher rpm at full throttle.

[4] Such a placard was fitted to G-CCWR.

> *'Airstrips surrounded by trees or other obstacles should be avoided, particularly in windy conditions, since low-level turbulence and rotor are likely to be present. Exercise great care when visiting other airstrips for the first time, since it is possible that they are not suitable for safe Microlight operation.'*

The OM describes roll control with the following statements:

> *'The roll response is aided by the intentional flexing of the airframe and sail designed into the Quik wing. The Quik wing also incorporates a floating keel and hang-point roll linkage to reduce the effort required to produce and stop the roll, especially in response to small pilot inputs. This makes the aircraft much easier to fly if the pilot inadvertently flies into turbulence. Because the wing is only deflected a certain amount by the pilot's roll input, the roll rate achieved will be faster at high speeds than low speeds.'*

It also states:

> *'Roll control becomes slower at low airspeeds, so the bar should be pulled in slightly to increase airspeed before commencing the turn.'*

The recommended approach speed for a Pegasus Quik is 60 mph but '*a slightly higher speed than normal*' is recommended when a crosswind approach is unavoidable. The maximum crosswind limits which pilots must observe is dependant on experience and the OM states that the following apply:

- For beginners with less than 10 hours time as pilot in command, the maximum permitted windspeed is 5 mph (4.5 kt) and no crosswind is allowed.
- With between 10 and 100 hrs time as pilot in command, the maximum permitted windspeed is 15 mph (13 kt) and the crosswind limit is 5 mph (4.5 kt).
- For those with greater than 100 hrs time as pilot in command[5], the maximum permitted windspeed is 23 mph (20 kt) and the crosswind limit is 12 mph (10.5 kt).

Permit to Fly

G-CCWR was being flown under the conditions of a Permit to Fly from the CAA. This exempted the requirement for the aircraft to be issued with a Certificate of Airworthiness. The conditions of the Permit to Fly stated:

> *'The aircraft shall be operated in accordance with the current procedures and limitations contained in the applicable technical publications and with the manufacturer's instructions for the type and model of aircraft.'*

Footnote

[5] The pilot of G-CCWR had logged 132 hours pilot in command time in the five years since he started pilot training.

Aircraft weight

G-CCWR had an empty weight of 212 kg. The pilot weighed 128 kg (see *Medical and pathological information),* while the passenger weighed 50 kg. The structural weight limit for the pilot's seat was exceeded by 18 kg. The baggage, including camping equipment, carried on the accident flight was weighed after the accident and found to total 16 kg. A full 65 litres of fuel in the tank would have a weight of 46.8 kg, assuming a specific gravity of 0.72 kg/litre. This indicates that the aircraft weighed a total of 452.8 kg at the start of its flight.

Based on fuel consumption figures from the OM, about 8 litres (5.8 kg) would have been burnt during the flight and the aircraft would therefore have weighed around 447 kg at the time of the accident. This would have placed the aircraft around 38 kg or 9.3% above the *'maximum weight'* at the time of the accident.

Aircraft designer's comments

The designer observed that flex-wing microlight aircraft have a light wing loading and low inertia. Roll control may be quite heavy when close to the stall speed but response will improve as airspeed increases. Wind or thermal activity can create strong turbulence and windshear close to the ground when trees or other obstacles are present. Such turbulence is often strongest around treetop height and if the airspeed is too low at this stage during a landing approach or on climb out, there may not be enough roll control to prevent involuntary turns. Wind shadow may also cause airspeed to decay rapidly, inviting a wing drop. If this occurs close to the ground there may be insufficient height to recover.

He stated that the normal approach path for a Pegasus Quik is about a 10:1 ratio (5.7º angle). However, he observed that when a pilot is committed to landing in low-level turbulence, a better technique is to make a steeper-than-normal approach at about a 6:1 ratio (9.5º angle) through the turbulent zone whilst maintaining an extra margin of airspeed and that "70 mph is enough for the Pegasus Quik". The round-out should take place a few feet above the ground, allowing speed to decay in the ground effect until the final flare. This technique minimises the time spent in the turbulent zone and maximises control authority.

An overweight aircraft will require more power to fly straight and level and therefore it will have less excess power available to help it climb than one which is lighter. The best rate of climb quoted in the OM for G-CCWR at 409 kg was 1,200 ft/min. Calculations by the designer indicated that this would be reduced by around 19% to 957 ft/min if the aircraft weighed 450 kg.

The front seat in this type of microlight is forward of the hang point[6], so the heavier the occupant of that seat is, the more the trike will hang nose down. The pilot will balance this increased nose-down attitude by positioning the control bar further forward. This will place the control bar closer to the front strut, limiting the bar's forward range of movement which will reduce the aircraft's pitch-up capability. The designer estimated that exceedance of the

Footnote

[6] The hang point is the position on the wing from which the trike unit is suspended.

seat limit by 18 kg would have meant that the control bar was about 20 mm closer to the front strut than it would have been if the pilot had weighed 110 kg. He suggested that this would have had a minimal effect on the aircraft's ability to pitch up.

When the weight of a flex-wing aircraft is increased, the shape of the wing is altered and this tends to increase the machine's longitudinal and lateral stability. This means that more force has to be exerted to manoeuvre the aircraft. The designer indicated that with the aircraft 9.3% overweight, the pilot would need to exert about 7.5% more force to push the control bar forward, but he considered that an increase by this amount would probably not be discernible unless a pilot was very experienced and frequently flew aircraft that were loaded differently.

The designer stated that the carriage of items within the wing envelope was not approved, but it was his opinion that the presence of the pop-up tent would not have significantly affected the profile of the wing. The tent was found resting against the leading edge tube and the keel tube but, as it was not restrained, calculations were done to check how it could have affected control of the aircraft had it moved. As a result of these calculations, the designer concluded that if the tent had shifted the maximum possible distance in either the fore and aft or the lateral axis, any changes to the control forces or to the aircraft's speed would have been small and masked by the effects of moderate turbulence. It was noted that there were no control cables within the wing which could have been fouled by the tent.

The designer considered the possibility that the control bar may have caused the pilot's chest injuries. He was unable to propose an alternative design for the control bar on the Pegasus Quik but said that this information could help influence the design of future aircraft. He noted that inertia belts are offered for later models of microlight and that it might be possible to modify the Pegasus Quik with an inertia belt.

Analysis

Aircraft examination

The damage to the wing and trike was consistent with the aircraft having hit the ground on its left side. The location of the plastic cable end shroud midway between the trees and main wreckage indicated that the right wing flying wires most likely failed as a result of impact with the trees. When these wires hit the trees, the A-frame would have been pushed aft against the pilot's chest, and the aircraft would have yawed right while the left wing dropped. The propeller was damaged and was turning at high speed when it hit the trees, as evidenced by the two propeller tip pieces that were found south of the tree line. It was probable that the right aft flying wire was cut by one of the propeller blades during the tree impact sequence. There was no evidence to suggest a defect in the wing or airframe prior to tree impact.

A test of the engine after the accident revealed that it was capable of producing 5,620 rpm using a test propeller, which was within 2% of the maximum engine rpm measured using the same propeller on another Rotax 912ULS engine. This evidence combined with the propeller damage indicated that the engine had not suffered a loss of power prior to impact with the trees. The evidence from the GoPro recording revealed that the maximum engine

speed during takeoff was about 5,044 rpm[7] with the mixture in a mid-position, which was close to the 5,100 rpm measured during the post-maintenance flight test. And, since the FLYDAT recorded a peak engine rpm of 4,970 rpm during the last 6 minutes before the accident, this indicated that the engine was probably producing near to full power when it hit the trees. It was not possible to explain why the mixture was found in the full LEAN position and one ignition switch was OFF; however, had these been the pre-impact positions, the engine would have still run smoothly, albeit at a lower rpm and producing less power.

Aircraft weight

The maximum authorised weight for the aircraft was estimated to have been exceeded throughout the flight. Guidance in the OM on how to limit the fuel load should have been followed, to prevent the maximum authorised weight from being exceeded. The extra weight would have reduced the aircraft's climb performance. The designer indicated that the force needed to push the control bar forward would have been increased by 7.5% due to the extra weight. However, this was unlikely to have been discernible to the pilot given his limited experience.

Also, the 110 kg structural limit for the pilot's seat was exceeded by 18 kg. This would have slightly reduced the ability of the aircraft to pitch up.

The exceedance of the maximum weight quoted in the OM, meant that the conditions of the Permit to Fly were not met.

Operation of the aircraft

The pilot of G-CCWR had little recent flying experience. Records indicated that he had not flown between August 2013 and March 2014, and although there is evidence that he had flown twice since then, he had not had a refresher lesson with an instructor, as advised by the OM.

As part of his pre-flight planning, the pilot made enquiries about Farway Common but it was not an airfield he was familiar with and there were no warnings promulgated about the trees in the vicinity of the approach to Runway 36. The airfield photograph that the pilot carried with him did show trees near the runway, but he would not have known that the photograph was five years old and that the trees were likely to have grown taller since the photograph was taken.

When he joined overhead, about 250 ft below the height advised, the pilot might have seen from the windsock that the wind was about 10 kt (11.5 mph) or more. The direction of the wind may have indicated that Runway 36 was more favourable with regard to the crosswind but there were fewer obstacles on or adjacent to the approach to Runway 10. The OM advises pilots to exercise great care when visiting airstrips for the first time and that, particularly in windy conditions, they should avoid airstrips surrounded by trees because of the likelihood of turbulence.

Footnote

[7] Lower than in the test due to the different Warp Drive propeller.

It was apparent from the recorded data that the final approach was flown at an angle of around 6º. The aircraft designer has indicated that, when low-level turbulence is anticipated, a better technique is to fly a steeper approach, at about 9.5º, and to penetrate the turbulence at the higher-than-normal speed of around 70 mph. If the approach had been flown in this way, G-CCWR would have spent less time descending through the turbulence that was probably present in the lee of the trees. A higher speed would also have afforded more roll control.

Recent grass cutting adjacent to the runway could have made the strip appear narrower than it actually was. When making a visual approach, a pilot uses the visual aspect ratio of the runway to help judge if he is flying along the desired approach angle or not. On a steep approach a runway will appear to be long and thin. Conversely, on a shallow approach it will appear relatively short and wide. When a runway is narrower than expected it will look thinner and may give a pilot the impression that the approach is steeper than it actually is. This may have influenced the pilot to adopt a shallower approach path than intended.

The passenger's evidence suggests that G-CCWR was being flown at a target airspeed of 60 mph for the approach, which is slower than recommended for turbulent conditions. Recorded data showed that at the start of the approach the groundspeed was close to 70 mph but that it then reduced, with indications that the airspeed may have fallen below 51 mph before the accident.

It is likely that, during the latter part of the approach, G-CCWR descended into turbulent air in the lee of the trees to the right. This is borne out by the steepening of the descent angle and the increased rate of descent in the last 100 ft. The right turn recorded before the crash suggests that the turbulence or loss of airspeed in the wind shadow caused the right wing to drop and that the pilot was unable to prevent the aircraft from turning right towards a group of trees that were taller than those below the final approach track. The pilot appeared to be applying full power and attempting to push the bar as far forward as he could to climb the aircraft. In the overloaded condition, the aircraft's climb rate would have been adversely affected. As the airspeed had probably reduced below 60 mph, it would have made it more difficult for the pilot to turn the aircraft away from the trees.

The reduction in groundspeed that occurred during the latter part of the approach was reversed in the final few seconds before the aircraft struck the trees. This may have been because the aircraft was now below tree level and in shadow of the wind or it may have been because the aircraft was accelerating in response to a power increase. However, the pilot was unable to climb the aircraft to clear the taller trees that were now in its path and it collided with two of these trees.

