PA-28-161, G-BSPZ

AAIB Bulletin No: 1/97 Ref: EW/C96/10/3 Category: 1.3

Aircraft Type and Registration:	PA-28-161, G-BSPZ
No & Type of Engines:	1 Lycoming O-320-D3G piston engine
Year of Manufacture:	1985
Date & Time (UTC):	16 October 1996; at approximately 1305 hrs
Location:	18 nm North West of Perth, Scotland
Type of Flight:	Private
Persons on Board:	Crew - 1 - Passengers - 1
Injuries:	Crew - Fatal - Passengers - Fatal
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence
Commander's Age:	68 years
Commander's Flying Experience:	473 hours (of which 95 were on type)
	Last 90 days - 12 hours
	Last 28 days - 3 hours
Information Source:	AAIB Field Investigation

History of the flight

The pilot had planned to fly from Edinburgh Airfield to PerthAerodrome with his wife as a passenger. The weather forecastwas for isolated rain showers with associated hill fog, with goodvisibility away from the showers and a moderate southerly wind. At about 1200 hrs, prior to departure, the pilot madea telephone call to Perth to confirm the weather details and wastold that there was light rain with a cloudbase of 2,000 feet,the visibility was 30 km and the surface wind was estimated at160º/10 kt. Before take-off the pilot copied the latestweather at Edinburgh which was reported as: recent rain showerswith a few clouds at 1,400 feet, scattered cloud at 1,800 feetand broken cloud at 4,500 feet, the surface wind was 140º/15kt with the direction variable between 100º and 190ºand with gusts to 25 kt, the QNH was 993 mb

The pilot was cleared for a 'Kelty' departure and took off at1242 hrs from Runway 08 at Edinburgh. The Kelty departure isthe normal visual routing for aircraft leaving Edinburgh whenclearing to the north. At 1248 hrs the pilot reported overheadKelty, he was then instructed to call when leaving the

controlfrequency. At 1250 hrs he told Edinburgh ATC that he was leavingthe frequency and would now call Perth. He told Perth that hewas at Kinross (a prominent feature 15 nm south of Perth) at 2,000feet, estimated arriving at Perth in 15 mins and requested anupdate on the weather and the runway in use. He was told thatthe weather conditions were as briefed at 1200 hrs and that Runway16 was in use: the pilot acknowledged this message.

At about 1320 hrs the airfield manager at Perth attempted to callG-BSPZ by radio. He also contacted the local ATC agencies andairfields, but discovered that no one had spoken to that aircraft. He then informed Edinburgh ATC that the aircraft was overdue. The Rescue Co-ordination Centre at RAF Kinloss initiated overdueaction at 1339 hrs and a search and rescue operation commenced. After an extensive search of the expected route from Kinrossto Perth and the surrounding area, the two rescue helicopterswere sent to an area 15 nm to the northwest of Perth followingan analysis of radar returns that might have been from the missingaircraft; the wreckage was found in that area, in remote and hillycountry, at 1724 hrs.

Analysis of recorded secondary radar data from the radar headat Lowther Hill, in Dumfries and Galloway, confirmed that initiallythe aircraft had followed a ground track entirely consistent withthe Kelty departure from Edinburgh Airport and then a direct routeto Perth Aerodrome. However, at 1253 hrs, when 8 nm from Perthon a bearing of 200º and at 2,200 feet amsl, the aircraftturned left onto a track of 308º. This track was maintaineduntil 1257 hrs when the radar return faded from radar cover. From Mode C information the aircraft appears to have maintainedan altitude of between 2,200 feet and 2,400 feet amsl over groundthat is generally 300 feet to 400 feet amsl and in an area thatwas reported to be clear of significant cloud. No further radarreturns from this aircraft were then displayed until 1302 hrswhen a single return appeared as a direct continuation of theprevious track and having apparently maintained a constant groundspeed. It was then at an altitude of 2500 feet amsl. The positionof this single, final return was within 2 nm of the crash sitewhich was on a further continuation of the aircraft's track.

The aircraft had struck the side of a hill at an altitude of 2300feet; much of the surrounding high ground was above 2,000 feetand a spot height of 2,641 feet was less than a quarter of a milefrom the wreckage. The immediate area had been in cloud for mostof the day and throughout the afternoon there had been prolongedheavy rain with the cloud base approximately 500 feet below thelevel of the crash site.

Other pilots who were in the area at about the same time reportedthe cloud base between Edinburgh and Perth as 2,200 feet withexcellent visibility such that Kelty was clearly visible whilstclimbing out from Perth. They also commented on the heavy showersvisible over the hills to the north west (the area of the crashsite) and the Ochill Hills (to the west of Kinross).

Pilot Experience

The pilot had obtained his Private Pilot's Licence in 1982 whilsta member of the Dundee Fying Club. His subsequent flying wascarried out in light, single-engine aircraft, mainly within Scotland. In February 1996, after completing an approved course of instrumentflying, he gained a CAA rating which provided him with a limitedability to fly on instruments in poor weather (IMC Rating). He had flown between Edinburgh and Perth many times, including15 times in the previous 3 months, and he reportedly knew thelocal area very well.

