

Piper PA-38-112 Tomahawk, G-BOCC

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| AAIB Bulletin No: 5/2004 | Ref: EW/C2003/07/05 | Category: 1.3 |
| Aircraft Type and Registration: | Piper PA-38-112 Tomahawk, G-BOCC | |
| No & Type of Engines: | 1 Lycoming O-235-L2C piston engine | |
| Year of Manufacture: | 1979 | |
| Date & Time (UTC): | 10 July 2003 at 0946 hrs | |
| Location: | Near Llanberis, North Wales (5306.9N 00404.5W) | |
| Type of Flight: | Private | |
| Persons on Board: | Crew - 1 | Passengers - None |
| Injuries: | Crew - 1 (Serious) | Passengers - N/A |
| Nature of Damage: | Aircraft destroyed | |
| Commander's Licence: | Private Pilot's Licence | |
| Commander's Age: | 52 years | |
| Commander's Flying Experience: | 237 hours (of which 218 were on type) | |
| | Last 90 days - 12 hours | |
| | Last 28 days - 3 hours | |
| Information Source: | AAIB Field Investigation | |

Synopsis

The aircraft departed Tollerton, Nottingham, for Caernarfon, Gwynedd, routing from Tollerton to Crewe and then direct to Caernarfon. The pilot received a Flight Information Service from Liverpool ATC, but at 0939 hrs the pilot left the Liverpool frequency and made no further contact with ATC. At about 0945 hrs three hill walkers who were in hill fog on a track just to the east of Elidir Fawr in Snowdonia heard an aircraft fly past them. Very soon after, they heard an impact and the engine noise ceased. The walkers reported what they had heard to the police, and several hours later the wreckage of the aircraft and the pilot, who was seriously injured, were located. The pilot made a full recovery but was unable to remember anything of the flight. The investigation, therefore, was based on examination of the wreckage, witness evidence, recorded radar data and data recovered from the aircraft's GPS. The engineering examination found no fault with the aircraft that could have caused the accident and the report concludes that the aircraft probably flew into terrain whilst in IMC.

History of the flight

The pilot had owned the aircraft since early 2003 and used it for pleasure flights and the occasional business trip. On the day of the accident he planned to fly from Tollerton Airport to Caernarfon Airport for a business meeting. Although he had flown a considerable number of cross country flights since qualifying for his Private Pilot's Licence in 1999, the pilot's cross country experience was

limited mainly to flights around the Midlands area. Since the flight to Caernarfon was to be his longest solo cross country flight to date, he sought the advice of his flying club's Chief Flying Instructor (CFI).

