

Reims Aviation SA Cessna F150F, G-ATOE

AAIB Bulletin No: 10/2002	Ref: EW/C2002/02/02	Category: 1.3
Aircraft Type and Registration:	Reims Aviation SA Cessna F150F, G-ATOE	
No & Type of Engines:	1 Continental Motors Corp O-200-A piston engine	
Year of Manufacture:	1966	
Date & Time (UTC):	7 February 2002 at 1714 hrs	
Location:	Hannington, Hampshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 0
Injuries:	Crew - 1 Fatal	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilots Licence	
Commander's Age:	66 years	
Commander's Flying Experience:	1,054 hours (of which 331 were on type)	
	Last 90 days - 16 hours	
	Last 28 days - 5 hours	
Information Source:	AAIB Field Investigation	

Background

The pilot had owned the aircraft for some years and normally based it at Popham Airfield, Hampshire. On occasion however, he would base the aircraft for varying periods of time at Enniskillen (St Angelo) Airfield in Northern Ireland. On the day prior to the accident the pilot had begun his return journey from such a stay at St Angelo, planning to return to Popham via a refuelling stop at Blackpool Airport. However, the aircraft had developed a rough running engine on the flight to Blackpool, forcing the pilot to seek engineering assistance on his arrival at approximately 1240 hrs. He was informed that it would not be possible to repair the aircraft until the following morning.

The pilot spent the night at a local guesthouse before returning to the airport the next day to continue his flight to Popham. The aircraft's rough running engine was rectified by replacing one of the spark plugs and cleaning and adjusting the others, although the RPM drop on the left magneto was such that it was suggested to the pilot that further work was advisable. The RPM drop was, however, just within limits and the pilot elected to seek such repairs later.

History of the Flight

Having had the aircraft repaired, the pilot made a telephone call to a pilot colleague at about 1000 hrs in which he stated that he did not wish to stay at Blackpool if at all possible. High winds were forecast and he was concerned that he might not be able to get tie-downs for the aircraft. In a later telephone conversation at midday with the same friend, the pilot enquired about the weather conditions along his intended route. His colleague, who was in London, replied that he was concerned about the strength of the headwind for the flight. He had a handheld radio transceiver with him and held the telephone next to it so that the pilot could hear the relevant VOLMET broadcast for himself. At about 1400 hrs the pilot telephoned a third time to say that he was about to depart Blackpool and "Regarding the weather problem, I might pull into White Waltham".

The pilot took off from Blackpool at 1438 hrs, declaring his destination as Popham, although no flight plan or arrival booking was received at Popham. Blackpool ATC reported the cloud base at the time to be about 200 feet and the controller was concerned to see the aircraft disappear into cloud soon after take off. On calling the aircraft the pilot reported that he was "Clear on top".

Documents found in the aircraft suggested the following intended route: Blackpool - Manchester Low Level Corridor - Stoke-on-Trent - Lichfield - Daventry - Westcott - Stokenchurch Mast - Popham. Subsequent analysis of a GPS unit found in the aircraft confirmed that this was basically the route flown.

With the exception of Blackpool airport and Manchester low level corridor frequencies, attempts to trace any ATC communication with the pilot along this route were unsuccessful. A colleague who regularly flew with the pilot stated that the pilot did not normally use the radio unless necessary, other than to update the QNH by monitoring relevant frequencies.

The last known contact with the aircraft was at about 1700 hrs when a witness saw it flying in a south-westerly direction about ten miles north-east of the crash site, flying below 500 feet and being buffeted by strong winds. At the time the witness states that there was patchy rain, poor visibility and that it was beginning to get dark.

At about 1715 hrs two residents at a house near the crash site report seeing a big blue flash and hearing a loud bang. Both were indoors at the time but, being aware of the poor weather outside, they assumed these phenomena were caused by lightning. The house is on top of a hill next to a line of electricity pylons about 100 feet high and they described the weather as misty, with the tops of the pylons being barely visible. One of the witnesses had also heard a low flying aircraft just before seeing the flash. This was not unusual as low flying military helicopters regularly flew over the house and there seemed no reason to connect this aircraft noise with the flash or bang. At about 1805 hrs the husband of one of the residents arrived home and mentioned finding a cable from the electricity line lying in the road outside. They now took this to be the cause of the flash and telephoned the local electricity board to report the broken cable.

As a result of this telephone call and because of a fault indication on the electricity line at 1714 hrs, engineers were dispatched by both the local electricity company and the National Grid. They arrived at approximately 1835 hrs and 1845 hrs respectively and discovered the broken cable to be the earth cable which runs between the tops of the pylon towers. The engineers stated that at the time of their arrival they were unable to see the tops of the pylon towers due to low cloud, despite using a powerful torch.