Survivability

The pilot wore a lap strap around his waist but he had not attached the third strap that could have fitted over his right shoulder to provide upper torso restraint. It was estimated that the shoulder strap installed was of insufficient length to correctly fit this pilot. A slightly longer belt was available and the manufacturer intends studying the possibility of offering an inertia reel seat belt modification for Pegasus Quik aircraft.

It was evident that the pilot had freed himself from the aircraft before succumbing to his injuries. It is possible that the pilot's chest injuries had been caused by impact with the control bar when the wing collided with the trees; similar injuries have been noted in two previous microlight accidents. While it may not be practical to modify the control bars of existing microlights to prevent this type of injury, this observation may help in the design of future aircraft.

CAA advice

The CAA publishes two leaflets that are pertinent to this accident. Safety Sense Leaflet 09 is titled '*Weight and Balance*' and it cautions pilots that the effects of overloading an aircraft include impaired manoeuvrability and controllability. It provides examples of pre-flight calculations that must be done and emphasises that accurate weights must be used for all persons and items that will fly in the aircraft. The leaflet's summary includes the following instruction:

> *'Check that the aircraft maximum take-off weight is not exceeded. If it is, you MUST reduce the weight by off-loading passengers, baggage or fuel.'*

Safety Sense Leaflet 12 is about '*Strip Flying*' and it contains extensive guidance for pilots who intend to fly to an unfamiliar airstrip. It refers to *CAP 793 - Safe Operating Practices at Unlicensed Aerodromes* and advocates careful planning of the approach and go-around area, paying particular attention to woods or buildings that could create windshear or turbulence. There is also a suggestion that a first visit to an unfamiliar airstrip should be done in the company of a pilot who has experience in operating from there. On the last page of the leaflet there is a summary of things to do and not to do, including the following:

> *'**DO** be ready for unexpected effects from trees, barns, windshear, downdraught etc.'*

Both leaflets can be downloaded from the CAA's Publications website.

Safety action

After this accident, the owner of Farway Common Airfield changed the airfield's website to add a cautionary note about turbulence and windshear from the trees close to the Runway 36 approach. He said he would request that the hazards be mentioned in commercially produced airfield guides. The Pooleys Flight Guide was subsequently amended in July 2014.

In addition, he allowed grass to grow over the numerals near the runway thresholds so that they were no longer visible. He realised that pilots approaching Runway 36 might have been inclined to have used the numbers as an aiming point, even though they might have needed to aim further along the runway to ensure clearance from the trees under the approach path.

The owner acknowledged that the website photograph which showed Runway 36 and its approach was old and that the trees had grown taller. He

has annotated the website photograph with a note about the height of the trees on the approach to Runway 36 and added a cautionary note about turbulence. He has also stated that he will brief pilots about the hazards associated with Runway 36 when they phone him to request prior permission to visit Farway Common.

The CAA intends to revise its '*Strip Flying'* leaflet and add illustrations to show how obstructions can create low level turbulence and how obstacles below the approach path can affect an aircraft's approach angle and point of touchdown.

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

Aircraft Type and Registration:	Airbus A320-214, G-EZWM
No & Type of Engines:	2 CFM56-5B4/3 turbofan engines
Year of Manufacture:	2013 (Serial no: 5739)
Date & Time (UTC):	28 August 2014 at 0537 hrs
Location:	In climb over Oxfordshire
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 6 Passengers - 157
Injuries:	Crew - None Passengers - None
Nature of Damage:	Static inverter overheated
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	52 years
Commander's Flying Experience:	13,976 hours (of which 5,641 were on type) Last 90 days - 183 hours Last 28 days - 35 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent enquiries by the AAIB

Synopsis

During the en-route climb, the caption AVIONICS SMOKE was displayed on the Electronic Centralised Aircraft Monitoring (ECAM) display and the crew could see smoke emanating from the right side of the centre console inside the co-pilot's footwell. The aircraft diverted to London Gatwick Airport and, during the descent, the smoke stopped. It landed without further incident.

It was found that a component in a static inverter, powering electrical outlet sockets in the cockpit, had overheated.

History of the flight

The aircraft was on a flight from Liverpool to Naples. Passing FL320 in the climb, the co-pilot reported an odd odour. The commander said that he could not smell anything unusual but checked the galley area on the CCTV camera to see if the cabin crew were cooking anything which might account for the smell. As he pressed the interphone button to talk to the cabin manager, the commander saw smoke rising from the right of the centre console next to the co-pilot's knee. He told the cabin manager he would ring her back and both flight crew donned their oxygen masks.

The ECAM display AVIONICS SMOKE caption then appeared. Simultaneously, an amber SMOKE light illuminated on the GEN 1 LINE pushbutton and a FAULT caption appeared on the BLOWER

and EXTRACT pushbuttons. (Note: the ECAM caption and the lights will all appear if smoke is detected in the avionic ventilation duct.) The caption and lights extinguished after about a minute but the visible smoke continued and the crew made a PAN call, commencing a descent and initiating the Quick Reference Handbook (QRH) AVIONICS SMOKE drills. The commander decided that he would hand control of the aircraft and responsibility for communications to the co-pilot whilst he continued with the QRH drills, the cabin crew and passenger briefing and reprogramming the Flight Management Guidance Computer for a diversion to London Gatwick Airport.

During the descent, the smoke appeared to stop and the aircraft landed on Runway 26L at London Gatwick without further incident. It was met by the Airport Fire Service (AFS), who escorted the aircraft to a remote stand where the passengers were disembarked using stairs. After engine shutdown, the crew removed their oxygen masks and the AFS scanned the aircraft for 'hot spots' using a thermal imaging camera but found none.

Further investigation by technicians found that a static inverter, part number 1-002-0102-1830/2A350-1AS-1830, located in the avionics bay, had signs of severe overheating (Figure 1). It was replaced and, after further testing, the aircraft returned to service. The function of the inverter is to supply 115VAC and 60 Hz power to a utility socket in the cockpit so that domestic equipment, such as computer laptops and tablets, can be plugged in. It does not form part of the racked avionics but is a stand-alone unit mounted below the co-pilot's footwell floor to the right of the centre console. The floor is not sealed to prevent fumes from the avionics bay entering the cockpit. The inverter was standard equipment on aircraft manufactured after serial number 2700.

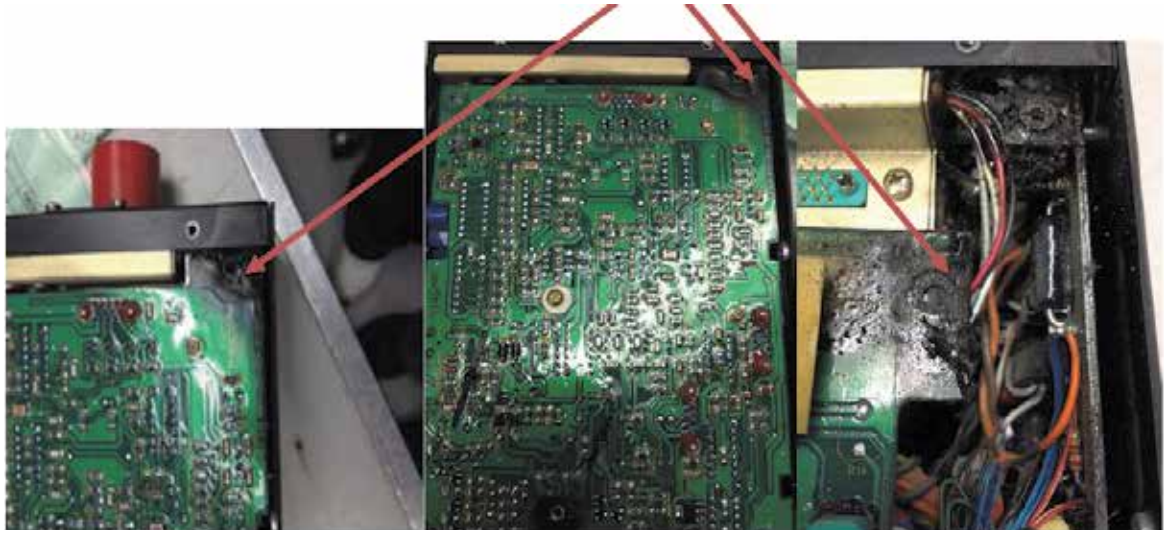

Figure 1

Burn marks on the PCB of the static inverter

The inverter was returned to its manufacturer for examination. They reported that the damage centred on a capacitor, C306, which had been destroyed by overheating (Figure 2). The damage precluded establishing the precise reason for its failure, although tests on

another unit indicated that the capacitor was operating well within its allowable working temperatures. The manufacturer also examined the reliability and failure rates of the inverter and they were found to be acceptable. They consider this failure was an isolated incident but advise that they will monitor the reliability of the static invertors.

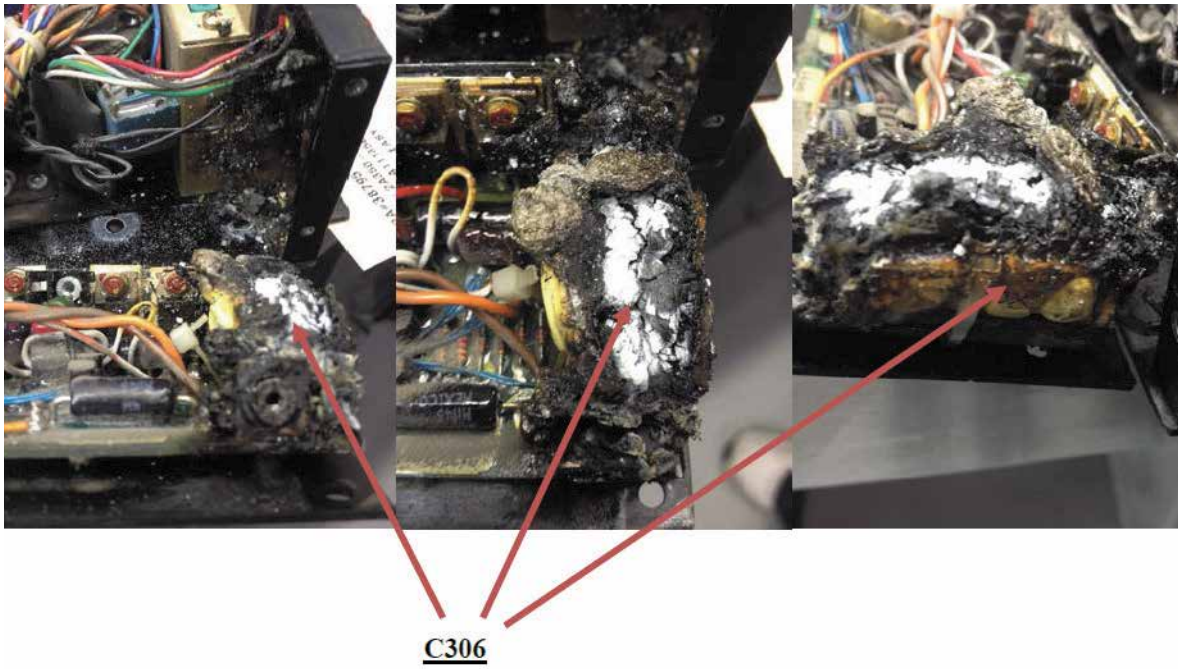

Figure 2
Overheated capacitor C306

ACCIDENT

Aircraft Type and Registration:	Boeing 737-8AS, EI-EFB
No & Type of Engines:	2 CFM56-7B turbofan engines
Year of Manufacture:	2009 (Serial no: 37532)
Date & Time (UTC):	29 July 2014 at 2144 hrs
Location:	Stansted Airport, Essex
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 6 Passengers - 171
Injuries:	Crew - None Passengers - None
Nature of Damage:	Lower rear fuselage skin and drain mast
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	26 years
Commander's Flying Experience:	4,905 hours (of which 4,754 were on type) Last 90 days - 262 hours Last 28 days - 82 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

After a stable instrument approach, the engines remained at approach power during the landing flare and the aircraft bounced. The thrust levers were then moved to idle, the speed brakes deployed automatically and during the subsequent heavy landing, the tail of the aircraft scraped along the runway.

