

ACCIDENT

Aircraft Type and Registration:	Jabiru UL, G-VILA
No & Type of Engines:	1 Jabiru Aircraft Pty 2200A piston engine
Year of Manufacture:	1999 (Serial no: PFA 274A-13364)
Date & Time (UTC):	8 December 2012 at 1119 hrs
Location:	Aldham, near Hadleigh, Suffolk
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:	Private Pilot's Licence
Commander's Age:	56 years
Commander's Flying Experience:	634 hours (of which 260 were on type) Last 90 days - 6 hours Last 28 days - 2 hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft departed from a grass airstrip for a local flight. Although the weather at the time of departure was fine, the forecast included substantial areas of low cloud and fog. Following an extended period of flying, in poor weather and at times below 300 ft agl, the aircraft crashed while manoeuvring in the vicinity of Elmsett Airfield. The pilot suffered fatal injuries in the impact and there was a severe post-crash fire.

History of the flight

The pilot owned G-VILA and had based the aircraft at a grass airstrip in the village of Newton, near Sudbury. His exact movements on the morning of the accident are unknown but another Newton-based pilot had arrived at the airfield at 1000 hrs and seen the pilot there. They

had a short and inconsequential conversation before the other pilot departed in his aircraft.

Recorded information was available from the radar at Debden, a GPS¹ recovered from the aircraft² and a ground-based radio telephony (RTF) recorder at Wattisham Airfield. The history of the flight was constructed using these sources of information and additional information from eyewitnesses.

Figure 1 shows the progress of the flight. G-VILA departed from Newton airstrip (Point A in Figure 1) at

Footnote

¹ Garmin manufactured unit, model 196.

² The GPS unit, which was normally attached to the top of the instrument panel in G-VILA, was found below the main wreckage.

1031 hrs, with the pilot transmitting on the Wattisham frequency that he was climbing to 2,000 ft and had set a QNH of 1025 hPa. The aircraft initially climbed to 700 ft amsl but then descended to about 400 ft (about 200 ft agl) as it approached Boxford (Point B). The aircraft flew to the south of Boxford and then climbed to about 850 ft amsl. Reaching Ipswich (Point C) the pilot flew an orbit near the city (Point D) before tracking towards Felixstowe, 7 nm to the south-east (Point E).

At 1053 hrs, having flown along the coastline at Felixstowe, the aircraft flew over Ipswich, in a north-westerly direction, at between 800 ft and 850 ft amsl (Point F) and tracked towards Newton. A friend of the pilot recognised the aircraft as it passed

over Ipswich and called the pilot's mobile phone. The pilot answered the incoming call at 1105:05 hrs and the call ended at 1106:28 hrs; during the conversation the pilot described his route and commented that there was mist ahead and that he would need to descend to 300 ft. The phone call ended with the pilot saying he would visit his friend's house later in the day. At 1107:04 hrs (Point G) the aircraft started to descend at about 300 ft/min. Having descended to 440 ft (approximately 240 ft agl), the aircraft flew over an industrial area located at the easterly edge of Hadleigh (Point H), following which it started to climb at about 250 ft/min.

When the aircraft was about 0.5 nm to the north of Hadleigh, it made a left turn, routing overhead the town in an easterly direction. East of the town, the aircraft