In reporting the broken cable the occupants of the house had also mentioned hearing an aircraft before seeing the flash. One of the engineers remembered something catching his vehicle's headlights as he approached the site of the broken cable, and on returning to search the area he discovered the aircraft resting in a field adjacent to the road. The pilot was found injured but conscious in the aircraft and first aid was administered. The emergency services were notified and arrived shortly afterwards.

Meteorological Conditions

Frontal systems were affecting southern England on the day of the accident. The UK Low Level Forecast (Form 215) issued by the Met Office at 1235 hrs and valid from 1500 hrs showed a cold front lying along a line from Cardiff to Hull and a warm front lying from Southampton also to Hull. Both fronts were likely to move south-easterly at 20 to 25 kt. North of the cold front, the visibility would be generally 25 km with cloud above 2,000 feet. Between the fronts (which included the final leg from Stokenchurch mast to Popham) the forecast was extensive cloud at base 800 feet with a visibility of 8 km but there would be occasional areas of stratus at 200 feet and reduced visibility of 1,500 metres in rain, drizzle and mist. Cloud on the hills was predicted both north and south of the cold front. The spot wind chart for the afternoon predicted winds of 230°/20 kt at 1,000 feet and 250°/35 kt at 2,000 feet over central England.

The 1450 hrs METAR (Aviation Routine Weather Report) for Blackpool airport was: wind 230°/18 kt; visibility 4,000 metres; scattered cloud at 200 feet; broken cloud at 1,200 feet; overcast cloud at 2,500 feet, temperature 10°C, dew point 9°C and QNH 1007 millibars.

The radio operator at Popham Airfield (550 feet amsl) stated that the weather there that day was poor with heavy rain showers, low cloud and poor visibility. At 1600 hrs he estimated the cloud base was less than 100 feet above the airfield with visibility down to about 400 metres.

Odiham airfield (405 feet amsl), 11 nm east of Popham, had the following TAF and METAR for the aircraft's projected arrival time:

TAF: wind 200°/22 kt gusting 32 kt; visibility over 10 km in light rain; scattered cloud at 1,000 feet broken cloud at 1,800 feet; temporarily between 1500 hrs and 2000 hrs; visibility 6,000 metres in light rain and drizzle; 40% probability of a temporary reduction between 1500 and 1900 hrs to a visibility of 3,500 metres in moderate rain and drizzle with a cloudbase of 600 feet.

METAR: wind 220°/18 kt; visibility 9,000 metres in light drizzle; overcast cloudbase of 500 feet; temperature 9°C, dewpoint 8°C, QNH 1014 millibars; and temporary reductions in visibility to 4,000 metres.

There is no runway lighting at Popham and sunset that day was at 1703 hrs. Some years previously the pilot had gained both an IMC and a night rating, but these had since lapsed.

Aircraft Endurance

On arrival at Blackpool the aircraft was refuelled to full tanks but it was not refuelled again after the engineering work, which involved some short engine runs.

Calculation has shown that the aircraft had a maximum endurance of approximately three hours. The planned route under still air conditions would have taken 2 hours 10 minutes. Under the prevailing wind conditions this would have been increased to about 2 hours 40 minutes.

Examination of the Aircraft

The aircraft had struck and severed the earth cable, which also carried a fibre-optic datalink between the pylons, approximately 100 feet above the ground. The earth cable is secured at the apex of each pylon, above the conductors, and there was no evidence of any contact between the aircraft and the pylons, insulators or conductors. After striking the cable the aircraft travelled about 170 metres before its impact into wet soil, travelling in a direction of 115°M, and it then bounced about 30 meters further before coming to rest after rotating about 160° to the left.

Examination of the aircraft showed that it was structurally complete when it struck the earth cable and the flying control system was intact. There was evidence of power being supplied to the propeller and the aircraft's trajectory after striking the cable indicated that, before the cable strike, it was close to level flight and heading south-east.

There had been no fire after the impact with the ground and the fuel system had remained largely intact. During recovery of the aircraft, the fuel quantity was measured and allowing for spillage, there was no more than a total of 18 litres remaining at the time of the accident. The Flight Manual for the Reims/Cessna F150 states that the total fuel volume for this type is 98 litres of which 85 litres are usable in all flight conditions and 13 litres are counted as 'unusable fuel'. Therefore, at the time of the accident there was sufficient usable fuel onboard for about 10 minutes of flight.

Survival Aspects

The aircraft was fitted with a shoulder harness for each occupant as well as a lap strap. The shoulder harness appeared to have been retrofitted, as the manufacturer confirmed that when G-ATOE was built in 1966, the shoulder harnesses were available as an option but were not fitted to this aircraft. The damage to the fittings showed that the lap and shoulder harnesses were being worn at the time of the accident but the structural damage and deformation within the fuselage had allowed the anchor point of the shoulder harness to move forward.