History of the flight

The pilots report that they flew an ILS approach for a Flaps 30 landing on Runway 04 at Stansted Airport. At 500 ft aal, with the aircraft stabilised on the approach, the co-pilot, who was pilot flying, disconnected the autopilot and then the autothrottle and continued flying manually to land. The wind in the final 200 ft before landing varied slightly from the ATC reported wind of 330° at 7 kt and the co-pilot was applying left aileron, into wind, which resulted in a touchdown on the left main landing gear first. The commander reports the aircraft then bounced "a few feet" back into the air. Three or four seconds later, there was a second much firmer touchdown, during which the aircraft had a high-nose attitude. The landing rollout was normal. After shutdown, the cabin crew commented that the second landing was hard, so the commander conducted a visual inspection of the aircraft and found damage to the lower rear fuselage.

The visible damage consisted of a large scrape along the skin of the tail section of the aircraft; numerous stringers and frames beneath the surface were also damaged, requiring a substantial repair before the aircraft was returned to service.

Technical information

During landing the speed brake on the Boeing 737 will deploy automatically if selected and certain parameters are met, including thrust levers at idle and radio altitude less than 10 ft agl.

Recorded information

The aircraft touched down at 144.5 KCAS with 5.1° of nose-up pitch and a peak normal acceleration of 1.3g. The recorded left and right engine N_1s after touchdown were 59% and 56% respectively. The speed brake was ARMED before touchdown but switched to NOT ARMED during touchdown.

The air/ground parameter then returned to AIR. The thrust levers were retarded and reached idle approximately 2 seconds after the initial touchdown. The speed brake then became ARMED, the speed brake handle position moved to the deployed position and the flight spoilers deployed. The highest recorded radio altimeter height in this period was 5 ft. The aircraft pitch attitude initially remained at just over 5°, reduced to 4° just before spoiler deployment and then increased.

4.4 seconds after the initial touchdown, the normal acceleration parameter rapidly increased with a peak recorded value of 2.07g. Pitch reached a peak of 8.9° nose up. This pitch value remained constant for 1 second before starting to reduce. During the recorded hard landing the engine N_1 values had reduced to 31%, the auto brake became active and the ground spoilers deployed. Eight seconds after the second touchdown, the nose gear registered as on the ground.

Comment

The commander considered that the aircraft bounced because the first touchdown occurred with higher than idle thrust. When the thrust lever was selected to idle during the bounce, the speedbrakes deployed automatically; this caused a loss of lift, the nose of the aircraft to pitch up, and the subsequent tailstrike on touchdown.

The Boeing 737 Flight Crew Training Manual contains the following advice:

> *'Bounced landings can occur because higher than idle power is maintained through initial touchdown, disabling the automatic speedbrake even when the speedbrakes are armed. During the resultant bounce, if the thrust levers are then retarded to idle, automatic speedbrake deployment can occur resulting in a loss of lift and nose up pitching moment which can result in a tail strike or hard landing on subsequent touchdown'*

SERIOUS INCIDENT

Aircraft Type and Registration:	Percival P66 Pembroke C Mk1, G-BNPH	
No & Type of Engines:	2 Alvis Leonides 127 piston engines	
Year of Manufacture:	1955 (Serial no: PAC/66/027)	
Date & Time (UTC):	7 July 2014 at 1030 hrs	
Location:	MOD St Athan, Glamorgan	
Type of Flight:	Private	
Persons on Board:	Crew - 2	Passengers - 2
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None reported	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	56 years	
Commander's Flying Experience:	409 hours (of which 24 were on type) Last 90 days - 11 hours Last 28 days - 6 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

After a normal landing, the aircraft drifted towards the left side of the runway. In an attempt to arrest this drift, the pilot used asymmetric braking which caused the aircraft to yaw rapidly right and depart the paved runway surface. The brakes on this aircraft are sensitive when used asymmetrically and the pilot inadvertently applied more braking force than he intended.

History of the flight

The aircraft was on a private flight from RAF Waddington to MOD St Athan and the pilot was making an approach to Runway 26. The pilot reported no significant crosswind. On short final, the pilot experienced some turbulence and windshear but he was able to continue the approach and landed normally slightly left of the runway centreline.

Immediately after touchdown the aircraft started to drift towards the left edge of the runway. The pilot applied full right rudder and then gentle braking, at which the aircraft yawed rapidly right through about 70°. The pilot observed that the area ahead of the aircraft was clear of obstructions so allowed the aircraft to run off the paved surface and onto the grass before gently turning it left to bring it to a halt approximately parallel with the runway. There were no injuries and no damage to the aircraft or any other structure.

The brake system on this aircraft is a pneumatic system operating on the two main wheels. The pilot controls the overall braking effort with a lever on the main control yoke. Brake

pressure is fed differentially to the mainwheels in proportion to the amount of rudder pedal deflection so that with full rudder applied the majority of the braking effort is applied to the mainwheel on the corresponding side. The pilot explained that, under these circumstances, the brakes are very sensitive.

The pilot assessed that the initial drift to the left was the result of an unexpected change in wind direction just after landing that caused the aircraft to weathercock. Despite his intention to apply gentle braking, the sensitivity of the braking system with full rudder pedal deflection caused him to apply greater asymmetric braking effort then he intended, and this caused the aircraft to yaw rapidly to the right.

ACCIDENT

Aircraft Type and Registration:	CASA 1-131E Series 2000 Jungmann, G-CDLC	
No & Type of Engines:	1 Enma Tigre G-IV-A2 piston engine	
Year of Manufacture:	1955 (Serial no: 2095)	
Date & Time (UTC):	8 September 2014 at 1839 hrs	
Location:	Near Marlborough, Wiltshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - 1 (Minor)
Nature of Damage:	Damage to lower right wingtip and spars, landing gear, propeller, engine cowlings and bearers	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	56 years	
Commander's Flying Experience:	247 hours (of which 68 were on type) Last 90 days - 8 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

Following a normal landing in light wind conditions, the pilot was unable to prevent the aircraft deviating to the left. It left the grass airstrip and dug in to soft ground, coming to rest upright. The nature of the incident and the tracks left by the mainwheels suggested to the pilot that an undercarriage drag strut may have failed, causing the loss of directional control.

History of the flight

The pilot was conducting a short local flight from a farm airstrip in Wiltshire. The weather was fine, with a light surface wind of 4 kt from 330°. The grass airstrip being used was orientated north-south and was 650 m long.

The pilot flew a normal approach and landing in a northerly direction. Almost immediately after touchdown, the aircraft started to deviate to the left, accompanied by a left wing drop. The pilot was able to correct the wing drop but, despite applications of right rudder and power, was unable to prevent the aircraft leaving the prepared landing strip.

The aircraft crossed onto a recently harvested field and dug in to the soft surface, pitching nose-down and yawing left through about 270° before coming to rest in an upright attitude, though with its undercarriage collapsed beneath it. The passenger, who was occupying

the front seat, suffered a superficial cut and a minor bruise; the occupants were otherwise uninjured.

The pilot thought that the accident may have been caused by a failure of the left landing gear drag strut on takeoff or landing, although no impact had been felt to suggest it. The possibility was supported by the apparent lack of support on the left side after landing, and the fact that the right wheel tracks across the ground were considerably more pronounced than the left.

ACCIDENT

Aircraft Type and Registration:	Cessna 152, G-BZWH
No & Type of Engines:	1 Lycoming O-235-N2C piston engine
Year of Manufacture:	1978 (Serial no: 152-81339)
Date & Time (UTC):	10 July 2014 at 1510 hrs
Location:	Perth Airport, Scotland
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Nose landing gear, left wing and fuselage
Commander's Licence:	Student
Commander's Age:	52 years
Commander's Flying Experience:	55 hours (of which 55 were on type) Last 90 days - 17 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and his instructor

Synopsis

During the go-around from a bounced landing, the aircraft stalled at low height and dropped a wing which hit the ground. The aircraft cartwheeled through 360° before coming to rest.

History of the flight

The student flew with his instructor from Aberdeen Airport to Perth Airport and, on arrival, practised circuits to Runway 09 including three touch-and-go landings and one go-around. The student then flew two uneventful solo circuits – his first since his first solo flight in May 2014 – following which he took a break while the aircraft was refuelled.

The student did not want to fly a second solo flight because he did not feel that he had been flying well and had not enjoyed the first solo flight. The instructor reassured him that his earlier circuits had been flown correctly and that his decision-making had been correct, especially in relation to going around when necessary. The student agreed reluctantly to fly a second solo flight and, after the aircraft was refuelled, took off to practise circuits. The reported weather was CAVOK, the temperature was 17°C and the surface wind was from 120° at 5 kt.

During the first circuit, the student "just wanted to get it over with" but decided to go around from the first approach because he considered he was not positioned correctly. During the second approach he "had a mindset that I was definitely landing this time" but on touchdown

the aircraft bounced back into the air. He pushed the control column forward and the aircraft bounced again. The instructor, who was observing, described the aircraft's motion as "divergent bounces". The student applied power to go around and raised the flap. He heard the stall warning horn, the aircraft yawed to the left, the left wing dropped and hit the ground and the aircraft cart-wheeled through 360° before coming to rest. The student, who was unhurt, vacated the aircraft through the left door.

Human factors

An instructor's judgment is important in deciding when to encourage an inexperienced or under-confident student to fly solo. In this case, it had been approximately two months since the student flew solo for the first time, the weather conditions were good and the instructor encouraged the student to take the opportunity to fly solo circuits.

The student did not wish to fly solo but reluctantly agreed. Following the go-around at the end of the first circuit, this reluctance to be airborne turned into a firm intention to land from the second approach. It is possible that the student's determination to land caused him to push the control column forward after the first bounce, rather than apply power to go around, which seems to have led to a second, higher bounce from which the aircraft did not recover.

Assessment of cause

In his assessment of the cause, the student described a "feeling of losing control" and a "desire to land". The description of the left yaw and left wing-drop indicates that the aircraft stalled during the attempt to go-around. It is possible that raising the flap reduced the airspeed margin above the stalling speed, contributing to the stall.

ACCIDENT

Aircraft Type and Registration:	Cessna P210N, N210SH
No & Type of Engines:	1 Rolls Royce 250-B17F/2
Year of Manufacture:	1981 (Serial no: P21000739)
Date & Time (UTC):	24 June 2014 at 1008 hrs
Location:	Cotswold Airport, Gloucestershire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Nosewheel, landing gear doors, propeller, gearbox and engine damaged
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	67 years
Commander's Flying Experience:	17,000 hours (of which 43 were on type) Last 90 days - 146 hours Last 28 days - 46 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

As the aircraft slowed after landing on a grass runway the nose landing gear collapsed. The aircraft was manufactured with a plastic component in the mechanism which keeps the nose gear locked down. This component was discovered not to be strong enough and in 1984 the manufacturer recommended replacing it with a new, all metal, component. No record was found of the new component having been fitted to the aircraft.

