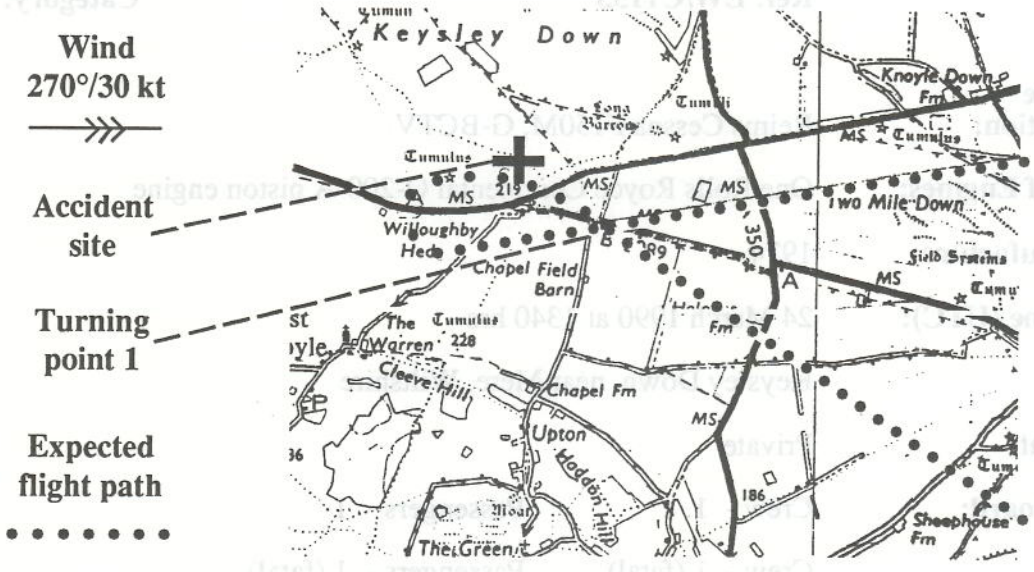
No: 6/90 **Ref: EW/C1153** **Category: 1c**

Aircraft Type and Registration:	Reims Cessna F150M, G-BCTV
No & Type of Engines:	One Rolls Royce Continental O-200-A piston engine
Year of Manufacture:	1974
Date and Time (UTC):	24 March 1990 at 1340 hrs
Location:	Keysley Down, near Mere, Wiltshire
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 with night rating and instrument rating
Commander's Age:	51 years
Commander's Total Flying Experience:	1430 hours (of which at least half were on type)
Information Source:	AAIB Field Investigation

History of the flight

The aircraft was one of a number that had assembled that day at Old Sarum aerodrome for a practice day organised by the British Precision Flying Association. The association promotes and practices the skills of accurate flying and precise navigation. Its activities include navigation and spot landing competitions. On the day of the accident a cross-country route had been prepared and was being used for practice.

The weather was good with a strong westerly wind, estimated to be 270°/30 kt at 1,000 feet amsl. The route began near Boscombe Down and the first turning point was 14.3 nm to the west on a track of 262°T. The second leg left the turning point on a track of 125°T, requiring aircraft to change heading through approximately 137°. One minute was allowed on the flight plan for reorientation over this turning point, and it was customary for aircraft to use this time to turn the long way round and cross the turning point again close to the required outbound heading. On this day pilots could expect to perceive an increase in groundspeed of some 60 kt as they made this turn from into wind to downwind. A typical flight pattern is shown on the diagram below. It was usual for such routes to be flown at 1,000 feet agl at an airspeed which allowed for time to be gained or lost by changing speed, and for flap (or more flap) to be lowered when time had to be lost.



On the morning of the day of the accident the aircraft had been flown over the practice route by a member of the association, who stated that he had been perfectly satisfied with its behaviour and performance. He observed that the aircraft was considerably affected by turbulence in the strong wind.

After the aircraft had been refuelled another member of the association took off to fly the same route, accompanied by his son. This pilot was familiar with the route, having flown it in a previous competition. Witnesses who saw the aircraft near the first turning point described it as initially flying level towards the south-west at a height estimated variously as between 100 and 500 feet agl. One witness was impressed by the slow speed of the aircraft; he described it as appearing to be almost stationary, as if it could make no progress against the strong wind. It was then seen to bank to the right as if to begin a turn. The bank angle varied as if the wings had been caught by a gust of wind, and then the nose dropped and the aircraft fell rapidly to the ground.

There was no evidence of any medical condition that could have contributed to the accident.

Engineering investigation

Examination of the accident site showed that the aircraft had impacted the ground heading due east, with the nose pitched down approximately 50°, wings level, yawed slightly to the left and with a very small amount of rotation to the left. The wing flaps were in their retracted position when the aircraft hit the ground. Evidence from the propeller suggested that the engine was not producing much power at impact. There was no evidence that any part of the aircraft had been disrupted or had fallen away prior to the impact. A detailed examination of the flying control cables showed that the right aileron had been fully down at impact but there had been no pre-impact failure, disconnection or restriction. The elevator trim actuator was found to be at a slightly nose-down setting. Examination of the engine did not reveal any failures that would have resulted in a reduction or loss of power. The severity of the post-impact fire indicated that there had been a large quantity of fuel within the aircraft's fuel tanks.

Downwind turns

The Manual of the British Light Aircraft Centre describes the effects of downwind turns as follows:

> 'Just as movement due to the speed of the aircraft is more noticeable at low level, so are the effects of the wind upon that movement. When flying into wind and down wind the change in groundspeed can be seen quite clearly, giving the impression of a change in airspeed. The temptation to alter the power setting without reference to the airspeed indicator must be resisted, as a reduction of power when flying downwind, in the belief that the airspeed has increased, could lead to an inadvertent stall.'

The Royal Air Force Flying Instructors' Handbook suggests that demonstrations of this effect should be made to show how such turns may give a pilot the false impression that the aircraft is slipping into the turn and that its airspeed is increasing. Corrective action taken on these false impressions, such as raising the nose or reducing power, can lead to a drop in airspeed.

A relevant accident

The New Zealand Office of Air Accident Investigation in their report number 86-047 reported on a similar accident that occurred to a Cessna 152, which crashed whilst executing a turn to the left at low level with flaps set to 10 degrees. The following is an account of the flight tests carried out to reproduce the flight path of this aircraft.

Engine power was set to give 75 kt in straight and level flight. A left turn was commenced with 30° of bank and the bank angle was then increased abruptly to 60°. Engine power was increased to maintain 75 kt. The aircraft's nose was then raised above the horizon by application of top rudder. The airspeed decreased rapidly, though not to the point where stall warning was encountered. The rudder was then used smoothly to centralize the slip indicator. The nose settled somewhat below the horizon, then the aircraft rolled rapidly to the left. Immediate corrective action was taken at this point; the throttle was closed, back pressure on the control column was relaxed and full aileron and rudder was used to oppose the roll. The aircraft continued initially to roll left and adopted a steep nose-down attitude; the speed reached the flap limiting speed of 82 kt. The manoeuvre was repeated with identical results. In both manoeuvres a height loss of 250 feet occurred before the aircraft was recovered to level flight. The manoeuvre did not appear to be a flick roll, but rather a demonstration of yaw-roll coupling. The rate of roll, and the extent to which it continued after recovery action had been initiated, surprised the instructors performing the experiment.