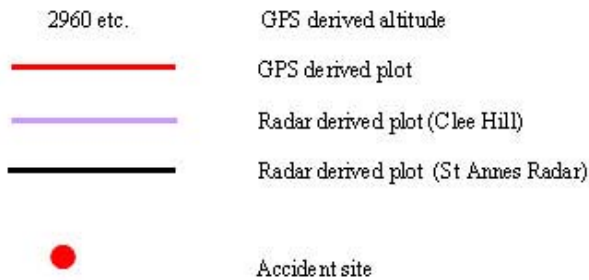
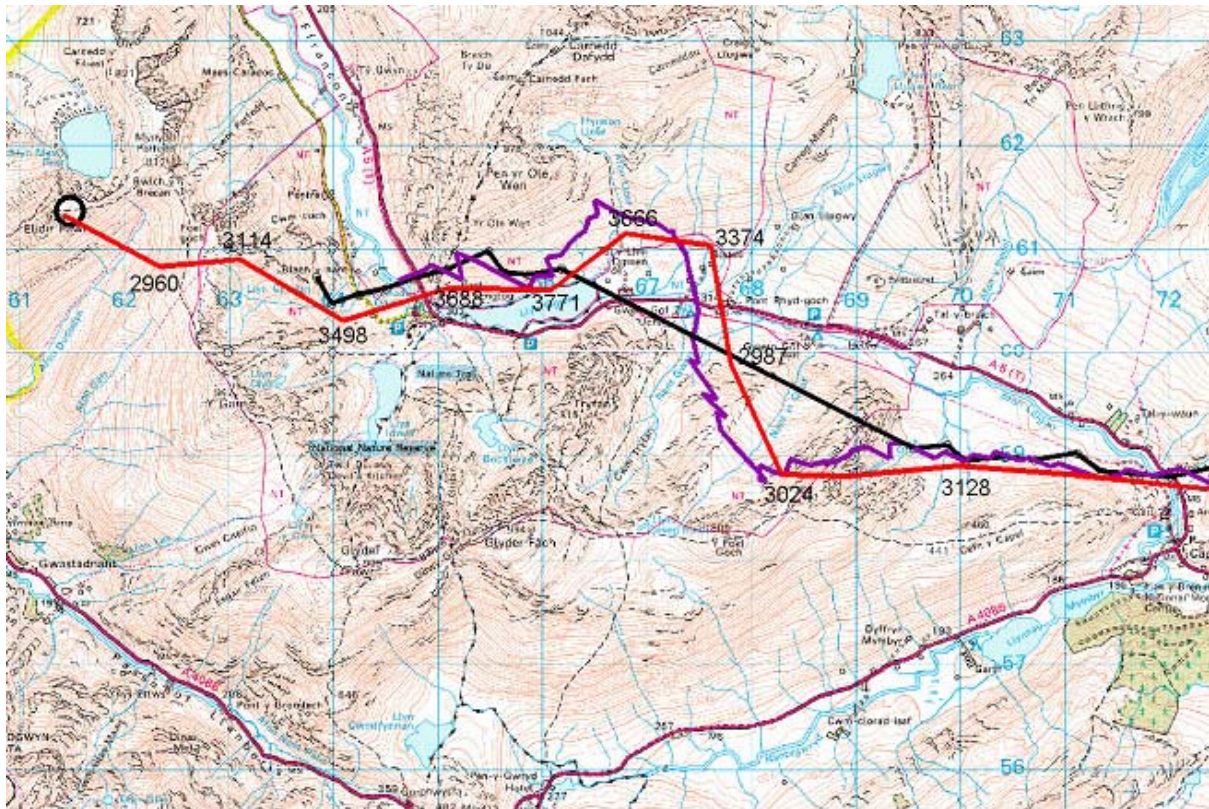
A direct track from Tollerton to Caernarfon passes over the mountains of Snowdonia. Given frequent poor flying weather in the Snowdonia area, the CFI advised the pilot to plan both a fair weather and an alternative route. The pilot's map, recovered from the aircraft wreckage, depicts two routes, the first from Tollerton to Crewe and then directly to Caernarfon across Snowdonia, and a second route from Crewe to Conway and then direct to Caernarfon along the Menai Strait.

The pilot filled the aircraft with fuel the night before the flight and arranged for it to be hangared overnight close to the hangar exit to facilitate an early morning departure. On the morning of the accident the pilot rose early and travelled to the airport via his place of work. Phone records from his work place showed that at 0709 hrs he made a telephone call to Caernarfon Airport. The Caernarfon Airport manager recalled receiving two telephone calls that morning from pilots asking for weather information. Caernarfon Airport does not have a qualified meteorological observer, but the manager gave 'unofficial' weather information to both pilots. To the best of his recollection, the manager told the first caller that the visibility was about eight to nine kilometres with cloud overcast at about 1,500 feet agl. However, he recalled that shortly after the call the weather deteriorated to about three to four kilometres visibility and the cloudbase lowered to about 1,000 feet agl.

The aircraft departed Tollerton at 0815 hrs. Radar and GPS data recovered after the accident showed that the aircraft tracked from Tollerton to Crewe and thence, on a track of 270°, directly toward Caernarfon. At 0906 the pilot contacted Liverpool ATC stating that he was overhead Wrexham at 2,000 feet on the QNH and requesting a Flight Information Service and a climb to 4,000 feet. Liverpool agreed to provide the requested service and acknowledged the climb. The pilot then remained on the Liverpool frequency for the next 33 minutes until, at 0939 hrs, Liverpool advised him to contact RAF Valley ATC for a continuation of the service. Valley ATC records for the period showed no call from the pilot.

Data recovered from the aircraft's GPS receiver (see Figure 1) showed that just after leaving the Liverpool ATC frequency, at 0941 hrs, the aircraft descended from 4,000 feet to 3,000 feet about five nautical miles to the west of the Conway valley. The aircraft continued on its westerly track for a further 1½ minutes, before turning on to a northerly heading, and shortly thereafter commencing a climb.