History of the flight

There was work in progress on the main runway at Cotswold Airport so the pilot landed the aircraft on the grass Runway 08; the wind was calm. After landing, reverse thrust was selected and the pilot applied the brakes firmly in order to slow the aircraft sufficiently for his desired runway turn-off. Approaching the turn-off the pilot realised the aircraft was too fast, and continued rolling to the next turn-off, simultaneously releasing the brakes and cancelling the reverse thrust. The pilot reported that when the brakes were released suddenly on this aircraft, it was not unusual for it to pitch up and down, which it did on this occasion. This oscillation was subsiding, with the aircraft at a fast walking speed as it neared the next runway turn off, when the nose landing gear collapsed. The pilot made the aircraft safe and he and his passenger, who were uninjured, exited it normally. There was no fire.

Background information

When the aircraft was manufactured, Cessna installed a nose gear actuator spring guide made entirely of plastic, with two plastic pins fitting into holes in the downlock hooks. It was discovered that these plastic pins had a tendency to break, which could result in the downlock spring falling out, leaving no tension on the downlock hooks. If the aircraft was subsequently taxied over a bump the nose landing gear could collapse. Cessna produced an improved nose landing gear actuator spring guide of all-steel construction as direct replacement. Service Information Letter SE84-3 issued in January 1984 contained relevant information.

An inspection of the available logbooks showed no evidence that the new spring guide had been fitted.

ACCIDENT

Aircraft Type and Registration:	Cvjetkovic CA-65 Skyfly, G-CFVJ
No & Type of Engines:	1 NSI Propulsion Systems EA81 piston engine
Year of Manufacture:	2013 (Serial no: PFA 233-14129)
Date & Time (UTC):	31 August 2014 at 1120 hrs
Location:	Chavenage Airfield, Gloucestershire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Propeller, pitot head, right aileron mass balance arm, belly flap and small area of ply skin on left wingtip damaged
Commander's Licence:	Private Pilot's Licence
Commander's Age:	74 years
Commander's Flying Experience:	2,167 hours (of which 27 were on type) Last 90 days - 23 hours Last 28 days - 7 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

After takeoff the pilot raised the landing gear. Doing so in this aircraft involved selecting the undercarriage lever to the UP position then manually operating a ratchet handle. A short while later the pilot noticed that the selector lever on the undercarriage ratchet handle had become disconnected and had fallen beneath the floor of the aircraft where it was no longer accessible in flight. He was now unable to lower the landing gear. The pilot flew for a while to reduce fuel and then carried out a 'wheels up' landing on the grass strip. He was unhurt and vacated the aircraft normally. There was no fire.

ACCIDENT

Aircraft Type and Registration:	1) DH82A Tiger Moth, G-ACDC 2) Avions Pierre Robin CEA DR400/140B, G-BFJZ
No & Type of Engines:	1) 1 De Havilland Gipsy Major 1F piston engine 2) 1 Lycoming O-320-D2A piston engine
Year of Manufacture:	1) 1933 (Serial no: 3177) 2) 1978 (Serial no: 1290)
Date & Time (UTC):	3 September 2014 at 1410 hrs
Location:	Headcorn Aerodrome, Kent
Type of Flight:	1) Private 2) N/A
Persons on Board:	1) Crew - 1 Passengers - 1 2) Crew - None Passengers - None
Injuries:	1) Crew - None Passengers - None 2) Crew - N/A Passengers - N/A
Nature of Damage:	1) Propeller, cowling and lower wing leading edge 2) Propeller and engine cowling
Commander's Licence:	1) Commercial Pilot's Licence 2) N/A
Commander's Age:	1) 42 years 2) N/A
Commander's Flying Experience:	1) 399 hours (of which 49 were on type) Last 90 days - 2 hours Last 28 days - 2 hours 2) N/A hours (of which N/A were on type) Last 90 days - N/A hours Last 28 days - N/A hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot reported that, after landing, he was taxiing towards the hangar to park his aircraft. To reach his intended parking area, it was necessary for his aircraft to pass along a concrete taxiway, between a helicopter that had just landed and another aircraft which had just started its engine. The reported wind strength was 15 kt and the aircraft was taxiing downwind. The pilot found directional control of the aircraft, which was fitted with a tail skid, difficult whilst downwind; furthermore, the concrete provided little friction to help control the aircraft's speed. The aircraft was not fitted with brakes and the pilot was unable to prevent his aircraft from taxiing into G-BFJZ, causing damage to both aircraft. The pilot was unhurt and, after making the aircraft safe, he and his passenger vacated it normally.

The pilot considered that, had he stopped earlier, he would not have been caught out taxiing on the concrete in gusty conditions.

ACCIDENT

Aircraft Type and Registration:	Escapade, G-LEEK
No & Type of Engines:	1 ULPower UL260i piston engine
Year of Manufacture:	2010 (Serial no: LAA 345-14843)
Date & Time (UTC):	17 July 2014 at 1920 hrs
Location:	Haverfordwest Aerodrome, Pembrokeshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Right hand landing gear, right wingtip and fuselage
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	62 years
Commander's Flying Experience:	66 hours (of which 29 were on type) Last 90 days - 3 hours Last 28 days - 1 hour
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot had completed an earlier flight using Runway 03 at Haverfordwest Aerodrome. The forecast wind was from the north-north-east at 7 kt. Towards the end of his second sortie with an approach to Runway 09, the pilot quickly glanced at the wind sock and confirmed that little wind was present. He reported that, after touchdown, the left wing lifted and the aircraft slewed to the left. The application of right rudder did not correct the problem. The right wheel was caught by gravel as the aircraft departed the left side of the runway at low speed and the right leg broke away from the fuselage.

The pilot stated that the actual wind was varying in direction from that forecast to being more easterly and with a speed of 0-7 kt. He considered that the loss of control after landing was due to a gust of wind from the left and, with hindsight, he should have used Runway 03 as he had for his earlier flight.

ACCIDENT

Aircraft Type and Registration:	Eurofox 912(S), G-CHUP	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2013 (Serial no: LAA 376-15188)	
Date & Time (UTC):	2 September 2014 at 1330 hrs	
Location:	Near Hay-on-Wye, Powys	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to left wingtip and structure in cockpit area	
Commander's Licence:	Light Aircraft Pilot's Licence	
Commander's Age:	81 years	
Commander's Flying Experience:	3,833 hours (of which 16 were on type) Last 90 days - 33 hours Last 28 days - 12 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft was landing at a private grass airstrip when the accident occurred. The airstrip was orientated 06/24 and was 750 m long by 30 m wide. Online information available to pilots using the airstrip identified 11 kVA power cables which ran across the 06 threshold and parallel to the northern edge of the runway.

The pilot overflew the airstrip and, with a surface wind from the north-east at 2 or 3 kt, decided to land in a north-easterly direction. The aircraft drifted to the left during the landing roll and the left wing struck a pole supporting the power cables. The aircraft yawed to the left through 270° and came to a stop. Although there was some damage to the cockpit area, the two occupants were uninjured and able to vacate through the doors.

The pilot considered that the accident had occurred because he had allowed the aircraft to drift to the left and had not seen the cables. He thought that the left brake may have been applying more brake pressure, despite the application of a symmetrical braking effort.

ACCIDENT

Aircraft Type and Registration:	Extra EA 300, G-SIII
No & Type of Engines:	1 Lycoming AEIO-540-L1B5 piston engine
Year of Manufacture:	1994 (Serial no: 58)
Date & Time (UTC):	10 October 2014 at 1430 hrs
Location:	White Waltham Airfield, Berkshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to propeller, spinner, shock-loaded engine, lower cowling and left spat
Commander's Licence:	Private Pilot's Licence
Commander's Age:	55 years
Commander's Flying Experience:	812 hours (of which 56 were on type) Last 90 days - 9 hours Last 28 days - 9 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot, who is a long-standing member of the flying club at White Waltham, had landed on Runway 21 and intended to taxi to the fuel pumps to refuel (Figure 1). Because forward visibility when taxiing is limited on the Extra 300, the pilot adopted a weaving path to clear himself from other aircraft and to follow some existing tyre tracks. Unfortunately, he did not see a small, low bowser containing Jet A1 fuel which the aircraft struck nose-first, causing damage to both. The pilot admitted that he had known perfectly well that the bowser, which

Figure 1

Aerial view of White Waltham Airfield, showing location of bowser containing Jet A1 fuel (circled)

is almost always parked in that location to service helicopters, would be there but on this occasion he had not picked it up visually. He was of the opinion that conflict was more probable with aircraft landing on Runway 21, since the bowser is located along the path that such aircraft would be likely to use when taxiing to the fuel pumps.

ACCIDENT

Aircraft Type and Registration:	HAPI Cygnet SF-2A, G-BWFN
No & Type of Engines:	1 HAPI 60-2DEH piston engine
Year of Manufacture:	1995 (Serial no: PFA 182-11335)
Date & Time (UTC):	3 July 2014 at 1214 hrs
Location:	Near Blithfield Reservoir, Staffordshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Minor) Passengers - 1 (Minor)
Nature of Damage:	Damage to the propeller, cowling, landing gear, lower fuselage and right wing
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	60 years
Commander's Flying Experience:	454 hours (of which 171 were on type) Last 90 days - 9 hours Last 28 days - 1 hour
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

During the initial climb, following a takeoff from Runway 23, the aircraft's engine lost power. The pilot carried out a forced landing into a field but the ground conditions were rough and the aircraft's landing gear collapsed on touchdown. The two occupants both suffered some minor injuries but were able to vacate the aircraft unassisted.

History of the flight

The aircraft was based at Abbots Bromley Airfield, also known as Yeatsall Farm. The airfield elevation is 410 ft amsl, with a grass strip, 680 m in length and 22 m wide, orientated 23/05. It is situated close to Blithfield Reservoir, over which the climb-out path from Runway 23 extends.

The pilot was accompanied by a passenger for a local flight. The weather conditions reported by the pilot were fine, with no cloud below 3,000 ft, good visibility and a temperature of 27°C; the surface wind was from 250° at 8 kt.

The pilot warmed the engine up to the normal operating temperatures and pressures and carried out his usual pre-flight checks. He reported that the takeoff and initial climb were normal but, at about 450 ft aal, the engine started "popping" and there was a loss of power. The pilot lowered the nose and set the trim, checked that the fuel was on and applied carburettor heat. The aircraft was fitted with electronic ignition, with a separate isolated

back-up supply, which he selected. The running of the engine did not improve and, because of the aircraft's low height, he decided not to attempt any further troubleshooting but to concentrate on finding a field and carrying out a forced landing. The field ahead contained cattle, so he chose another field to its left.

As the aircraft descended the propeller stopped completely. The pilot noted that, although he had practised simulated engine failures previously, the aircraft felt quite different to fly when the engine had actually stopped. In particular, he noticed a lot more drag on the aircraft, the flying controls felt more "sluggish" and the aircraft responded differently, especially in the final turn to the left, without the slipstream from the propeller.

The aircraft touched down in the field at slow speed and stopped quickly, as the landing gear collapsed and the right wing contacted the ground. Both occupants were wearing full four-point harnesses and were able to escape from the aircraft without assistance, although they had suffered some minor injuries.

Discussion

After the accident, the pilot and a Light Aircraft Association (LAA) inspector carried out an investigation into the engine failure. No faults were found in either the electrical or fuel systems, so they concluded that the most likely reason for the loss of power was carburettor icing.