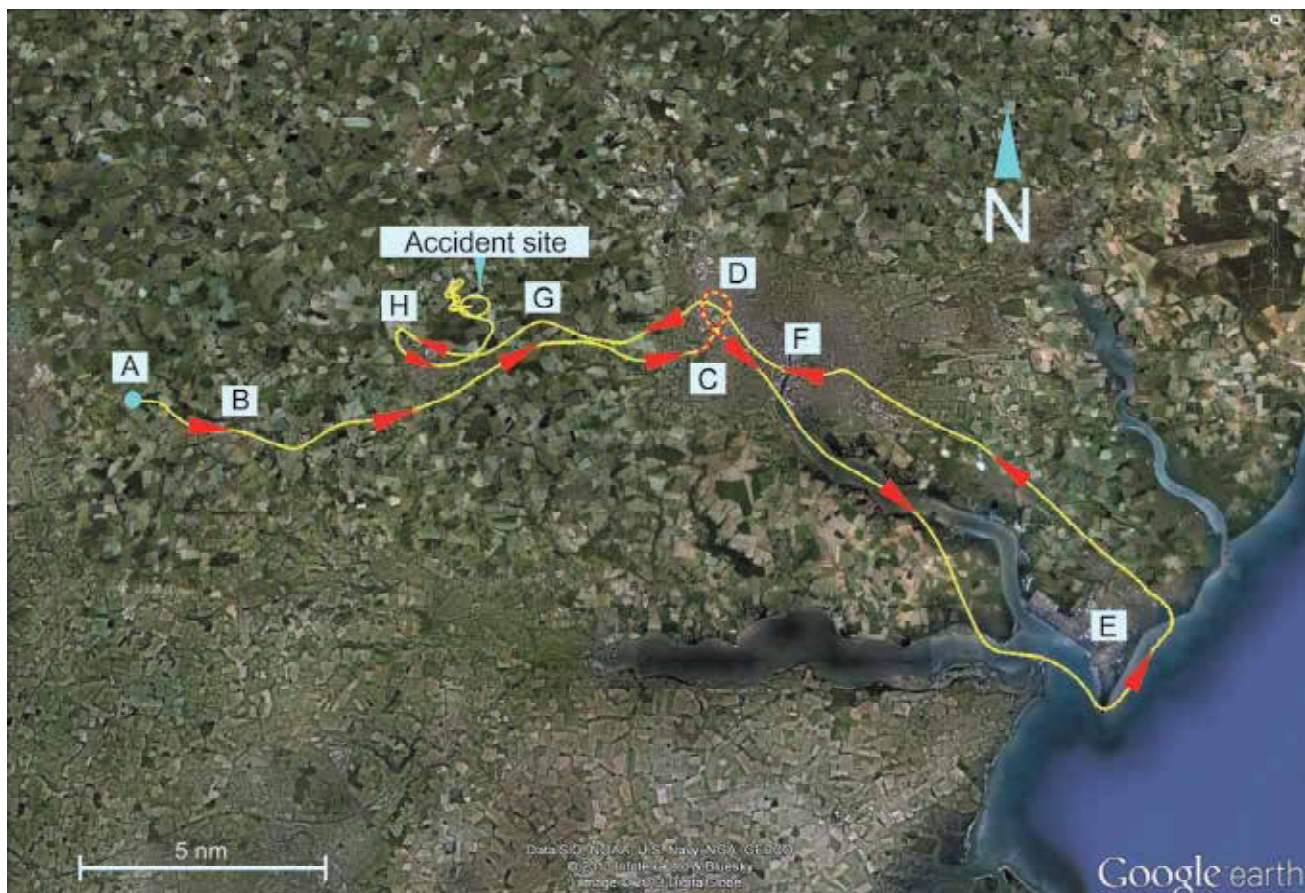


Figure 1

Overview of track of G-VILA (Points A to H)

had climbed to about 1,000 ft; this was the maximum recorded altitude during the flight. The aircraft then started to descend towards Elmsett Airfield, located approximately 1.3 nm to the north-northeast of Hadleigh. At about this time a military pilot walking his dogs about 1 nm east of Hadleigh heard and saw a light aircraft, which he estimated as being at 500 ft agl, on a heading of about 070° and travelling at about 70 kt. The aircraft was operating in the base of the cloud which he estimated as "...in the region of 300 ft, with a surface visibility of approx 3 to 4 kilometres but this was rapidly reducing as the front or weather system was approaching fast".

Figure 2 shows the last seven minutes of flight. Approximately 0.5 nm south-east of Elmsett Airfield, the aircraft flew an orbit down to about 260 ft, (Figure 2, Point 1) before making a series of turns ending almost overhead the threshold of Runway 05, at 200 ft aal. The aircraft tracked along the runway centre line, continuing to descend (Point 2). About two-thirds along the runway the aircraft had descended to approximately 50 ft, at a groundspeed of 58 kt. The aircraft then climbed in a left-hand turn, consistent with positioning for a further approach to Runway 05 (Point 3). Reaching the threshold, the aircraft flew a tight left-hand orbit at about 180 ft, and then flew south, away from the runway.

