

**Aircraft type and registration:** Piel Emeraude CP301A G-BHLV

**No & Type of engines:** 1 Rolls Royce 0-200A piston engine

**Year of Manufacture:** 1957

**Date and time (UTC):** 6 September 1987 at 1337 hrs

**Location:** 50m west of the western boundary of Perth (Scone) airfield, Scotland

**Type of flight:** Private

**Persons on board:** Crew — 1                      Passengers — 1

**Injuries:** Crew — 1 (fatal)                      Passengers — 1 (fatal)

**Nature of damage:** Aircraft destroyed

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 39 years

**Commander's Total Flying Experience:** 55 hours (of which 1.55 mins were on type)

**Information Source:** AAIB Field Investigation.

The aircraft was owned by two pilots, one of whom was flying it when the accident occurred. They had bought the airframe at the end of 1986 and the engine had been removed and sent for shock-load inspection, following a minor accident which prompted sale of the aircraft. When the engine was returned, it was re-fitted mainly by the co-owners.

The aircraft was of a type operated under the rules of the Popular Flying Association (PFA), a body approved by the Civil Aviation Authority to recommend the issue of Permits to Fly.

During the period that the aircraft was grounded, following the minor accident, the previous existing Permit to Fly had lapsed. Accordingly, the airframe was inspected by a PFA approved inspector both for the effects of any damage and for the issue of an Annual Check Certificate. He completed and certified the airframe checks and drew the attention of the owners to the fact that the engine was a CAA approved type which was required to be maintained in accordance with CAA procedures.

It was therefore decided to enlist the assistance of an engineer with CAA licence coverage appropriate to the engine. This licenced engineer completed his inspection of the installation and appropriate engine runs on 5 September 1987, certifying this work, and the first of the Duplicate Inspections of the engine controls, in the engine log book. He also annotated the log book with a space for the second of the Duplicate Inspections, and pointed out to the owners that the work was not complete until the second of these Inspections had been carried out by a suitably qualified person.

Meanwhile the PFA inspector, who had been informed by the pilot that the CAA licensed

engineer was due to finalise the engine documentation on 5 September, issued a Certificate of Fitness for Flight valid from this date to 11 September. This document, subject to the completion of the engine documentation, permits the aircraft to be test flown by a suitably experienced pilot. Such a flight test is required before a Permit to Fly may be issued but the Certificate of Fitness to Fly is valid for only a single flight.

Prior to this certification, the subject pilot had agreed that the other owner should carry out the airtest as he had considerably more flying hours, a lot of them on tailwheel aircraft. However, at lunchtime on Saturday 5 September, being unable to find anyone to accompany him, as is recommended, the subject owner decided to fly the flight test solo.

Accordingly, he started-up the aircraft and, following a comprehensive engine run, taxied out to runway 28. Having selected one 'notch' of flap and ensured full engine response, he then took off. The wind at that time was approximately down the runway and the cloudbase has subsequently been estimated as 2-3000 feet. This cloudbase would have been likely to prevent certain parts of the flight test being achieved, and the partially completed flight test schedule found in the aircraft wreckage following the flight on Sunday, suggest that it did. Nevertheless, the flight was conducted apparently without significant event, and that evening the pilot reported, during a conversation with the co-owner, that the aircraft had climbed at only 300 feet/min until the flap was raised, but that it had then assumed a more normal climb of around 800 feet/min.

Runway 28 is 609 metres long and 300 metres beyond the end is a substantial pine wood. Beyond the wood lies the Tay valley and, in conditions of strong wind from the south west, this combination produces very severe turbulence over the trees.

The following day, Sunday 6 September, the pilot returned to the airfield to continue the flight test, on this occasion with a colleague who was to fly with him, presumably as an observer. As one flight had already been undertaken, this flight was not covered by the Certificate of Fitness for Flight and a new one had not been issued.

When they boarded the aircraft and started up, the wind at Scone was 220°, 20 gusting 27 kt. The aircraft taxied out to runway 28, rather than the available runway 22 and, again following extensive engine checks and the selection of one 'notch' of flap, began the take-off run. On this runway, the cross-wind component was 17 gusting 23 kt.

Because the Emeraude has a steerable tailwheel and poor rudder response at low speed it is customary, when taking off in a crosswind, to hold the tailwheel on the runway to assist with directional control, until sufficient speed is attained to ensure positive aerodynamic control. This normally occurs significantly before the scheduled take-off speed. However, although the entire take-off run was seen to have been performed with the tailwheel on the ground, it is unlikely that the tailwheel steering alone would have been able to cope with the prevailing wind conditions. This suggestion is supported by the fact that intermittent skid marks were found on the north side of the runway. Although it cannot be stated that they were definitely made by this aircraft on this particular day, their characteristics would be difficult to attribute to any cause other than an effort to keep the Emeraude straight by use of differential braking.

Despite the fact that differential braking was probably used, and the entire take-off run performed in the three point attitude, the point at which the aircraft lifted off the ground approximately coincided with the 250 metre ground-run suggested by the only performance figures available. Following take-off, the same attitude was maintained whilst the aircraft climbed to 100—150 feet. The nose was then seen to drop, although never to less than 2° nose-up, and a significant sink rate was established. The nose was then raised as the aircraft passed over the edge of the trees where, in severe turbulence, the nose fell sharply, the right wing dropped and the aircraft fell, displaying classic stall characteristics, into the trees. Several witnesses state that the engine note remained constant from the start of the take-off run until the aircraft disappeared into the trees. Although only circumstantial, the reported conversation about climb rates with and without flap on the previous flight suggests that the observed sink rate probably coincided with retraction of the flap selected for take-off.

Although the impact did not result in fire it nonetheless destroyed the aircraft. Examination of the wreckage did not reveal any evidence of pre-impact failure within the aircraft and it appeared that the flaps were fully retracted at impact. All connections in the engine controls were found to have remained secure.

A strip examination of the engine did not provide any evidence to indicate that the engine was unable to produce its rated power output. However, the material of the propeller and the nature of the multiple impact made it impossible to establish reliably the presence, or otherwise, of power at the time of the first impact.