It is, perhaps, surprising to think that carburettor icing could occur with such warm ambient temperatures and the engine at full power. However, the 1120 hrs UTC METAR at East Midlands Airport, 20 nm to the east of Abbots Bromley, indicated a significantly lower temperature of 21°C, with a dewpoint of 14°C. So, it is possible that it was similar at Abbots Bromley. The pilot advised that he had used a temperature gauge fitted to his aircraft to note the temperature and that it may been misleading because it had been parked in the sun.

The actual temperature and dewpoint split would suggest a moderate risk of carburettor icing at cruise power[1], although this will vary according to the engine type and installation. Other factors that may have contributed to the possibility of carburettor icing include time that was spent at idle power on the grass surface, before takeoff, and local conditions that may have increased the level of humidity in the atmosphere.

The pilot considered that the full four-point harnesses had reduced the potential for injury by restraining the upper torso, even though one strap slipped off his shoulder.

Footnote

[1] CAA Safety Sense Leaflet 14, *Piston Engine Icing*.

ACCIDENT

Aircraft Type and Registration:	Jodel D117, G-AWFW
No & Type of Engines:	1 Continental Motors Corp C90-14F piston engine
Year of Manufacture:	1963 (Serial no: 599)
Date & Time (UTC):	1 June 2014 at 1504 hrs
Location:	Near Keighley, West Yorkshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Serious) Passengers - 1 (Serious)
Nature of Damage:	Canopy and glazing crushed, propeller blades and engine cowling damaged
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	71 years
Commander's Flying Experience:	734 hours (of which 559 were on type) Last 90 days - 9 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The aircraft flew from Sywell Airfield to a private airfield near Keighly, West Yorkshire, which had two grass runways: 11/29 which was 435 m long by 15 m wide, and 06/24 which was 325 m long and 10 m wide.

The pilot reported that the weather was fine and calm for landing, and that he flew a powered 'short field' approach to Runway 24. The runway surface was of wet grass and was soft. After touchdown, the aircraft's main wheels sank into the surface, causing it to pitch nose down and overturn. The cockpit canopy was crushed, trapping the two occupants. The emergency services attended and the occupants, who both suffered spinal injuries, were assisted from the aircraft and taken to hospital.

ACCIDENT

Aircraft Type and Registration:	Jodel D120A Paris-Nice, G-BDWX	
No & Type of Engines:	1 Continental Motors Corp O-200-A piston engine	
Year of Manufacture:	1966 (Serial no: 311)	
Date & Time (UTC):	18 July 2014 at 0820 hrs	
Location:	Hatkill Lane, Full Sutton, Yorkshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Landing gear, wings and tailplane	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	62 years	
Commander's Flying Experience:	1851 hours (of which 50 were on type) Last 90 days - 7 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft took of from Runway 04 at Full Sutton Airfield at close to its maximum all-up weight. The reported wind was from 090° at 10 kt. The pilot noticed a slower than normal acceleration during the takeoff roll, which he expected as the aircraft was heavy, but he was airborne before his decision point. Shortly after becoming airborne, at approximately 50 ft, the pilot reported that the aircraft encountered a downdraft and he was unable to prevent it from sinking. The aircraft was unable to climb above the rising ground ahead, and its undercarriage collided with a hedge forcing the aircraft to pitch forward onto the ground, where the undercarriage collapsed and the aircraft came to an abrupt halt. The pilot made the aircraft safe and he and his passenger exited normally.

During its last LAA flight test, at close to its maximum weight, the aircraft reportedly achieved a climb rate of over 600 fpm.

ACCIDENT

Aircraft Type and Registration:	Jodel DR1050 Ambassadeur, G-ARRE	
No & Type of Engines:	1 Continental Motors Corp O-200-A piston engine	
Year of Manufacture:	1961 (Serial no: 275)	
Date & Time (UTC):	21 July 2014 at 1758 hrs	
Location:	Coventry Airport	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Left main landing gear, left wing	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	60 years	
Commander's Flying Experience:	130 hours (of which 45 were on type) Last 90 days - 2 hours Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft approached Runway 23 at Coventry Airport with a reported wind of 10 - 12 kt from the north-west. The pilot reported allowing for crosswind but, at the point of touchdown, he was not aligned with the runway centreline. When on the ground, he attempted to correct by applying right rudder which caused a significant yaw to the right. The pilot was unable to correct this yaw which led to the collapse of the left landing gear. The aircraft slowed to a halt, resting on the left wing.

The uninjured pilot was wearing a lap and diagonal harness; he considered the cause to be an over-compensation of yaw using the rudder after touchdown.

ACCIDENT

Aircraft Type and Registration:	Piper PA-18-150 Super Cub, G-WLAC
No & Type of Engines:	1 Lycoming O-320-A2B piston engine
Year of Manufacture:	1970 (Serial no: 18-8899)
Date & Time (UTC):	28 September 2014 at 1208 hrs
Location:	White Waltham Airfield, Berkshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Propeller bent, engine shock-loaded, some fuselage damage
Commander's Licence:	Private Pilot's Licence
Commander's Age:	53 years
Commander's Flying Experience:	220 hours (of which 10 were on type) Last 90 days - 15 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot was practising circuits at White Waltham Airfield. On the second touch-and-go, the aircraft bounced twice and the pilot decided to go around. The airspeed was low and he was unable to arrest a pitch down which caused the propeller and nose to strike the ground. The aircraft overturned and settled on its back. The pilot commented that he should have initiated a go-around immediately after the first bounce and that wearing four-point harnesses, which were done up tightly, prevented the occupants from suffering any injury.

ACCIDENT

Aircraft Type and Registration:	Piper PA-32R-301 Saratoga SP, G-RIGH
No & Type of Engines:	1 Lycoming IO-540-K1G5 piston engine
Year of Manufacture:	1998 (Serial no: 3246123)
Date & Time (UTC):	21 August 2014 at 1805 hrs
Location:	Strathallan Airfield, Perthshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Propeller blade, dents in leading edge of both sides, scrape on left engine side panel
Commander's Licence:	Private Pilot's Licence
Commander's Age:	75 years
Commander's Flying Experience:	2,305 hours (of which 2,021 were on type) Last 90 days - 35 hours Last 28 days - 15 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft touched down a significant distance along the wet grass strip. The pilot was unable to stop it before it went off the end of the runway and crashed through a fence.

History of the flight

The pilot arrived at Strathallan Airfield having refuelled the aircraft to full tanks at Cumbernauld. The reported temperature was approximately 23°, pressure 1005 hPa with a light crosswind, there had been recent heavy rain and the grass strip was wet. The pilot reported that after a normal approach, the aircraft touched down "after considerable float", having landed a few knots fast. He then found the brakes were ineffective on the wet grass and he was unable to prevent the aircraft from departing the end of the runway, crashing through a fence and stopping approximately 15 m into the next field. The pilot was unhurt; he made the aircraft safe and vacated it normally.

Strathallan has a grass strip 620 m long with two landing runways, 28 and 10. The field slopes down to the east with a gradient of approximately 0.5%, with trees and higher ground to the west of the threshold of Runway 10. The surface temperature and pressure at the time of the accident resulted in an airfield density altitude of approximately 1,300ft.

Information provided by the manufacturer indicates that the normal landing distance from 50 ft for this aircraft, when fitted with a three-bladed propeller, is 479 m including a ground

roll of 309 m. The CAA Safety Sense Leaflet 7e '*Airplane Performance*', highlights that the landing distance required on short wet grass may increase by 60%, before additional safety factors are added. Published performance figures assume that the aircraft touches down in the correct place at the correct speed.

The pilot concluded that the main cause of this accident was not touching down in the correct place. The slipperiness of the short wet grass, the lack of any headwind, the gentle downward slope and the density altitude were contributory factors.

ACCIDENT

Aircraft Type and Registration:	Pitts Special S-1S, G-TAYL	
No & Type of Engines:	1 Lycoming AEIO-360-B4A piston engine	
Year of Manufacture:	1981 (Serial no: 20940)	
Date & Time (UTC):	5 July 2014 at 1315 hrs	
Location:	Perth Airport	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Landing gear, propeller, wing tip and wing fabric	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	54 years	
Commander's Flying Experience:	255 hours (of which 1 was on type) Last 90 days - 5 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot was on his second flight in a Pitts Special. Because visibility of the landing area during the approach is not good in this type of aircraft, he flew an approach in which his initial aiming point was about a third of the way along the runway and, when certain of reaching the airfield, side-slipped the aircraft to steepen the approach and bring the touchdown point closer to the threshold.

The accident occurred when the pilot stopped the side-slip and flared the aircraft for landing. The rate of descent was too high and the flare did not prevent the aircraft from hitting the ground hard. The undercarriage collapsed, allowing the propeller to strike the ground, and the aircraft ground looped before stopping. The pilot, who was uninjured, made the aircraft safe and vacated it normally. There was no fire.

The pilot considered that he did not maintain sufficient airspeed whilst side-slipping, so the flare did not arrest the high rate of descent. He thought that the energy-absorbing seat foam and using a seven-point harness had prevented injury.

ACCIDENT

Aircraft Type and Registration:	Rans S6-116 Coyote II, G-BVZV	
No & Type of Engines:	1 Rotax 912 UL piston engine	
Year of Manufacture:	1995 (Serial no: PFA 204A-12832)	
Date & Time (UTC):	19 June 2014 at 1700 hrs	
Location:	Private airstrip near Oldbury-on-Severn, Gloucestershire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Firewall, fin, rear of fuselage and flying strut damaged	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	64 years	
Commander's Flying Experience:	640 hours (of which 185 were on type) Last 90 days - 27 hours Last 28 days - 13 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot made an approach to grass Runway 28 at the airfield where the weather was CAVOK and the wind was from the north-east at 10 kt. The aircraft "floated" along the runway before touching down and bounced back into the air. When it touched down again, the nose landing gear collapsed, the propeller dug into the grass and the aircraft tipped forward, coming to rest upside down. The pilot left the aircraft through the normal exit.

The pilot believed that a combination of factors contributed to the accident: a higher-than normal groundspeed at touchdown (due to a tailwind), the bounce and his subsequent correction to the flightpath, and the slight upslope of the runway. He considered that the nose landing gear was "lightly engineered".

ACCIDENT

Aircraft Type and Registration:	Socata TB10 Tobago, G-POPI
No & Type of Engines:	1 Lycoming O-360-A1AD piston engine
Year of Manufacture:	1982 (Serial no: 315)
Date & Time (UTC):	17 June 2014 at 1600 hrs
Location:	Field east of Guernsey Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Minor) Passengers - 1 (Serious)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence
Commander's Age:	59 years
Commander's Flying Experience:	817 hours (of which 751 were on type) Last 90 days - 20 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional enquiries by the AAIB

Synopsis

The aircraft was departed Guernsey on a flight to Norfolk. Whist climbing, smoke was detected in the cabin which became 'rapidly choking' and thicker such that visibility reduced significantly. The pilot shut down the engine and turned towards the airport, intending to make a forced landing there. The aircraft struck a disused greenhouse approximately 0.5 nm short of the runway and the passenger suffered a serious back injury.

An engine exhaust pipe had fractured and the hot gases had burnt the glass-fibre cowling.

History of the flight

The aircraft was preparing to depart Guernsey Airport using Runway 09 for a flight to Seething Airfield, near Norwich, from which it had arrived earlier that day. The takeoff and climb were normal and the pilot concentrated on climbing straight ahead to 1,500 ft whilst his passenger took photographs. Upon reaching 1,500 ft, he turned the aircraft towards the ORTAC reporting point and was approximately above Fermain Bay, south of St. Peter Port when he and his passenger noticed a faint burning smell.

