

No: 10/86

Ref: 1b

Aircraft type and registration: Cessna F150M G-BEYM

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

Year of Manufacture: 1976

Date and time (UTC): 10 September 1986

Location: Norwich Airport, Norfolk

Type of flight: Display rehearsal

Persons on board: Crew — 1 Passengers — None

Injuries: Crew — 1 (fatal) Passengers — N/A

Nature of damage: Aircraft destroyed

Commander's Licence: Air Transport Pilot's Licence

Commander's Age: 33 years

Commander's Total Flying Experience: 7472 hours (including a substantial number on type)

Information Source: AIB Field Investigation

The aircraft was one of 3 that were flying a rehearsal for a forthcoming display. The weather was good with a surface wind of 040°/8 knots, 2 oktas of cumulus at 2000 feet and 3 oktas of stratocumulus at 3500 feet. The pilots were familiar with the display routine, and had practised it several times since it had first been developed more than a year ago. The routine included an item described as a "fast and low pull up into spin and recover". It was later stated by one of the display pilots that the pull up was usually to about 800 feet and that only 200 feet of height was lost in the spin. The Flight Manual for the aircraft states that 1000 feet of altitude loss should be allowed for a one turn spin and recovery.

On the day of the accident one complete rehearsal was flown in mid-afternoon, and recorded on video film. The pilot studied the film after landing, made some minor adjustments to the routine, and took off again in late afternoon for a second rehearsal. During the pull up and spin manoeuvre the aircraft recovered from the spin after little more than half a turn but failed to pull out of the ensuing dive before striking the ground.

Examination of the ground marks showed that G-BEYM had struck the ground with wings almost level and on a heading of 110°M; it slid forward some 40 feet and came to rest inverted. The pilot was found to be secured in a 3-point harness which was properly adjusted and secured. The damage to the propeller indicated that it was rotating at impact but under low power; this was consistent with the position of the throttle control which was found to be at mid-travel at the moment of impact.

Examination of the wreckage showed that the flying-control system had sustained several failures but they were all attributable to the break-up of the aircraft and there was no evidence of

any pre-existing defect. It was not possible to determine the position of the ailerons or rudder at impact; however, the damage to the controls in the cockpit area indicated that full, or nearly full, aft pitch control was being applied and that there was a neutral setting on the elevator trim tab.

Analysis of the video recording revealed significant differences in the behaviour of the aircraft on the first and second rehearsals of the spin manoeuvre. On the first occasion the aircraft approached along the 09 runway, pulled up and executed a stall turn followed by a downward aileron turn through 180° before recovering to level flight at a height of approximately 170 feet above the ground, again heading along the 09 runway. The pitch attitude of the aircraft changed from 80° nose down at the start of the aileron turn to approximately 50° nose down by the time the turn was stopped. On the second occasion, the stall turn appeared to be flown more slowly and at the top, when the wings were vertical and the fuselage horizontal, the nose of the aircraft moved sharply away from the inside of the turn, as if the pilot had pushed the control wheel forward. After the stalled turn, with the aircraft descending vertically, its pitch attitude was seen to change positively to about 70° nose down before rotation of the wings began, and rotation continued through about 210°. The pitch attitude of the aircraft steepened to just beyond the vertical during the first 120° of rotation and did not change positively again until the spin stopped at about 300 feet above the ground. At 160 feet the nose down pitch had reduced to 65° and further reduced to about 22° before the aircraft struck the ground. At impact the aircraft's velocity was approximately 85 knots along a line about 35° below the horizontal.

There was no evidence that the pilot had any medical condition that might have contributed to the accident.