Plot of GPS and Radar Derived Track and Altitude



G-BOCC - Plot of GPS and Radar Derived Track and Altitude

Figure 1

The aircraft maintained the northerly heading for about one minute before resuming its roughly westerly track and levelling off at about 3,800 feet. The aircraft maintained this altitude for 1½ minutes before again descending. Two minutes after commencing this descent, the GPS data ceased in the area of Elidir Fawr, a mountain that rises to 3,029 feet above sea level.

At this time three hill walkers were walking along a track about 700 metres east of Elidir Fawr peak at an altitude of about 2,500 feet. At about 0945 hrs they heard an aircraft approaching from a roughly southerly direction. The weather conditions were poor with a strong wind and reduced visibility in hill fog and light rain. Not long after the noise of the aircraft passed them, the engine noise suddenly increased and then ceased abruptly accompanied by the sound of something hitting the ground. The walkers telephoned the police and reported what they had heard.

The police started making enquiries to determine if an aircraft had been reported overdue. However, the pilot had not filed a flight plan and although he had spoken with the Caernarfon Airport manager

he had not stated his intention of flying to Caernarfon that morning. Some time later a business man, who was scheduled to meet the pilot, arrived at Caernarfon Airport and the airport manager became aware of the flight. This information was passed to the Rescue Co-ordination Centre (RCC) and their enquiries revealed that an aircraft had spoken to Liverpool en route to Caernarfon. At 1130 hrs the RCC requested examination of radar recordings and these showed that the aircraft had disappeared from radar in the Llanberis area of Snowdonia. A rescue helicopter was scrambled but was unable to reach the estimated crash position due to poor weather. The wreckage was eventually located at 1435 hrs with the pilot trapped inside seriously injured but conscious. Several hours later the pilot was freed from the wreckage and taken to hospital.

Accident Site

The aircraft had struck the ground approximately 85 metres from the summit of Elidir Fawr, on a heading of about 250°. The initial impact was to the left and front of the aircraft, the force of which caused the propeller to become detached and the tail section of the aircraft to twist to the left. This caused damage to the tip of the left horizontal stabiliser when it struck the ground and the aft structure on the right of the airframe to tear. However, the tail remained attached to the fuselage by flying control cables and the intact structure on the left of the fuselage. G-BOCC had then continued up the slope of the hill, toward the summit, and after travelling about 20 metres the right main landing gear failed rearwards. During this sequence the nose landing gear also failed and the aircraft rotated to the left through 90 degrees before coming to rest some 30 metres from the first impact with the hill.

Detailed Wreckage Examination

The AAIB salvaged the aircraft and took it to Farnborough for a detailed examination. The engine was found to be free to turn and the nature of the damage to the propeller blades indicated that the engine was under power at the time of the accident. Further examination of the engine did not reveal any pre-existing defects. Both fuel tanks were empty and the fuel lines in the wing roots and around the engine were damaged and holed, consistent with being caused by impact forces. This damage would have led to a complete fuel loss at the accident site. Examination of the flying controls revealed no evidence of pre-accident defects.

Impact forces had caused the left instrument panel to distort and the glass of the turn and slip and horizontal situation indicator to shatter. There were no other apparent defects with the remaining instruments. The barometric setting of the altimeter was found set to 1010 mb.

G-BOCC was equipped with four point harnesses. The attachment of the pilot's harness to the fuselage mounting points was still secure, with no visible defects to the harness webbing or its locking mechanism.

Pilot's flying experience

The pilot started training to obtain a Private Pilot's Licence in June 1997 and successfully completed the course in May 1999. In January 2000 he started training to obtain an IMC rating, but he stopped this training in January 2001, after 20 hours of instrument flying training. Almost all his flying had been from Tollerton in PA-38 Tomahawk or PA-28 Cherokee aircraft.

Meteorological information

An Aftercast issued by the Meteorological Office for 0600 hours on 10 July, showed a weak cold front moving into the western areas of England and Wales. Some very moist air was affecting the western side of Wales. The weather was CAVOK at Tollerton but, between Tollerton and Snowdonia, scattered or broken clouds based 2,500 to 3,000 feet were forecast and further west the cloud was forecast to become broken or overcast at 400 feet. In the Snowdonia area the cloud was forecast to be on the hills. Since Caernarfon Airport does not have a qualified Meteorological

Observer, detailed information on the Caernarfon weather was not available, but RAF Valley 12 miles to the north-west, had broken clouds at 400 feet with visibility temporarily reducing to 1,500 to 2,000 metres and the cloudbase lowering to 100 feet. The Holyhead Regional Pressure setting passed to the pilot by Liverpool ATC was 1010 mb. The temperature at 3000 feet was such that at cruise power settings there would have been a moderate risk of carburettor icing in cloud.