There followed a sudden ingress of large quantities of smoke into the cabin from the pilot's footwell. He immediately turned left back towards the airport and declared an emergency to Guernsey ATC, intending to land on Runway 27.

As he rolled out of the turn, the smoke was restricting his vision but he was confident that the airport was ahead. However, the smoke became very thick and choking and the pilot suspected that he had an uncontrollable engine fire, so shut the engine down using only the ignition keys which he located by feel. By now he was concerned about becoming asphyxiated by the smoke but was reluctant to open the 'gull wing' doors believing that they could cause seriously disturbed airflow and consequent handling problems. He recalled a brief conversation with ATC in which he corrected their misapprehension that he was joining downwind for Runway 09 but did not remember any further communications.

In the absence of any visual references outside the cockpit and unable to see the instruments, the pilot tried to maintain a steady glidepath on a straight-ahead track, in the hope that it would eventually terminate somewhere on the airfield. The smoke cleared slightly and he saw in his peripheral vision to the left that the aircraft was below 100 ft and impact was imminent. Looking up, he saw tree branches ahead and pulled back on the control yoke in the hope that the aircraft would land belly-first into the trees; impact occurred shortly afterwards, approximately 0.5 nm short of the runway.

The pilot sustained an injury above his right eye and enquired after his passenger, who said her back was injured. The aircraft was suspended above ground in a nose-down and slightly left-wing-low attitude inside a disused and heavily overgrown commercial greenhouse. The pilot was concerned about fuel leaking from the ruptured wing tanks and told his passenger that they must exit the aircraft immediately. They did so through the pilot's door and exited the greenhouse and thick foliage with the assistance of others on the ground who had come to assist. They were then taken to hospital.

The passenger had sustained serious injuries to several vertebrae and was airlifted to Norwich for surgery.

Figure 1

G-POPI after being laid on the ground and foliage cleared to assist recovery.
Note remains of the disused greenhouse to the left

Examination of the wreckage

A local maintenance organisation examined the aircraft and prepared a report, which was made available to the AAIB. It identified an area of severe burning on the lower left side of the glass-fibre engine cowling (Figure 2) and scorching of the metal forward fuselage structure. The left side of the engine firewall was also scorched and, whilst the firewall itself had remained intact, a seal around the nosewheel steering linkage where it passed through it had been badly heat-affected and had probably allowed the smoke to enter the cabin.

Figure 2

Lower left side of engine cowling showing burning of glass-fibre construction

The No 4 engine cylinder exhaust downpipe had fractured at the clamp where it joins the exhaust muffler (Figure 3). Since the other end of the pipe allows movement should this occur, the end of the pipe was free to move away from its normal position and allowed hot exhaust gasses to flow unrestricted into the cowling.

The exhaust system and muffler are visually inspected every 50 flying hours or 6 months according to the Light Aircraft Maintenance Programme (LAMP). The condition of the fracture suggests that it had started as a crack which developed over a considerable period of time, but its location, effectively inside the clamp, would render it very difficult to see without dismantling the joint.

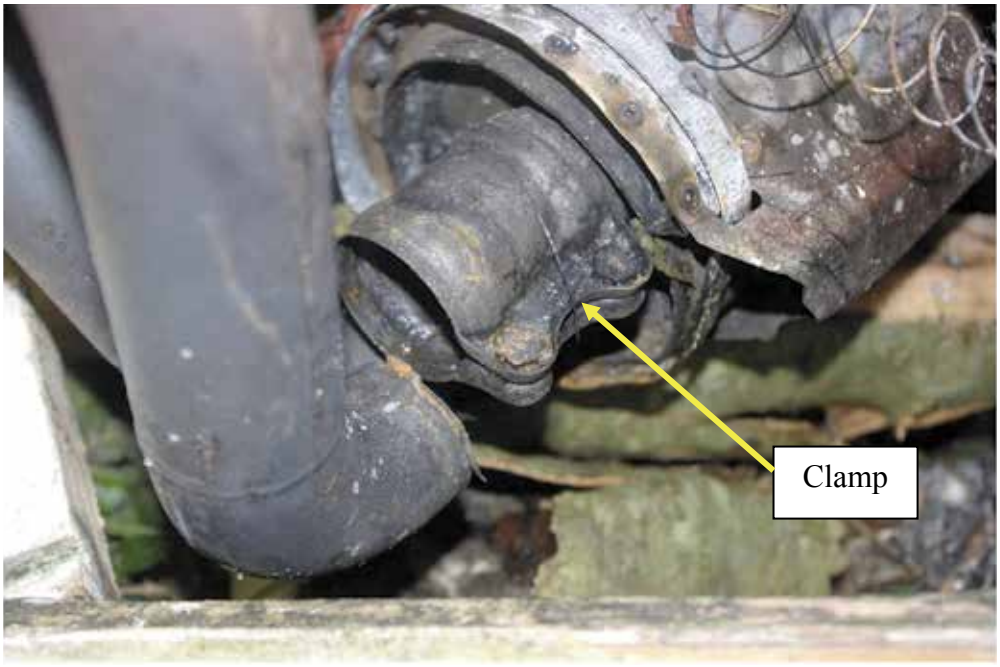

Figure 3

Fracture of No 4 cylinder exhaust downpipe where it attaches to exhaust muffler

ACCIDENT

Aircraft Type and Registration:	Socata TB20 Trinidad, G-JDEE
No & Type of Engines:	1 Lycoming IO-540-C4D5D piston engine
Year of Manufacture:	1982 (Serial no: 333)
Date & Time (UTC):	16 July 2014 at 0645 hrs
Location:	North Moor Airstrip, Lincolnshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to the left main landing gear, pilot foot step and left wing
Commander's Licence:	Private Pilot's Licence
Commander's Age:	44 years
Commander's Flying Experience:	194 hours (of which 76 were on type) Last 90 days - 10 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot reported that he was landing on Runway 27, a 550 m long grass runway. Conditions were clear, with a 5 kt wind from the southwest; the grass was damp from overnight dew. He had flown into North Moor twice before and was familiar with electricity cables on the approach, 270 m from the runway threshold. He described his approach as slightly high over the cables, which, when combined with a long flare, resulted in the aircraft touching down about half way along the runway. The pilot commenced braking and, as he approached the end of the runway, still braking, attempted to turn the aircraft. The aircraft started to skid and the pilot straightened the aircraft to correct the skid. However, as the aircraft straightened the left main landing gear collapsed and the aircraft stopped on the runway just beyond the painted numbers designating Runway 09.

The pilot reported that the marks on the runway suggested that a skid of 10 to 20 m had preceded the landing gear collapse. He commented that the grass was wetter than he had realised and, with hindsight, he should have gone around as his margin for error was too small.

ACCIDENT

Aircraft Type and Registration:	Stampe SV4C (Modified) Stampe, G-BPLM	
No & Type of Engines:	1 De Havilland Gipsy Major 10 MK.2 piston engine	
Year of Manufacture:	1948 (Serial no: 1004)	
Date & Time (UTC):	22 June 2014 at 1640 hrs	
Location:	½ nm north-west of Paddock Wood, Tunbridge Wells, Kent	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Cowling and spinner dented, damage to leading edges and tops of wings, rudder compressed	
Commander's Licence:	Commercial Pilot's Licence	
Commander's Age:	66 years	
Commander's Flying Experience:	20,546 hours (of which 910 were on type) Last 90 days - 41 hours Last 28 days - 35 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

On passing Redhill, during a flight from Clutton Hill in Somerset to Headcorn in Kent, the pilot checked he had sufficient fuel for the remaining 25 nm of the flight. Just west of Paddock Wood, at 1,700 ft amsl, the aircraft was caught in a "particularly harsh" thermal, shortly after which the engine "coughed". The pilot considered this to be so unusual that he decided to land immediately at Old Hay Airfield, 1 nm east of Paddock Wood; however, the engine then stopped. He checked the mixture, fuel and magnetos and set up for a forced landing in what looked like a hay field. At about 100 ft, positioned to land a third of the way into the field, the pilot realized the crop was rapeseed which he knew was much denser than hay. To try to reduce his forward speed on touchdown, he "deep stalled" the aircraft just above the crop; however, the undercarriage caught in the rapeseed and the aircraft slowly pitched over onto its back. With the magnetos and fuel off, he released his full harness and additional lap strap before vacating the aircraft unhurt. The pilot suspected that the problem was caused by the carburettor's float needle jamming in its base – a problem he was aware had occurred on another Stampe at Headcorn in 2013.

ACCIDENT

Aircraft Type and Registration:	Stits Playboy SA3A, G-BVVR	
No & Type of Engines:	1 Continental Motors Corp A65-8 piston engine	
Year of Manufacture:	1962 (Serial no: P-736)	
Date & Time (UTC):	8 September 2014 at 1540 hrs	
Location:	Goodwood Aerodrome, West Sussex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Propeller, engine shock-loaded and both wings' leading edges damaged	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	65 years	
Commander's Flying Experience:	533 hours (of which 0 were on type) Last 90 days - 0 hours Last 28 days - 0 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot reported that he had just purchased the aircraft and was intending to fly it from Goodwood Aerodrome to Oaksey Park in Wiltshire. This was to be his first flight in the aircraft.

The pilot taxied the aircraft on the grass towards Runway 32. As the aircraft approached the runway threshold the pilot "suddenly and inexplicably" lost control of the aircraft. The aircraft turned left through about 90° and then collided with a temporary fence which stopped the engine. It came to rest embedded in the fence and was substantially damaged. Having isolated the aircraft's fuel and electrics the pilot vacated the aircraft uninjured.

The pilot commented that his unfamiliarity with the layout of the cockpit and controls on G-BVVR may have contributed to the accident.

ACCIDENT

Aircraft Type and Registration:	Tecnam P92-EA Echo, G-TCNM	
No & Type of Engines:	1 Jabiru 2200A piston engine	
Year of Manufacture:	2002 (Serial no: PFA 318-13922)	
Date & Time (UTC):	24 August 2014 at 0910 hrs	
Location:	Lleweni Parc Airfield, Denbigh, Denbighshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to nose and right main landing gear legs, fuselage spaceframe and propeller	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	67 years	
Commander's Flying Experience:	650 hours (of which 300 were on type) Last 90 days - 10 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The aircraft's engine failed shortly after takeoff, following which the aircraft stalled. The pilot was unable to recover from the stall before the aircraft struck the ground close to the departure runway, causing damage to the aircraft's propeller, landing gear and fuselage spaceframe.

History of the flight

The pilot intended to make a flight from Llewyni Parc Airfield to Wolverhampton Airport. After completing pre-departure power checks, during which the engine responded normally, he lined up on Runway 27 and applied full power. The takeoff roll proceeded normally and, as the indicated airspeed reached 45 kt, the pilot rotated the aircraft and climbed away at approximately 45 kt. The pilot stated that, as the aircraft passed 200 ft agl, the engine lost power suddenly and very shortly thereafter the aircraft stalled. The pilot had insufficient height to recover from the stall and the aircraft impacted the grass to the right of the runway in a level attitude, approximately 300 m from the start of the takeoff roll. The ground impact caused the nose and right main landing gear legs to collapse and distorted the fuselage's steel-tube spaceframe. The propeller, which was windmilling at impact, sustained damage to the propeller tips.

The aircraft's flight manual lists, for an aircraft weight of 450 kg and with the flaps retracted, the speed for best rate of climb, V_Y, as 62 kt. The stalling speed with the flaps set at 15° is

listed as 36 kt. The speed for best angle of climb, V_X, is not listed in the flight manual, however information supplied by the LAA, from a flight test report of the Tecnam P92J[1], indicated that V_X is 52 kt for an aircraft weight of 525 kg.