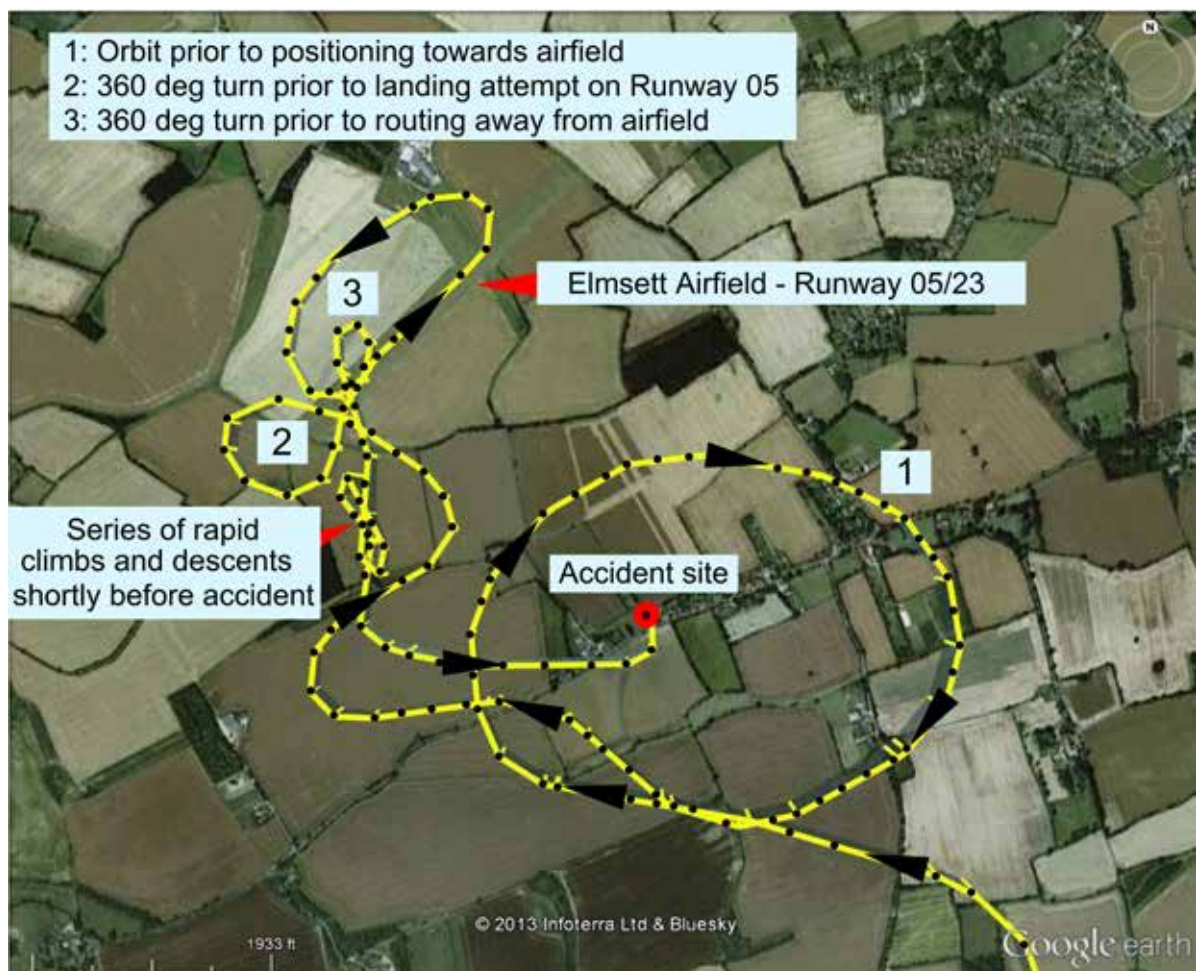


Figure 2

GPS-derived position and altitude of G-VILA - final seven minutes

The aircraft then climbed rapidly before descending to a height of about 150 ft. It climbed again and then descended to 170 ft, whilst making two 180° turns. Coincident with these manoeuvres, an open microphone transmission lasting about 3.5 seconds was recorded on the Wattisham radio frequency. The transmission contained no speech but some breathing, consistent with an inadvertent transmission being made by the pilot of G-VILA. The aircraft then made a left turn towards the east and briefly climbed to a height of about 480 ft, before descending at a rate of 3,300 ft/min, in a left turn. The aircraft impacted the ground a few seconds later (Point 4).

A farmer in a house on The Street, Aldham heard an aircraft which he believed to be doing aerobatics. He went outside to watch and realised the weather was poor with, he estimated, a cloudbase of 150 ft. He considered it odd that an aircraft would be doing aerobatics in those conditions. As he followed the sound he saw the aircraft “hop” over a line of trees and farm buildings to the west of him and head towards him. He considered that the aircraft was no more than 150 ft agl and just below the clouds. It then seemed to pull up at a very steep angle, passing out of sight in the cloud as it crossed above him. He was able to follow the engine sound which he described as being a roar as the aircraft pulled up, followed by a spluttering noise as it went overhead. The witness then saw the aircraft drop out of the cloud about 150 m east of his location, striking a power cable before disappearing from view behind buildings and trees. A severe fire developed immediately.

Recorded information

Basis of recorded information used in history of the flight

The radar at Debden is located approximately 27 nm to the west of the accident site and recorded the aircraft’s position and pressure altitude (to a resolution of 25 ft)

at a nominal rate of once every six seconds. The record commenced shortly after G-VILA took off from Newton airstrip and ended at 1119:01 hrs, with the final radar position 48 m from where the aircraft impacted the ground.

