No: 2/86 **Ref: EW/C931**

Aircraft type and registration:	Cessna U206 G-BDGL (light single engined fixed wing aircraft)	
Year of Manufacture:	1965	
Date and time (GMT):	8 September 1985 at 1500 hrs	
Location:	Great Coll Wood, Winterborne Zelston, Dorset	
Type of flight:	Private — parachute dropping	
Persons on board:	Crew — 1	Passengers — 5
Injuries:	Crew — 1 (Fatal)	Passengers — 1 (Fatal) 1 (Minor) 3 (None)
Nature of damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	39 years	
Commander's Total Flying Experience:	738 hours (of which 39 were on type)	
Information Source:	AIB Field Investigation.	

History of the Flight

The aircraft was regularly used for dropping sport parachutists. It was normally based at Thruxton aerodrome but on this occasion was operating from a grass strip some 2500 metres north of Bere Regis. It is from this strip that the recently formed Dorset Parachute Centre (DPC) operates. Parachuting operations began at about 1000 hours GMT on 8 September 1985, the aircraft having remained overnight at the strip. The four parachutists in the first "lift" were unable to drop due to the presence of low stratus cloud between 2000 and 3000 feet. Whilst flying overhead the Dropping Zone (DZ) and waiting for the low cloud to disperse, the pilot, who is also the Chief Engineer of the maintenance organisation which carried out the last 50 hour check on the aircraft, noticed a tendency for it to fly left wing low. He attributed this to unequal fuel distribution in the two wing tanks. Once the cloud had dispersed three static line drops were completed during the remainder of the morning, without untoward incident.

At about 1300 hours GMT the nominated Chief Pilot of the DPC took over the operation of "GL" from the previous pilot. Since there was no supply of aviation fuel at the DPC strip he flew the aircraft to Compton Abbas airfield, where it was refuelled with 20 US gallons which were evenly distributed in the two wing tanks. The aircraft left Compton Abbas at 1340 hours GMT and dropped three parachutists before landing back at the strip. A further "lift" of four free fall parachutists together with a jumpmaster were embarked and the aircraft climbed to 10,000 feet before the jumpers were despatched. During this climb the jumpmaster reports that the stall warning buzzer was in almost continuous operation as the aircraft climbed through 9000 feet. The aircraft landed at the strip once again and a lift of four student parachutists making their second static line jump, and a jumpmaster, who was a British Parachute Association Potential Instructor, were embarked. The aircraft took off at about 1500 hours GMT. Some DPC members

noticed a slight drop of the left wing as the aircraft cleared the boundary hedge. It climbed to an estimated height of 1000 feet heading in a north easterly direction. Four parachutes were seen to deploy in quick succession and the DZ controller, who was also the Club Chief Instructor (CCI), initiated emergency procedures for the recovery of the student jumpers.

Evidence from the student parachutists indicates that about one minute after take-off an aircraft emergency developed during the climb. The pilot was heard to shout "I've lost control". The jumpers were instructed by the jumpmaster to prepare for an emergency landing. They adopted crash positions as they had been trained. When the jumpmaster queried the height, the pilot said that he would try and get to a thousand (feet). He also ordered an emergency evacuation and was heard to say "you'll have to dump (or ditch) them".

The aircraft was able to climb to about 1000 feet and the jumpmaster briefed each student in turn, advising them to pull their reserve parachutes if the static line canopy did not deploy fully.

The student parachutists exited in quick succession. By this time the aircraft was losing height and was seen to bank to the right and then more steeply to the left. In this attitude it crashed into a large wood. The pilot and jumpmaster both sustained fatal multiple injuries.

Technical aspects

Examination of the wreckage showed that the aircraft had finally struck the ground in a near vertically banked attitude to port whilst descending on a flight-path inclined 45 degrees to the horizontal and travelling at considerable speed.

Further examination revealed that the aileron cable system was disconnected at a turnbuckle in the port wing. This turnbuckle consists of a turnbarrel connecting a pair of fittings mounted on adjacent ends of two control cables. Each end fitting is externally threaded with respectively left and right handed threads. These screw into the matching threaded ends of the turnbarrel in such a way that simply rotating the latter in one direction will tighten the control cables, and turning it in the other direction will slacken the cables until the end fittings disengage from the threads and the cables become disconnected.

Once the control system is correctly connected and its tension adjusted, all turnbuckles are required to be locked by means of wire passing through a hole in each end fitting and another hole in the turnbarrel. Neither the turnbarrel in question nor either of the corresponding end fittings had any locking wire attached when recovered. None of the engaging screw threads showed any sign of pre-impact damage.

A defect in the locking of another part of the aileron circuit adjacent to the disconnected turnbuckle was also noted. A split-pin intended to prevent slackening of a nut on a bolt securing the aileron balance cable to the aileron bellcrank was absent, permitting the nut to become partly unscrewed.

All other connections in the aileron cable system were examined and found to be correctly locked.

Examination of the aircraft's technical records showed that the machine had a valid Certificate of Airworthiness in the private category, last renewed on 10th September 1982. All subsequent inspections required to maintain the validity of that certificate had been carried out at the appropriate intervals. During the last Annual Inspection required under the conditions of the Certificate of Airworthiness, it was found necessary to replace four of the aileron cables. The records show that this work was carried out by an appropriately licenced aircraft engineer.

The records also show that the duplicate inspection, required when any dismantling and re-assembly is carried out on flying control circuits, was carried out on that occasion by another licenced aircraft engineer.

Since then, although certain other maintenance activities were carried out on the aircraft, including two required 50 hour checks, no inspection was required that would have necessitated gaining access to the area of the aileron turnbuckle in question or to the balance cable attachment found to be insecure. The technical records also indicate that no rectification work was carried out in that area.

The position of the turnbuckle in the aileron circuit was such that, once disconnected, all aileron control to bank the aircraft to starboard would be lost whilst all control to bank to port would be retained.

Although the aircraft can to some extent be controlled in roll by the secondary effect of rudder, the result of recovering from a bank to starboard by means of aileron control application would readily produce a roll to port too rapid to be arrested by rudder alone.

The final sighting of the aircraft appeared to be during a recovery from an involuntary bank to starboard. This recovery apparently produced an unchecked roll to port leading to the vertically banked attitude to port in which the aircraft finally struck the ground.

The lack of aileron control for rolling the aircraft to starboard would therefore account for this failure to stop the roll recovery at the wings-level attitude, and would permit the aircraft to continue rolling to port despite the pilot's efforts.

The disconnection of the aileron turnbuckle was clearly the result of rotation of an unlocked turnbarrel. The complete absence of any locking wire from any of the components of the turnbuckle, together with the absence of a split-pin from the adjacent bolted control cable attachment permitted this to occur.