

No: 2/91

Ref: EW/C1179

Category: 1c

**Aircraft Type and Registration:** Partenavia P68B, G-BMCB

**No & Type of Engines:** 2 Lycoming IO-360-A1B6 piston engines

**Year of Manufacture:** 1978

**Date and Time (UTC):** 20 October 1990 at 0332 hrs

**Location:** 2 nm from East Midlands Airport

**Type of Flight:** Public Transport (positioning)

**Persons on Board:** Crew - 1      Passengers - None

**Injuries:** Crew - Fatal      Passengers - N/A

**Nature of Damage:** Aircraft destroyed

**Commander's Licence:** Commercial Pilot's Licence with Instrument rating

**Commander's Age:** 24 years

**Commander's Total Flying Experience:** 926 hours (of which 304 were on type)

**Information Source:** AAIB Field Investigation

### History of the Flight

The aircraft was used primarily to service a regular night freight contract between East Midlands and Dublin airports. The operating company's main base was at Manchester and the aircraft was positioned without payload between East Midlands and Manchester airports before and after the revenue flights. The schedule, which comprised four sectors and was self-handled throughout, was normally flown single-crew IFR over a seven hour duty period. Under Article 19 of the ANO, single crew IFR operation was permitted because the aircraft was fitted with a CAA approved autopilot system (which included the vacuum driven artificial horizon and electrically powered HSI).

The commander had qualified for his commercial pilot's licence and instrument rating through a CAA approved course which he completed in February 1988. He converted to the P68 in May 1990 and had flown the schedule some 60 times before, including the three previous nights.

After an apparently undisturbed rest period of approximately 17 hours and a meal eaten at home, the commander reported for duty at about 2040 hrs and self-briefed for the schedule. The flight to East Midlands airport was uneventful and there the commander embarked freight and one passenger who occupied the co-pilot's seat and was to remain with the aircraft for the return flight to East Midlands.

The aircraft departed for Dublin at 2313 hrs and both the outward and return flights progressed normally. En-route the commander and his passenger drank coffee from a flask and the commander ate a snack. The commander regularly checked for ice formation on the engine intakes using a torch but no ice was seen and the de-icing systems were not used. On the approach to East Midlands airport, where the weather was misty with extensive low cloud, the commander was given radar vectors for an ILS approach to runway 27 which he flew manually. During the approach, the passenger observed only minor deviations on the ILS localiser display and saw little of the ground beneath the aircraft until it crossed the outer marker beacon 4.3 miles from the runway threshold. Visual contact with the approach lights was achieved close to decision height and the aircraft landed at 0241 hrs. After shutting down on the main apron the commander and his passenger cleared customs and the passenger departed. The commander then taxied the aircraft from the apron to the maintenance area where the cargo was unloaded.

At 0327 hrs the commander requested clearance to taxi from 'the hangar' and clearance was given to taxi to holding point ALPHA (by runway 27 threshold). About one minute later, whilst taxiing, the commander asked for permission to take off from point CHARLIE (the runway intersection opposite the main apron) and declared that he would be ready for departure on reaching that point. ATC clearance was given to enter the runway at CHARLIE and to line-up pending clearance to take-off. The taxiing pattern from the maintenance area to line-up at CHARLIE involved at least four turns through 30 deg or more and the aircraft covered the 1000 metres distance in less than three minutes without stopping.

As the aircraft approached CHARLIE, departure clearance was given by the aerodrome controller which the commander read back correctly. The clearance required a right turn towards the DAYNE reporting point and included permission to take-off. A weather observation made 5 minutes later recorded the following parameters: surface wind 120/05; visibility 1200 metres in mist; RVR in excess of 1100 metres; 6/8 stratus at 200 ft and 8/8 strato-cumulus at 2000ft; temperature +13; dewpoint +12 and QNH 1012 mb. Given the emergency distance available from the CHARLIE intersection, the company's operations manual permitted take-off in these weather conditions. As soon as he had read back the ATC clearance, and without completing stationary engine power checks, at 0331:15 hrs the commander began the take-off roll. The aerodrome controller observed the aircraft get airborne after a ground roll of around 750 metres and disappear into the cloud/mist shortly afterwards. An eyewitness who lived locally and was driving his car in a south-westerly direction from Castle Donington village towards the extended centreline of runway 27, saw a single white light from an aircraft traverse his windscreen from left to right and then turn to its left at a height he considered to be lower than normal for departing aircraft. The SSR at Clee Hill, some 50 miles distant, recorded modes A and C responses from the aircraft's transponder at 0330:57 and twice more at 8.33 second intervals. The mode C responses were FLs 006, 007 and 006 respectively which corresponded to heights above the airfield datum of 260, 360 and 260 ft, all to a tolerance of  $\pm 50$  ft. Calculation of the aircraft's average speed over the 16.6 seconds between the first and last SSR responses results in a groundspeed of 108 kts but the true speed may have been between 81 and 131 kts due to the range discrimination tolerance of the SSR system. Vmca and the flaps-up stalling speed for the P68 are below 81 kts and all 3 returns lay on a straight track of 239°T.