Pathology

Post mortem examination of the pilot did not reveal any medicalcondition which was likely to have contributed to the accident.

Impact Parameters

The aircraft had crashed, at an altitude of 2,300 feet, into risingground that was covered with heather and strewn with rocks atposition 56° 31'N, 003° 52.5'W, approximately 1 mileSW of Lock Freuchie. At the point of impact there was an upslopeof some 15°, with no cross-slope, and analysis of the impactground marks suggested that the aircraft had been in controlledflight, with the wings level and the nose in a slightly high attitude,immediately prior to striking the ground. There was clear evidencefrom damage sustained by the fixed pitch propeller that it hadbeen rotating under a reasonably high power level and analysisof several propeller slash marks in the ground at the point ofimpact, suggested that the aircraft's ground speed had been inthe region of 135 kt If the likely tailwind is taken into accountthen this speed equates to an airspeed of approximately 110 kts. Just prior to striking the ground the aircraft had been on atrack of 310°M, a track that would have taken the aircraftover a ridge some half mile before the point of impact, and whoseelevation was the same as that of the accident site.

Wreckage Examination

Examination of the wreckage at the site, and later after its recoveryto the AAIB at Farnborough, indicated that the aircraft had beencomplete and intact prior to the accident, and was configuredwith the flaps fully retracted and with both the cabin and baggagedoors closed. Albeit shattered, the windscreens were recoveredand showed no evidence of impact with any bird. The collisionwith the rising ground had torn away the landing gear, the undersideof the fuselage and cabin floor back to a position just forwardof the tailplane, and ruptured both wing fuel tanks. There wasevidence of damage to surface vegetation from fuel splashing alongthe wreckage trail but there had been no fire. Refuelling recordsfor the aircraft showed that it had taken on 81 litres of AVGAS100L two days before the accident, resulting in full tanks (givingapproximately 4 hours duration) immediately following which itmade one flight of 40 minutes duration. The aircraft crashedon its next flight, two days later. Subsequent to the initialimpact, the aircraft tumbled over the ground for 350 feet, sheddingvarious airframe and engine components, before coming to reston fairly level ground, with the airframe broken into severallarge elements all loosely attached by sections of skin and wires. Both front seats had broken free from the cabin floor, but remainedwithin the fuselage, and the engine, firewall and instrument panelhad stayed together as a unit. Owing to the absence of a postimpact fire, it was possible to examine the aircraft's engine,instrumentation and flight controls, fuel and electrical systems. This examination did not reveal any pre-accident defects thatmight have relevance to this accident. It was noted, however,that the carburettor air heat control was set at 'Cold' and pitotheat selector switch was 'Off', although a functional check ofthe pitot heater showed it to have been serviceable.

All of the radio/navigation equipment and the flight instrumentswere removed and taken to an overhaul agency for inspection and,where possible, test. Here it was established that the artificialhorizon, direction indicator, altimeter, airspeed indicator andvertical speed indicator were all serviceable prior to the accident,all of these instruments performing within, or very close to,the normal requirements for accuracy. The aircraft was fittedwith dual VHF radio/VOR units, and single ADF, DME and transponderunits. All were found selected to ON. These were functioned,together with their indicator units where appropriate, with nosignificant defects being found. All these units had incandescenttype display panels and required electrical power to produce anindication of the selected frequency. These frequencies are retainedin a memory when the unit is

unpowered and thus, after loss ofelectrical power during the impact sequence, any rotation of theselector knobs on these units should not have changed the lastselected frequency. The last selections determined were as follows:-

Active, MHz Standby, MHz

Radio 1 119.8 Perth TWR 121.2 Edinburgh APP

Radio 2 132.075 Edinburgh ATIS 120.6 Cumbernauld TWR

Nav 1 110.4 Perth VOR (OBS set 035°) 108.9 Edinburgh ILS

Nav 2 112.5 St Abbs Head VOR 110.4 Perth VOR

(OBS set 310°)

DME 117.9 Mayfield

ADF 341 KHz Edinburgh - EDN 368 KHz Edinburgh - UW

The transponder was selected to code 7000, with mode C selected,and radio unit No 1 was the active unit. The 310° selectedradial from the St Abbs Head VOR passes very close to the siteof the accident, and also closely paralleled the aircraft's radartrack from 8 nm south of Perth towards to point of impact.

Aircraft Documentation

The aircraft was registered in the Transport Category (Passenger)and was being flown to Perth for maintenance, specifically fora 100 hour/62 day check, in accordance with the CAA agreed manufacturer'smaintenance schedule. The aircraft's documentation was examinedand found to be in order with the following minor exception thatthe previous maintenance check had been carried out 64 days priorto the date of the accident. No evidence, however, was foundto suggest that this two day exceedence of the calendar maintenanceperiod was a factor in the accident, further more the aircrafthad not flown on the day preceding the accident flight. The aircraft'sCertificate of Airworthiness was valid, and due for renewal by25 October 1996.