The GPS contained a track log of the accident flight, with aircraft GPS-derived position, track, altitude and groundspeed recorded. The record commenced with the aircraft positioned for takeoff from the easterly strip at 1027 hrs and ended at 1119:05 hrs, shortly before the aircraft impacted the ground. There was a close correlation between the radar and GPS information during the flight, confirming the accuracy of the two information sources. Information from the GPS is shown in Figures 1 to 3; Figure 3 showing the time-history plots.

Pilot information

The pilot’s licence was not found and was probably destroyed in the post-crash fire. CAA records show that the pilot had held a UK PPL (A) since 1989 with a Microlight class rating held since 1993. There was no record of the pilot holding any qualification to operate aircraft in Instrument Meteorological Conditions. Two pilot logbooks were located, though the dates were not contiguous. The earlier logbook, numbered “3” covered a period from February 2000 to April 2006. The later logbook commenced in April 2007 and the last entry was dated 11 November 2012. It included a current Certificate of Experience dated 1 September 2012, valid for 13 months. A running total of 634 hrs flying was recorded in this logbook including 330 hrs of flex-wing microlight flying. All the pilot’s recorded flying since 2007 was in G-VILA.

Official Record Series (ORS) 4 No 912 permits the holder of a UK PPL (A) to operate a microlight aeroplane, for which an appropriate class rating is held,