Two road tanker drivers who were travelling north-east along the A453 about 2 miles from the airport saw the wing tip navigation lights of an aircraft directly ahead of and coming towards them. The lights appeared to be losing height rapidly and moving laterally in a manner which one driver described as being similar in speed and amplitude to children on a see-saw. The driver of the leading tanker heard the roar of the aircraft's engines as it passed low and close to his overhead. The driver of the second tanker saw the aircraft on a collision course with his vehicle and then turn to its right shortly before he ducked his head. The aircraft passed to the left of the tanker and the driver heard a loud thud; on looking in his driving mirror he saw an explosion which lit up the sky. The second driver has stated that a few seconds elapsed between his first sighting of the lights and the explosion, and during that time the wings dropped alternately as the aircraft rapidly lost height. The emergency services were alerted by the drivers and the fire was extinguished by appliances from the local authorities and the airport. Post mortem examination of the commander revealed no pre-existing medical condition which would have contributed to the accident.

Examination of the wreckage showed that the aircraft had struck the ground in a shallow dive, on a heading of 241°(M), with the right hand wing slightly low, and with a fairly high rate of descent. Both engines had been producing power at impact. The propellers both left ground marks which, assuming 2500 propeller rpm, indicated a groundspeed in the region of 160 kts. The aircraft had disintegrated in the primary impact, with the wreckage coming to rest some 80 metres further on, and the commander himself was thrown a further 60 metres. The wreckage was recovered to Farnborough for detailed examination. The investigation has shown that the aircraft was complete at impact, and no malfunction of the flying controls, propellers or engines has been identified. The turn coordinator, vacuum pumps and all the components from the vacuum system were inspected and no pre-existing defect was found. The artificial horizon, which was the only one fitted to this aircraft, was stripped with the assistance of the manufacturer's agent. It was found to be very heavily corroded internally and to have suffered from thickening of the stearate based grease used during assembly. Analysis has shown that the corrosion was probably due entirely to the ingress of water and foam on the accident site but the thickening of the grease is a known characteristic of stearate based lubricants and is judged to be a long term feature. Either defect could have increased the instrument's required erection time.

During the investigation it was established that the vacuum system had stood with water in the inlet filter on at least two occasions, although no other component in the system exhibited significant corrosion. Also, the aircraft type has a history of horizon problems due to corrosion and water in the vacuum system. Another P68B was used for ground and flight tests during which it was established that the type of artificial horizon fitted to MCB was capable of erecting satisfactorily when taxiing was commenced immediately after starting engines. Thereafter, it remained erect whilst taxiing around several turns at idle engine rpm. On test the instrument is required to achieve full speed and erection in not more than three minutes with normal vacuum; this is equivalent to the time taken by MCB to taxi from the hangar and commence take-off. However, the aircraft used for the tests had a relatively new artificial horizon fitted; the previous instrument had been removed due to a tendency to precess during turns on the ground unless allowed an excessive erection time prior to taxiing. A strip report for this instrument was obtained from the overhaul agency which indicated that internal corrosion and

deterioration of the lubricant had been found which was similar to that found in the instrument fitted to MCB.

The commander had not been required by regulations to demonstrate 'partial panel' IF ability since passing the CPL general flying test at his training college. Moreover, the type of turn coordinator fitted to MCB, which had a moving horizon display, was subtly different to the needle types fitted to the training college's fleet. Recommendations have been made to the CAA that UK registered aircraft flying for the purpose of public transport under IFR should be fitted with at least 2 gyroscopic bank and pitch indicators with separate or duplicated power supplies.