As the aircraft had not accelerated to at least V_X before being placed into a climbing attitude, following the engine failure the pilot had little time to react before the airspeed reduced and the aircraft stalled.

Footnote

[1] The Tecnam P92J is a factory-built version of the P92E, equipped with a Rotax 912A engine.

ACCIDENT

Aircraft Type and Registration:	Thruster T600N 450, G-PSUK	
No & Type of Engines:	1 Jabiru 2200A piston engine	
Year of Manufacture:	2004 (Serial no: 0044-T600N-101)	
Date & Time (UTC):	14 August 2014 at 1050 hrs	
Location:	Balado Park Airfield, Perthshire	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - 2 (Minor)	Passengers - N/A
Nature of Damage:	Pod, nosewheel sheared, rear subframe tube behind left seat bent, left side front lift strut bent	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	52 years	
Commander's Flying Experience:	896 hours (of which 896 were on type) Last 90 days - 66 hours Last 28 days - 28 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The student was flying touch-and-go circuits under the supervision of an instructor. The instructor reported that near to the airfield was a large slow moving weather system. During the base leg on the third circuit, large droplets of rain had started to fall and the instructor noticed that the wind direction had also changed to a tail wind on the final approach so the student positioned the aircraft for a touch-and-go on the reciprocal Runway 06. The approach and touchdown seemed normal but, at a height of about 85 ft during the climb out, the engine spluttered and lost power. The instructor took control and, with the airspeed stabilised at the recommended best glide speed of 45 kt, looked for a suitable landing site. Directly ahead of the aircraft's flight path was a row of trees and he initially turned about 20° to the right, however this was towards an area of marshy ground so he turned to the left again. The aircraft landed heavily in an almost wings level attitude and came to a stop after it ran into a hedgerow. The instructor and student were both wearing full harnesses and suffered minor injuries.

The instructor considered that the loss of engine power had been due to carburettor icing. The recorded temperature at the airfield was +14°C and the dewpoint was +12°C.

ACCIDENT

Aircraft Type and Registration:	Yak-52, G-BWSV	
No & Type of Engines:	1 Ivchenko Vedeneyev M-14P piston engine	
Year of Manufacture:	1987 (Serial no: 877601)	
Date & Time (UTC):	29 September 2014 at 1440 hrs	
Location:	North Weald Airfield, Essex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to propeller and rear skid	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	47 years	
Commander's Flying Experience:	614 hours (of which 76 were on type) Last 90 days - 4 hours Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot was landing after a local flight of about 20 minutes duration. Everything was normal until, on touchdown, he sensed that the aircraft adopted a greater than normal nose-high attitude. The aircraft came to a halt on its retracted mainwheels, with the propeller broken.

The Yak-52 uses a pneumatic system for the mainwheels, flaps and brakes. The tricycle landing gear is selected using a lever in each cockpit. It requires the lever to be fully in the UP or DOWN detent to achieve the desired selection and another knob must be actuated to withdraw the detents each time the lever is moved. Three green lights to the left of the levers indicate when the landing gear legs are down and locked and three mechanical indicators, one in each wing and one in the nose, provide additional indications of gear position. The pilot reported that, when he selected DOWN, he did not move the lever fully into the DOWN detent and did not check the indicators. This resulted in the nosewheel only partially extending, whilst the mainwheels remained retracted (the aircraft was designed to land on its retracted mainwheels, with minimal damage, in an emergency).

ACCIDENT

Aircraft Type and Registration:	Aeroprakt A22 Foxbat, G-FOXB	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2002 (Serial no: PFA 317-13878)	
Date & Time (UTC):	28 September 2014 at 1530 hrs	
Location:	Slieve Croob Airfield, Co Down	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to the wingtip and leading edge of right wing	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	44 years	
Commander's Flying Experience:	337 hours (of which 15 were on type) Last 90 days - 13 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Slieve Croob Airstrip is a narrow grass strip 800 ft amsl, one mile south-east of the 1,752 ft summit of Slieve Croob in County Down, Northern Ireland. Bordering the west of the strip is a wooded area and with the wind in certain directions the airfield is known to experience 'rotor'[1] from the mountains.

The pilot reported he was on final approach to the grass strip 18 at Slieve Croob, with the reported wind from the south-west at 12 mph, when he experienced severe windshear. He applied power to go around, but he was unable to prevent the aircraft's right wingtip from making contact with a tree top. The aircraft then flew an uneventful circuit and landed safely. The pilot and his passenger were unhurt.

Footnote

[1] An eddy in which the air circulates around a horizontal axis, especially in the lee of a mountain.

ACCIDENT

Aircraft Type and Registration:	EV-97 Eurostar SI microlight, G-SINN	
No & Type of Engines:	1 Rotax 912 ULS piston engine	
Year of Manufacture:	2014 (Serial no: 2014-4203)	
Date & Time (UTC):	23 August 2014 at 0800 hrs	
Location:	Sandown Airport, Isle of Wight	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to structure at junction of firewall and floor panel	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	59 years	
Commander's Flying Experience:	109 hours (of which 4 were on type) Last 90 days - 6 hours Last 28 days - 4 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot reported that after what seemed to him a normal approach to Runway 05 at Sandown, he applied insufficient flare and the aircraft landed on its nosewheel. The pilot then applied power and went around. The next landing was normal. Some time later, the pilot noticed damage to the structure at the junction of the firewall and the floor panel, which he considered was most likely caused when the aircraft landed on its nosewheel.

ACCIDENT

Aircraft Type and Registration:	EV-97 Teameurostar UK Eurostar, G-CEND
No & Type of Engines:	1 Rotax 912-UL piston engine
Year of Manufacture:	2007 (Serial no: 2916)
Date & Time (UTC):	30 September 2014 at 1540 hrs
Location:	Sywell Aerodrome, Northamptonshire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to firewall, lower fuselage and left wingtip
Commander's Licence:	Student
Commander's Age:	54 years
Commander's Flying Experience:	56 hours (of which 56 were on type) Last 90 days - 13 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The student intended to practise circuits for an hour using Runway 23. The first circuit was conducted dual with his instructor, after which he took off again solo for the remainder of the time. Two further circuits were flown without incident but on the fourth, despite the student stating that the approach seemed "normal", the aircraft bounced three times on touchdown before coming to a halt on the left of the runway. The student taxied the aircraft back to the school's hangar where damage to the left wingtip, firewall and lower fuselage was found.

The instructor who was watching his student noted that the accident approach was fast and flat and that, after the first bounce, the student checked forwards on the control column instead of applying power and going around. He also saw the left wingtip strike the ground. Both recognise that the student should have gone around after the first bounce.

ACCIDENT

Aircraft Type and Registration:	Hoffmann H36 Dimona, G-CEUT	
No & Type of Engines:	1 Limbach L 2000-EB1C piston engine	
Year of Manufacture:	1987 (Serial no: 36270)	
Date & Time (UTC):	9 August 2014 at 1010 hrs	
Location:	RAF Wittering, Cambridgeshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Propeller, engine mountings, landing gear, left aileron, rear fuselage and tail	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	72 years	
Commander's Flying Experience:	7,518 hours (of which 96 were on type) Last 90 days - 5 hours Last 28 days - 4 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The pilot reported that due to glider operations on the runway aircraft were using the southern taxiway parallel to Runway 26. The wind was estimated to be from 260° at 15 to 20 kt. The METAR for RAF Wittering recorded the wind at 0950 hrs, about 20 minutes before the accident, to be from 250° at 17 gusting 27 kt.

After lift off the left wheel touched the runway. Shortly thereafter the left wing dropped slowly and the aircraft started to turn left. The pilot applied full right aileron and right rudder but this had no effect. After the aircraft had turned through about 70° its left wing struck the ground and it "fell" from 10 ft, landing heavily. The aircraft subsequently hit a boundary fence, spun through a further 90° and came to rest. The occupants vacated the aircraft uninjured.

The pilot presumed that the left wing stalled as a result of a gust of wind.

ACCIDENT

Aircraft Type and Registration:	Lindstrand, LBL 90A hot air balloon, G-MUPP	
No & Type of Engines:	No engine	
Year of Manufacture:	2012 (Serial no: 1417)	
Date & Time (UTC):	25 July 2014 at 1940 hrs	
Location:	Silverstone Golf Club, Buckinghamshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 2
Injuries:	Crew - 1 (Minor)	Passengers - 2 (Minor)
Nature of Damage:	Flying wires, scoop, lower nomex, top bar of basket and tank covers	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	61	
Commander's Flying Experience:	428 hours (of which 400 were on type) Last 90 days - 13 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

Due to an increase in wind strength, above that forecast, the pilot decided to land the balloon in the first suitable field. The balloon touched down positively and then became airborne again and contacted an electricity power line transformer post and the associated power cables, before finally landing. The occupants received minor injuries. The balloon was damaged but there was no fire.

History of the flight

The balloon was being launched from Silverstone Circuit. The weather was good, with a forecast wind from 040° at 4-7 kt. A pyeball balloon was released, to check the wind strength and direction, and confirmed that it was as forecast. The balloon was then laid out and inflated normally, standing up in the calm conditions. The passengers had been briefed and boarded the balloon, in accordance with their instructions.

After takeoff, the balloon flew across the Circuit (which was closed) at a height of about 200 ft agl. It was reported that it quickly became apparent that the wind strength had increased to 14 kt, from 040°, so the pilot decided to land at the first field that offered a safe landing. After some 12-15 minutes, he saw a suitable field which was long, with no obstructions in the landing direction, but which had a set of power lines running down the left side, parallel to the landing direction.

The pilot descended the balloon behind trees to shelter the approach from the wind, as the groundspeed was in excess of 10 kt. Just before landing, the pilot pulled the rip out line, which opens a panel, to release the hot air from the balloon envelope. The balloon made a positive landing but then lifted off again and, in the gusty wind conditions, the pilot estimated the balloon changed direction by some 60° to the left. This resulted in the balloon tracking towards the set of electricity power lines. Having lost a lot of heat from the envelope the pilot did not think that they could clear the power lines, so he shut off the fuel and pilot lights and continued to pull on the rip line. The pilot briefed the passengers to be ready for a heavy landing and they adopted the landing position in the bottom of the basket whilst the pilot continued to try and land the balloon. The balloon struck an electricity transformer post, carrying power lines, with a heavy impact about 15 ft above the ground, and the metal flying wires contacted the power lines, which caused arcing. The pilot was briefly caught under the flying wires and he and the passengers received minor injuries from the electrical arcing. The balloon slowly rotated around its vertical axis and then touched down allowing those onboard to climb out of the basket.

The balloon suffered damage to 11 of the 24 flying wires, the scoop, lower Nomex and the basket top bar. There were also slight burns to clothing, a flight bag and propane gas tank covers.

Discussion

The pilot concluded that the accident had occurred due to a local increase in wind speed, above that forecast, and having to carry out a landing in the gusty conditions. Had the balloon remained on the ground after the first landing or not altered its ground track to the left, he estimated that it would not have contacted the power lines.

ACCIDENT

Aircraft Type and Registration:	P and M Aviation Quik R, G-CFDL	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2008 (Serial no: 8370)	
Date & Time (UTC):	8 September 2014 at 1255 hrs	
Location:	Arclid Airfield, Cheshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Nosewheel suspension, front of trike, propeller and wing	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	49 years	
Commander's Flying Experience:	131 hours (of which 95 were on type) Last 90 days - 26 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The pilot was landing at an airfield with which he was unfamiliar. On his second attempt to land, he flared too high and for too long and the aircraft stalled from a height of about 10 ft. The nose landing gear suspension collapsed and the aircraft left the runway before rolling onto its side.