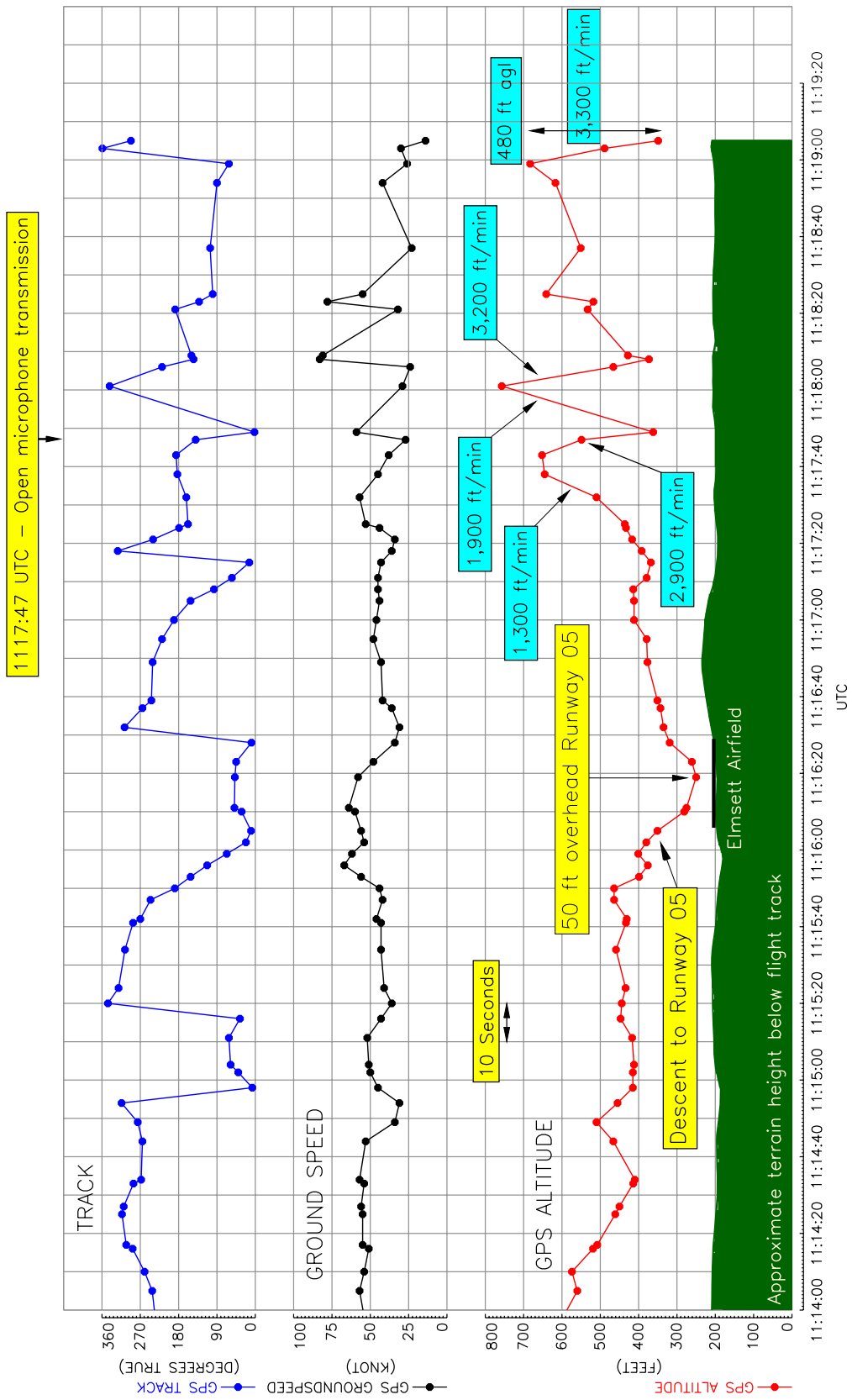


Figure 3

G-VILA - GPS track, altitude and groundspeed

without holding a medical certificate so long as they have a medical declaration appropriate to a National PPL (NPPL). In April 2008 the pilot had signed, and his GP countersigned, a medical declaration which remained valid at the time of the accident. However, ORS 4 No 912 also includes the following restriction:

'The licence holder shall not fly any such... microlight aeroplane on a flight outside controlled airspace when the flight visibility is less than 3 km.'

Aircraft information

The Jabiru UL is a three-axis home-built microlight aircraft. G-VILA was powered by a single Jabiru PTY 2200A engine and had a maximum takeoff weight of 430 kg. It was built in 1999. At the time of the accident the engine and airframe had both logged 907 flying hours. The aircraft was issued with a Permit to Fly on 11 August 2012.

Paragraph 5 of Article 23 of the Air Navigation Order 2009 states:

'An aircraft flying in accordance with a permit to fly may only be flown by day and in accordance with the Visual Flight Rules unless the prior permission of the CAA has been obtained.'

Wreckage site

The wreckage was located approximately halfway between two houses, which were about 20 m apart. Most of the fuselage wreckage was located in a 3 m wide drainage ditch which was approximately 50 cm deep. On both sides of the ditch there were woody hedges approximately 4 m high. There was evidence, from the freshly broken branches and twigs in the hedges, that the left wing had struck the hedge on one side of the

ditch and that the right wing had struck the other side of the ditch. From the orientation of the freshly broken branches it was concluded that the aircraft had struck the hedge area approximately 70° nose-down. The wreckage was contained in a small area except for most of one propeller blade that was found on the roof of one of the houses, about 10 m from the main wreckage. The small wreckage area was consistent with the aircraft being intact when it struck the hedge. There had been an intense fire that had consumed much of the aft fuselage and empennage, and it had badly damaged most of the cockpit area. There was comparatively little fire damage to the wings. The wreckage of the fuel tank, which was located in the fuselage, was recovered, but only ditch water was recovered from it.

Located 2 m from the ditch, and close to the main wreckage, was a 10 m wooden pole which carried electric power cables. One of the cables was broken and the pole had been fire damaged where it was close to the fuselage. There were witness marks on the right wing leading edge and on the right wing bracing strut that matched the damage to the electricity cable. It was evident from these marks and the piece of propeller found on the nearby roof that the propeller and right wing had struck the cable. The location of the piece of propeller blade 10 m from the main wreckage indicated that the engine was probably turning when it struck the power cable.

Detailed examination of the wreckage

The examination of the wreckage was limited due to the extensive fire damage.

The aircraft controls were checked. The ailerons, rudder, elevator and pitch trim were all actuated by Teleflex cables; all these cables were present and had been attached at both ends. The fire damage was such

that parts of the flap lever and the control stick no longer existed. In summary, no evidence of a control restriction was found, although it was not possible to determine conclusively there had not been a control problem, due to the extensive fire damage.

The engine was inspected. There was significant fire and heat damage which limited the extent of the inspection, but no evidence of a mechanical defect was found.

Weather

The UK Met Office provided an aftercast of the accident area, along with additional data. On the morning of the accident the forecast available to pilots included Metform F215, (Figure 4) The accident occurred in area C1 for which the Met Office report had the following forecast:

‘30 KM visibility in nil weather, with scattered or broken cloud bases at 1,500 – 3,000 ft

Isolated 7 km visibility in moderate rain showers

Isolated 3,000 m in mist until 1300 UTC with scattered or broken stratus bases 300 – 800 ft

Isolated 200 m in fog or freezing fog until 1200 UTC with associated cloud base at the surface

Isolated hill fog.’

They added that ‘isolated’ as used in an F215 area forecast is defined as affecting up to 25% of the area in question.