The pilot suffered multiple injuries. The aviation pathologist's report suggested that these injuries were probably survivable if the pilot had received prompt medical treatment. He was conscious when the aeroplane was found at about 1900 hrs and cut free from the aircraft shortly after 1930 hrs, but whilst being taken to hospital, he suffered a cardiac arrest. He died in hospital later that evening.

Analysis

An ICAO 1:500,000 aeronautical chart covering the route was found in the aircraft. South of the Manchester Corridor, only minor excursions from the direct tracks were necessary to avoid penetration of air traffic zones. The pilot preferred to minimise his RTF activity and the routing may explain why the pilot did not contact any airfields south of Manchester. Nevertheless, the latter part of the route did take the aircraft close to airfields such as Brize Norton and Benson which could have provided an air traffic service.

Apart from the Stoke-on-Trent and Daventry local areas, most of the elevated ground on the planned route to Popham was along the last leg from Stokenchurch Mast. Along this final leg, the map shading indicated terrain heights between 500 and 1,000 feet amsl and the dominant obstacle was the Hannington mast (very near the crash site) which rises to 1,226 feet amsl (498 feet agl). The map did not show obstacles below 300 feet agl.

The forecast weather, which was displayed in the pilot briefing room at Blackpool airport, was not suitable for the entire VFR flight to Popham. The final leg was predictably the most difficult and the pilot would probably have been warned of the very poor weather conditions at Popham if he had telephoned that airfield before leaving Blackpool.

The weather along the final leg was much as forecast. Replay of the pilot's GPS receiver data showed an irregular track south of Stokenchurch that avoided the higher ground and exploited the low ground. The flightpath suggested that cloud was covering the higher hills and the pilot was manoeuvring to find a way through the Chiltern hills. South of these hills, the flightpath skirted Henley-on-Thames which was three miles east of the planned track. The pilot would not have had to traverse yet more high ground if, from there, he had diverted to nearby White Waltham, an option that he had mentioned earlier that day to his friend in London. However, he continued in a south-westerly direction towards Hannington. This was in the general direction of Popham but three miles west of the planned track and towards more high ground. At that stage of the flight, the pilot had four problems:

- a. With an endurance reduced by engine ground runs to less than three hours, having been airborne for 2 hrs 36 minutes he was running low on fuel.
- b. He was fast running out of daylight (12 minutes after sunset and beneath thick cloud).
- c. The general cloud base was covering the tops of the hills (about 670 feet amsl by Hannington village).
- d. He was not receiving any form of ATC service (which he could have obtained from nearby airfields such as Brize Norton).

Because the weather was so poor, nobody saw the crashed aircraft until the electrical engineers arrived to repair the broken line. Had the pilot struck terrain or trees in that area instead of electricity lines, he might not have been found for some considerable time because no one would have been aware that the aircraft was either in difficulty or expected at Popham. It is possible that, had the pilot been talking to an ATC unit, the controller would have been able to hasten search and rescue action after the crash and the pilot might have survived. Nevertheless, the poor weather in the Hannington area and the onset of nightfall suggest that had a search been instigated, the pilot still might not have been found any earlier.

As a result of this accident and a similar one soon afterwards, enquiries were made to establish the practicality of linking unexplained power line interruptions with missing aircraft. On balance, there were more power line failures than aircraft wire strikes and it was considered impractical for the electricity distributors to contact air traffic agencies every time there was an unexplained power interruption. On the other hand, it was considered far more practical for aircraft search agencies to contact relevant electricity distribution companies when searching for missing aircraft. The likelihood of a link between a missing aircraft and a power cut would be affected by the time of day, the location of the distribution fault and the weather in that area.

Recommendation 2002-16

The Distress and Diversion Cells at the London Terminal Control and Scottish Area Control Centres are manned by RAF personnel. These military units are often closely involved in tracing 'missing' civilian light aircraft. Consequently, it was recommended to the RAF's Headquarters Strike Command that ATC units with a responsibility for locating overdue aircraft should liaise with the electricity industry to establish a procedure by which unexplained damage to power lines might be included as part of a search for missing aircraft.

Response to Recommendation 2002-16

On 21 August 2002 the Royal Air Force wrote to the AAIB stating that :

The Distress and Diversion Cells located at RAF West Drayton and RAF Prestwick will implement the following procedure:

- a. A database of National grid Control Room telephone numbers will be maintained within each Distress and Diversion Cell.*
- b. The Standard Operating Procedures for each Cell will be amended to reflect the need to consider the use of National Grid-derived information as a source of supplementary data when searching for lost aircraft.*