History of the flight

The pilot intended to land at Arclid Airfield after a flight from Wiltshire. Grass Runway 02 was in use, which had a length of 400 m and a slight downslope over its middle third; the wind was from 330º at about 7 kt. His first approach, the pilot felt, was too high for this unfamiliar runway, so he decided to go around and perform a second one. He was happy with the second approach and commenced a flare over the first third of the runway.

However, a microlight instructor watching from the ground saw that the flare was too high and was held for too long. The aircraft lost speed and stalled from about 10 ft, hitting the ground on all three wheels before bouncing back into the air and landing again on the nose landing gear, which collapsed. The damage to the nose gear apparently pulled the cable operating the foot throttle and increased the engine rpm, veering the aircraft to the right and into adjacent pasture, where it rolled onto its side and came to a halt. Although the aircraft was badly damaged, the pilot disembarked unhurt.

The pilot cited four factors which, in his opinion, contributed to the accident:

- In the flare he “held off” too high and for too long
- He was unfamiliar with the airfield
- The downslope on the runway led to him misjudging the landing flare
- After a long flight he was in some discomfort, and distracted, due to a full bladder.

ACCIDENT

Aircraft Type and Registration:	Rans S6-ESD XI (Modified) Coyote II, G-MZIY	
No & Type of Engines:	1 Rotax 582-48 piston engine	
Year of Manufacture:	1997 (Serial no: PFA 204-13184)	
Date & Time (UTC):	21 September 2014 at 1530 hrs	
Location:	Near Derby, Derbyshire	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - 1 (Minor)	Passengers - N/A
Nature of Damage:	Severe damage to forward fuselage, engine compartment and main flying surfaces	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	63 years	
Commander's Flying Experience:	3,452 hours (of which 1 was on type) Last 90 days - 76 hours Last 28 days - 28 hours	
Information Source:	Aircraft Accident Report Form submitted by the instructor pilot and verbal report from aircraft owner	

Synopsis

During a training flight, the pilot undergoing training appeared to become unwell and passed control to his instructor. The instructor flew the microlight back to the airstrip in use but, on landing, the microlight bounced and the instructor opted to fly a go-around. At this point, the other pilot appeared inadvertently to apply right rudder pedal, which the instructor was unable to counter. The microlight yawed right and departed from controlled flight, crashing to the right of the airstrip.

History of the flight

The aircraft owner held a National Private Pilot's Licence and had about 90 hours experience flying flex-wing microlights. He was undergoing conversion training to qualify him to fly fixed-wing microlights, such as G-MZIY, which he had recently purchased. He had completed six hours training on a Thruster T600N microlight, which his instructor reported had gone well. On the day of the accident, the aircraft owner was to fly in his own aircraft with his instructor for the first time. Apart from about 30 minutes flying as a passenger with the microlight's previous owner, as part of the purchase process, he had not done any other flying or formal training on the type.

A dual flight was planned from the private airfield; the weather was fine, with a surface wind

from the north-west at 3 to 5 kt. The grass airstrip was designated 01/19, with takeoff and landing being made in the 01 direction. Under the guidance of his instructor, the owner carried out a takeoff and climb, followed by a series of turns, which were all well flown. Soon after, the owner asked his instructor to take control. The instructor described the owner becoming rather agitated and possibly unwell so, concerned for his well-being, he commenced a return to the airfield.

The instructor flew a normal approach to land, but the aircraft bounced on landing and the instructor opted to fly a go-around. He thought the owner had braced himself at this point and had inadvertently applied right rudder pedal, which the instructor was unable to counter. The microlight yawed to the right and the right wing dropped. It struck the ground in a steep nose-down attitude to the right of the airstrip.

The accident was seen by the crew of an East Midlands Ambulance Service helicopter which was operating in the vicinity. The helicopter landed nearby for the crew to render assistance but, although the microlight suffered extensive damage, it was soon established that its occupants had escaped with only minor injuries.

The aircraft owner reported that he had experienced something akin to a panic attack, although he had not experienced anything similar before or since, and knew of no medical reason why he should have done so on this occasion. He thought it possible that it was linked to the unfamiliar sounds and sensations of flying the aircraft for the first time other than as a passenger. He was unsure exactly what had happened to cause the accident itself, but accepted his instructor's view that he had applied right rudder inadvertently. One possibility was that he had momentarily reverted to his previous flex-wing flying techniques, in which throttle is controlled with the right foot. Although his instructor was flying the microlight, he might have made an instinctive foot movement to ensure full power was applied to go around from the bounced landing.

AAIB comment

The reason for the aircraft owner becoming unwell in flight was not established, but did not appear to arise from an existing condition. It is not unknown for student pilots to experience hyperventilation, which can arise through anxiety and produce symptoms that could be interpreted as indicative of a serious physical illness. This has the potential to cause more hyperventilation, which worsens the symptoms, forming a 'vicious circle'. Based on the situation and reports from both occupants, hyperventilation offers a likely explanation in this case.

ACCIDENT

Aircraft Type and Registration:	Skyranger Swift 912S(1), G-CFBY	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2008 (Serial no: BMAA/HB/562)	
Date & Time (UTC):	7 September 2014 at 1300 hrs	
Location:	Eshott Airfield, Northumberland	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Noseleg forks bent back, spat, wheel and tyre, propeller, engine and gearbox shock-loaded	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	67 years	
Commander's Flying Experience:	253 hours (of which 242 were on type) Last 90 days - 10 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

After what seemed to the pilot to be a normal touchdown, the aircraft suddenly became airborne again and, before he was able to open the throttle to go around, the aircraft landed heavily on its nosewheel. The front forks bent backwards and the propeller struck the ground. The aircraft then left the runway and came to a halt. The pilot, who was uninjured, made the aircraft safe and vacated it normally.

The pilot considered that the accident was caused by him relaxing after the touchdown, and he was not able to react quickly enough to a gust of wind which had caused the aircraft to become airborne again.

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).

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

4/2010 Boeing 777-236, G-VIIR
at Robert L Bradshaw Int Airport
St Kitts, West Indies
on 26 September 2009.

Published September 2010.

5/2010 Grob G115E (Tutor), G-BYXR
and Standard Cirrus Glider, G-CKHT
Drayton, Oxfordshire
on 14 June 2009.

Published September 2010.

6/2010 Grob G115E Tutor, G-BYUT
and Grob G115E Tutor, G-BYVN
near Porthcawl, South Wales
on 11 February 2009.

Published November 2010.

7/2010 Aerospatiale (Eurocopter) AS 332L
Super Puma, G-PUMI
at Aberdeen Airport, Scotland
on 13 October 2006.

Published November 2010.

8/2010 Cessna 402C, G-EYES and
Rand KR-2, G-BOLZ
near Coventry Airport
on 17 August 2008.

Published December 2010.

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.

Published September 2011.

2/2011 Aerospatiale (Eurocopter) AS332 L2
Super Puma, G-REDL
11 nm NE of Peterhead, Scotland
on 1 April 2009.

Published November 2011.

1/2014 Airbus A330-343, G-VSXY
at London Gatwick Airport
on 16 April 2012.

Published February 2014.

2/2014 Eurocopter EC225 LP Super Puma
G-REDW, 34 nm east of Aberdeen,
Scotland on 10 May 2012
and
G-CHCN, 32 nm southwest of
Sumburgh, Shetland Islands
on 22 October 2012

Published June 2014.

3/2014 Agusta A109E, G-CRST
Near Vauxhall Bridge,
Central London
on 16 January 2013.

Published September 2014.

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

GLOSSARY OF ABBREVIATIONS

aal	above airfield level
ACAS	Airborne Collision Avoidance System
ACARS	Automatic Communications And Reporting System
ADF	Automatic Direction Finding equipment
AFIS(O)	Aerodrome Flight Information Service (Officer)
agl	above ground level
AIC	Aeronautical Information Circular
amsl	above mean sea level
AOM	Aerodrome Operating Minima
APU	Auxiliary Power Unit
ASI	airspeed indicator
ATC(C)(O)	Air Traffic Control (Centre)(Officer)
ATIS	Automatic Terminal Information System
ATPL	Airline Transport Pilot's Licence
BMAA	British Microlight Aircraft Association
BGA	British Gliding Association
BBAC	British Balloon and Airship Club
BHPA	British Hang Gliding & Paragliding Association
CAA	Civil Aviation Authority
CAVOK	Ceiling And Visibility OK (for VFR flight)
CAS	calibrated airspeed
cc	cubic centimetres
CG	Centre of Gravity
cm	centimetre(s)
CPL	Commercial Pilot's Licence
°C,F,M,T	Celsius, Fahrenheit, magnetic, true
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DME	Distance Measuring Equipment
EAS	equivalent airspeed
EASA	European Aviation Safety Agency
ECAM	Electronic Centralised Aircraft Monitoring
EGPWS	Enhanced GPWS
EGT	Exhaust Gas Temperature
EICAS	Engine Indication and Crew Alerting System
EPR	Engine Pressure Ratio
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration (USA)
FIR	Flight Information Region
FL	Flight Level
ft	feet
ft/min	feet per minute
g	acceleration due to Earth's gravity
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
hrs	hours (clock time as in 1200 hrs)
HP	high pressure
hPa	hectopascal (equivalent unit to mb)
IAS	indicated airspeed
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IP	Intermediate Pressure
IR	Instrument Rating
ISA	International Standard Atmosphere
kg	kilogram(s)
KCAS	knots calibrated airspeed
KIAS	knots indicated airspeed
KTAS	knots true airspeed
km	kilometre(s)
kt	knot(s)
lb	pound(s)
LP	low pressure
LAA	Light Aircraft Association
LDA	Landing Distance Available
LPC	Licence Proficiency Check
m	metre(s)
mb	millibar(s)
MDA	Minimum Descent Altitude
METAR	a timed aerodrome meteorological report
min	minutes
mm	millimetre(s)
mph	miles per hour
MTWA	Maximum Total Weight Authorised
N	Newtons
N_R	Main rotor rotation speed (rotorcraft)
N_g	Gas generator rotation speed (rotorcraft)
N_1	engine fan or LP compressor speed
NDB	Non-Directional radio Beacon
nm	nautical mile(s)
NOTAM	Notice to Airmen
OAT	Outside Air Temperature
OPC	Operator Proficiency Check
PAPI	Precision Approach Path Indicator
PF	Pilot Flying
PIC	Pilot in Command
PNF	Pilot Not Flying
POH	Pilot's Operating Handbook
PPL	Private Pilot's Licence
psi	pounds per square inch
QFE	altimeter pressure setting to indicate height above aerodrome
QNH	altimeter pressure setting to indicate elevation amsl
RA	Resolution Advisory
RFFS	Rescue and Fire Fighting Service
rpm	revolutions per minute
RTF	radiotelephony
RVR	Runway Visual Range
SAR	Search and Rescue
SB	Service Bulletin
SSR	Secondary Surveillance Radar
TA	Traffic Advisory
TAF	Terminal Aerodrome Forecast
TAS	true airspeed
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Collision Avoidance System
TGT	Turbine Gas Temperature
TODA	Takeoff Distance Available
UHF	Ultra High Frequency
USG	US gallons
UTC	Co-ordinated Universal Time (GMT)
V	Volt(s)
V_1	Takeoff decision speed
V_2	Takeoff safety speed
V_R	Rotation speed
V_{REF}	Reference airspeed (approach)
V_{NE}	Never Exceed airspeed
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omnidirectional radio Range

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