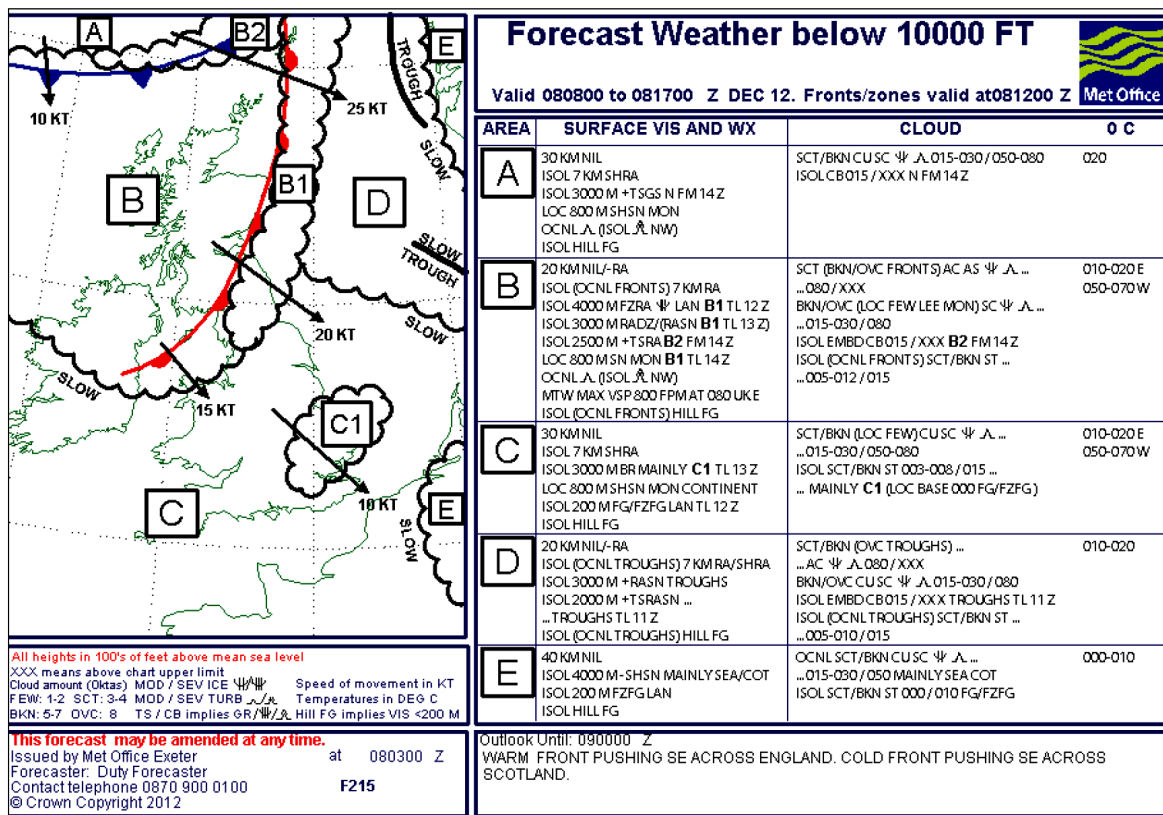


Figure 4
Metform F215

Reviewing the aftercast, the Met Office commented that:

'The weather over England was settled under a ridge of high pressure, however there were some areas of fog and low cloud. Looking at the satellite pictures from that morning much of the fog and low cloud cleared but there was a significant area over East Anglia which did not clear and was moving slowly south east. (Figure 5)

This area of advection fog and low cloud dropped the visibility to (between) 500-4000M. Cloud bases varied between the surface and 400FT.

Visibility outside of the area of cloud was at least 8-10 KM. The visibility and cloud base can vary quite significantly and rapidly within such an area of low cloud. These conditions were forecast on the F215 chart within the area C1.'

Wattisham Airfield is located 3.7 nm north of the accident site. Although the local meteorological office at Wattisham was closed that day, an automated weather station recorded rapid changes in cloud base and visibility (Table 1).