Flight planning

The majority of the pilot's cross country flying experience had been within the Midlands area, and after the accident he reported that he was in the habit of telephoning his destination to check the weather. He did not always refer to forecast or actual information provided by the Met Office.

Section ENR 1.10-Flight Planning of the UK Aeronautical Information Publication (AIP) outlines the requirements for filing flight plans. Para 1.4.4 states:

It is advisable to file a flight plan if the flight involves flying over the sea, more than 10 nm from the UK coastline, or over sparsely populated areas where Search and Rescue operations would be difficult.

The CAA's Safety Sense Leaflet 5D, *VFR Navigation* states:

If the weather deteriorates, don't press on - turn back or divert. Don't be lulled into a false sense of security by still being able to see blue sky. Stay within your licence privileges and your current capabilities.

Discussion

The pilot's inability to recall the flight is not unusual after the trauma of an accident, but this meant that the investigation had to rely only on the relatively small amount of firm evidence available. The engineering examination found no fault with the aircraft that might have caused the accident. Moreover, the evidence from the hill walkers that they heard the engine running just prior to hearing the impact, also makes it improbable that there was a serious engine problem. On the other hand, it has been impossible to rule out a reduction in power caused, possibly, by carburettor icing. The fuel on board prior to departure should have been more than sufficient for the planned flight and, although no fuel was found in the fuel tanks after the accident, it seems unlikely that lack of fuel was a factor. However, the fact that the hill walkers were in cloud and rain less than a kilometre from the accident site suggests that the aircraft was in cloud just before it hit the mountain.

The reasons why the aircraft might have entered IMC cannot be ascertained with any certainty. The fact that the aircraft first descended from 4,000 feet to 3,000 feet whilst flying toward ground higher than 3,000 feet amsl suggests that the pilot encountered a lowering cloud base and was trying to stay clear of cloud. The subsequent turn to the north recorded by the GPS receiver, tends to support this view, but the climb back to 3,800 feet and the resumption of a more or less westerly track, and the subsequent, possibly controlled, descent into the terrain, is not so easily explained. If the assumption is made that the pilot was successful in maintaining VMC after the turn on to north, then the resumption of a westerly track suggests that there were at least some clear areas in the weather ahead. The slight left turn at impact, derived from examination of the wreckage, may indicate that the pilot had inadvertently entered cloud and was attempting a turn back toward clearer weather. Given that there was a GPS receiver on board fitted with a moving map display, it seems unlikely that the pilot would have been uncertain of his position, although the GPS map did not depict terrain.

The poor weather over the mountains and in West Wales generally had been forecast. Whilst it is possible that the pilot obtained weather information from another source, the only evidence of his checking the weather is the phone call to Caernarfon Airport before he left his place of work. Given that the pilot chose to fly his fair weather, direct, route it seems unlikely that he was aware of the poor weather over the mountains, and that he had based his decision regarding the suitability of the destination weather only on his phone call.

The AIP entry for Caernarfon Airport shows that it does not offer meteorological services and therefore pilots planning to land there must use the information from en-route forecasts and meteorological actual reports and forecasts from nearby, larger, airports to determine if the weather is likely to be suitable. It is reasonable, however, for a pilot to call the airfield to get an unofficial view of the weather conditions from someone 'looking out the window' but the limitations of such a source must be recognised, even if it comes from an apparently reliable source such as ATC. The information must be used in conjunction with other, official data to achieve a complete picture of the likely weather conditions.

Given the apparently controlled flight into remote, mountainous, terrain, the pilot's survival is remarkable. The prompt action by the hill walkers and the rapid and effective response by the Distress and Diversion cell, the Rescue Co-ordination Centre and all those involved in the search and rescue were major contributors to the pilot's survival. Nevertheless if a VFR flight plan had been filed in accordance with AIP advice, overdue action would have been taken 30 minutes after the scheduled ETA at Caernarfon and this would probably have reduced time spent in locating the aircraft.