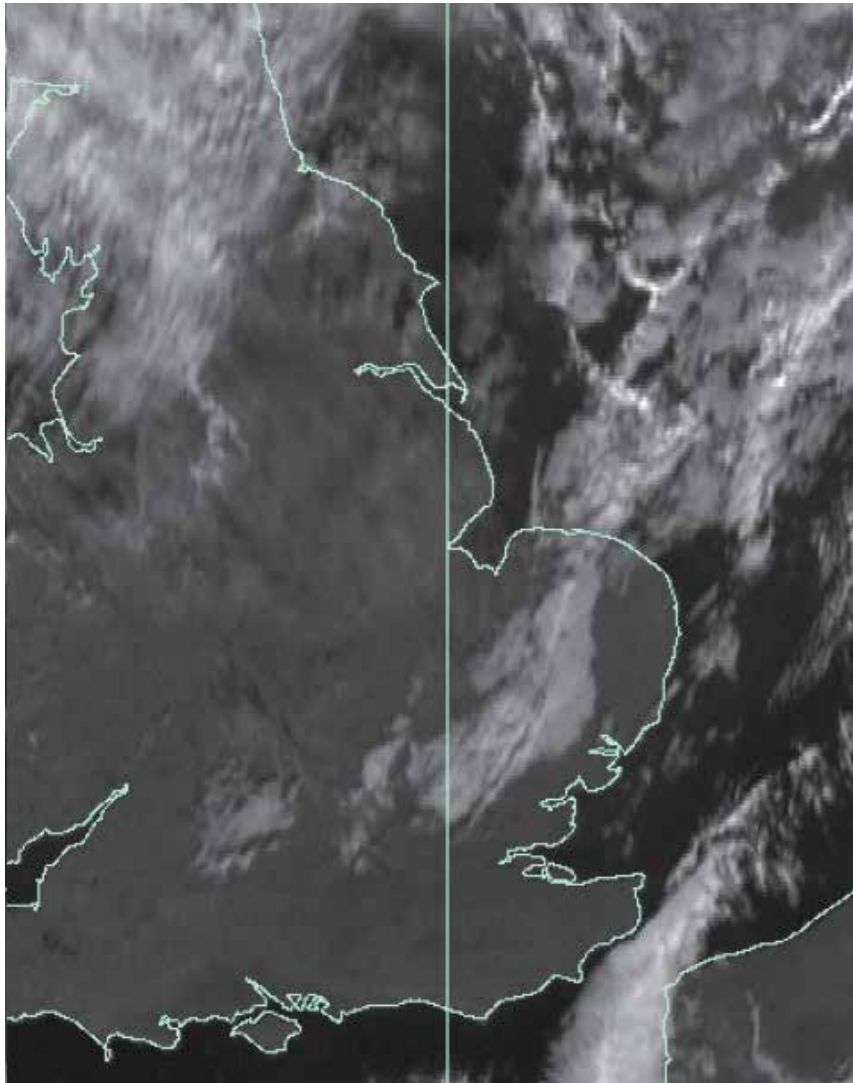


Figure 5

Satellite image of visible cloud and fog at 1115 hrs, 8 December 2012

Time	Surface Visibility	Cloudbase
1030	7 km	Overcast 4,000 ft
1040	6 km	Broken 4,000 ft
1050	700 m	Scattered 100 ft
1100	400 m	Scattered 100 ft
1110	1000 m	Scattered 100 ft
1120	800 m	Broken 100 ft
1130	900 m	Broken 100 ft

Table 1

Wattisham visibility and cloud base (surface visibility is rounded to 100 m)

Further information was extracted from the Wattisham weather station's memory. During the period between 1030 hrs and 1130 hrs the lowest visibility reading was at 1102 hrs with 438 m recorded, although this was only for a one-minute period. At 1119 the Wattisham station recorded a visibility of 764 m with the '*sky obscured*'.

SAR commander's weather report

Immediately following the accident the Wattisham-based Police Air Support Unit and the Air Ambulance were both unable to operate due to the visibility and low cloud. The emergency services therefore requested assistance from Distress and Diversion (D&D) Cell at Swanwick, who passed the request onto the Aeronautical Rescue Co-ordination Centre (ARCC). They scrambled a RAF SAR helicopter from Wattisham and a Coastguard SAR helicopter from Lee-on-the-Solent.

The commander of the RAF SAR helicopter described the weather conditions as "most unpleasant". He estimated that the in-flight visibility was 500 metres, with a solid cloud base at 200 ft agl. Given the poor visibility close to the ground, and the prevalence of low-level obstructions, the crew decided to climb and then transit above the cloud to the accident site. The cloud layer was between 250 and 400 ft thick, with good visibility above the cloud layer, but the layer was so

dense that the SAR helicopter crew were unable to find a safe path back below the cloud for a considerable period of time.

The SAR crew considered aborting the mission. However, the Fire and Rescue service repeated a request for overhead thermal imagery, to allow an effective search of the water areas surrounding the accident site. The SAR helicopter then returned to Wattisham and, operating at a 'hover-taxi' speed, followed roads to reach the accident site. The aircraft had been scrambled at 1148 hrs and reached the accident site at 1227 hrs. The commander estimated that the cloud cover had extended to the coast, some 20 nm to the south and east.

Distress and Diversion cell ('D&D')

D&D is the emergency centre based at the London Area Control Centre (LACC) at Swanwick, near Southampton. It is available 24 hours a day to pilots flying within UK airspace who are in distress, in urgent need of assistance or who are experiencing difficulties which could lead to an emergency. They also act as an information-gathering tool for the ARCC located in Kinloss.

The D&D cell have access to weather and airfield status information and can co-ordinate access to airspace or airfields that are normally unavailable to general aviation

pilots. By taking on the navigation and co-ordination task they can reduce the pilot's workload, allowing him or her to concentrate on maintaining safe flight.

D&D received no calls for assistance from aircraft operating in the East Anglia region during the day of the accident.

Pathology

A post-mortem examination was conducted by a specialist aviation pathologist. He commented that:

'the crash forces...were beyond the range of human tolerance.'

There was no evidence that the pilot had been alive during:

'either the post-crash fire or during submersion.'

In his summary the pathologist stated that:

'no medical or toxicological factors have been identified which could have caused or contributed to the accident.'

CAA operational rules

The CAA Guide to Visual Flight Rules (VFR) in the UK states that:

'Visual Flight Rules (VFR) require an aircraft to be flown in accordance with the Visual Meteorological Conditions (VMC) minima appropriate to the classification of airspace.'

It continues that for aircraft operating outside controlled airspace and at 140 kt or less the minima are:

'1500m flight visibility, clear of cloud and in sight of the surface.'

These conditions are the minimum and individuals should apply pragmatic limits considering their experience and equipment. Conditions of lower visibility, inability to see the surface or entry into cloud mean that an aircraft is in Instrument Meteorological Conditions (IMC) which requires the commander to comply with the Instrument Flight Rules (IFR).

Rule 5

Rule 5 of the UK Rules of the Air Regulations 2007 places certain constraints on aircraft, described in the Directorate of Airspace Policy information sheet (Number 2):

'Aircraft are not permitted to fly over a congested area of a city, town or settlement below a height of 1,000 ft above the highest obstacle within a horizontal radius of 600 meters of the aircraft.'

'Away from congested areas, aircraft are not permitted to fly closer than 500 ft to any person, vessel, vehicle or structure.'

Use of mobile phones in light aircraft

The UK CAA issued Safety Notice 2013/003 in January 2013 highlighting that:

'A mobile phone is a highly practical and useful tool for communicating but except in emergency should not be used in flight.'

Analysis

Based on CAA records and his logbooks, the pilot held the appropriate licence and medical declaration for flying G-VILA in VFR conditions and was in recent flying practice.

From the damage to the hedges it was concluded that the aircraft had struck the ground approximately

70° nose-down. The damage caused by the post-crash fire made it impossible to eliminate that a defect affected the operation of the aircraft. However, no technical defect was found and, from the evidence that the propeller was rotating when the aircraft struck the ground, there was probably no technical fault that contributed to the accident.

It is not possible to know what weather information the pilot considered before deciding to fly but an extensive area of fog and low cloud was forecast on the Metform F215. The reference, on the Metform F215, to '*isolated*' low cloud and fog meant that up to 25% of the indicated area could be affected. In this case, 25% of area C1 comprised several thousand square miles, and represented a hazard to light aircraft. The SAR commander's estimate of a 20 nm radius of solid fog is corroborated by the satellite data, but still would not have comprised more than 25% of area C1.

At the time the flight commenced, the Wattisham automated system recorded 7 km visibility and a cloudbase of 4,000 ft. Both of these measurements were suitable for visual flight in accordance with the Rules of the Air. However, the conditions rapidly deteriorated and by the time of the accident they were not compliant with either the 3 km visibility required by the pilot's licence or the Visual Flight Rules required by the aircraft's permit to fly.

The radar and GPS data show that the aircraft was operating at a low height before the cloud and poor visibility were encountered. The pilot's telephone call near Ipswich indicates that at this point he intended to continue the flight, descending to 300 ft. There was then an extended period of low-level flying, in poor weather. Once in the area of Hadleigh the pilot appears to have abandoned his return to Newton and diverted towards Elmsett Airfield. However, the ground rises between Hadleigh and Elmsett and the eyewitness report of a 500 ft cloudbase near Hadleigh would equate to one of about 150 ft over Elmsett.

From the evidence derived from the GPS onboard G-VILA, it is likely that the pilot was attempting to land at Elmsett Airfield. The GPS data from 1116 hrs showed rapid changes in speed, track and altitude, suggestive of an aircraft not fully under control. The description from the eyewitnesses of the aircraft's final manoeuvres suggests that, as the aircraft approached Aldham, the pilot pulled up into a cloud layer and hence his visual references would have been compromised. In the cloud, control of the aircraft was probably lost almost immediately, which resulted in a steep descent and ground impact.