

Pierre Robin R2160, G-VECB

AAIB Bulletin No: 9/2002	Ref: EW/C2001/12/1	Category: 1.3
Aircraft Type and Registration:	Pierre Robin R2160, G-VECB	
No & Type of Engines:	1 Lycoming O-320-D2A piston engine	
Year of Manufacture:	1996	
Date & Time (UTC):	28 December 2001 at 1614 hrs	
Location:	Goodwood Aerodrome, West Sussex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew 1 Fatal	Passengers N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilots Licence	
Commander's Age:	47 years	
Commander's Flying Experience:	166 hours (of which 14 were on type)	
	Last 90 days 3 hours	
	Last 28 days 0 hours	
Information Source:	AAIB Field Investigation	

On the afternoon of the accident, the pilot had booked an aircraft for a local flight from the club where he had recently undertaken a basic aerobatics course. He arrived at Goodwood with his partner shortly after 1500 hrs.

After a brief conversation with the Chief Flying Instructor (CFI), who was present in the clubhouse, the pilot went out to the aircraft, completed the pre-flight checks and started the engine. His partner remained inside the clubhouse. The time was by now 1551 hrs and the airfield ATC unit had closed for the day. Local standing arrangements were in place to allow aircraft to operate without an ATC service for certain types of flights.

The pilot made three radio calls to ATC, but was unable to get a reply as it was unmanned. He then shut down the engine and went back to the clubhouse to check with the CFI that he was using the correct radio frequency. By the time the pilot had returned to the aircraft, re-started the engine and made a 'blind' radio transmission indicating that he was about to taxi out, the time was 1556 hrs. Sunset that day was at 1603 hrs and, because the airfield had already closed, no airfield runway lighting was available. The aircraft had no serviceable landing light, as it had been temporarily

disabled following a recent bird strike. The pilot did not possess a night rating. Night time officially begins 30 minutes after official sunset time.

The aircraft took off from Runway 24 at 1559 hrs. The weather was good with a light westerly wind, good visibility and no significant low cloud. Runway 24 has a noise abatement turn to the right after take-off, and the aircraft was seen by a witness to make a steep climbing turn to the right once airborne.

A different witness then saw the aircraft performing a roll manoeuvre at an estimated height of around 1,200 feet. A further witness observed an aircraft, at about the same time, performing a roll manoeuvre close to Chichester. Whilst the witness could not identify the aircraft, subsequent study of recorded radar data indicated that no other aircraft were in the area at the time.

At 1607 hrs, the pilot made a 'blind' radio transmission on the Goodwood radio frequency, indicating that he would be making a fast approach to Runway 32. The aircraft was then seen flying along Runway 32 at approximately 150 to 200 feet, until it was about two-thirds of the way down the runway. It then made a steep climb to about 300 feet before making a tight right turn back over the airfield and heading off in a reciprocal direction.

Soon afterwards, the pilot again made a 'blind' radio transmission advising of another fast approach to Runway 32. The aircraft was then seen flying down Runway 32 at about 150 to 200 feet until it was approximately half way along the runway. It was then observed to carry out a rolling manoeuvre. During this manoeuvre, the aircraft's nose was seen to suddenly drop, the aircraft lost height and the right wing tip struck the ground. The nose was then seen to impact the ground with the aircraft skidding adjacent to the runway across the grass, coming to rest in an upright position but severely disrupted. There was no fire. On arrival at the wreckage location, the witnesses found the pilot's body in the main part of the wreckage. A post-mortem examination did not reveal any medical factors that would have contributed to this accident.

Wreckage examination

The aircraft crashed onto the grass immediately to the north of the main runway intersections. The impact point was marked by a deep gouge in the soil made by the engine and forward fuselage, and by lesser imprints from both wings, both main landing gear wheels, and the tail skid. The main wreckage was located some 30 metres beyond the impact point. Fragmented pieces of canopy and engine cowl, together with the detached propeller and items of aircraft equipment (fire extinguisher, ground locks etc) which had burst from the cockpit during the impact, were spread across the intervening area of ground. All parts of the aircraft were present at the crash site, and it was evident that nothing had become detached prior to impact.

The character and orientation of the impact marks on the ground, together with the disposition of wreckage relative to the point of impact and the pattern of damage sustained, indicated that the aircraft had struck the ground on a track of approximately 085°M. At the time of impact, the aircraft was banked approximately 25° to the right and pitched approximately 30° nose down. There were indications that the aircraft was sideslipping slightly to the left (yawed right) at the time of impact.

All of the structural damage was consistent with the impact and no evidence was found of any pre-impact structural failure. All flying control surfaces were present in the wreckage, and the patterns of damage to their hinges and associated fixings showed that they had been attached to the airframe

at the time of impact. All surface hinges were free moving, with no evidence of any stiffness or restriction. All flying control operating cables and linkages were intact and connected at the time of impact.

The flap screw jack actuator was at a position consistent with the flaps having been retracted fully at impact. The pitch trim mechanism in the tail, which adjusts the neutral position of the tailplane servo tab, was in a nominally neutral position at impact. A bruise line on the skin of the rear fuselage, made by the inboard end of the right tailplane top skin, suggested that the control column was fully back (full aircraft nose up pitch) at the time of impact. The impact positions of the rudder and the ailerons could not be determined.

There was clear evidence that the engine was delivering significant power at the time of impact. A deep propeller cut was found at the point of initial impact. Both blades of the separated propeller exhibited heavy chordwise scoring of the tip regions together with associated leading edge damage, which was particularly severe on one of the blades.

Due to the extensive damage, and disruption of the flying control system components during the impact, it was not possible to eliminate totally the possibility of some obscure form of jamming in flight. However, there was little scope for such jamming, and no overt signs of pre-impact bruising or damage were found anywhere in the flying control systems. No foreign objects, such as tools or other loose items capable of jamming the controls, were found anywhere inside the aircraft's structure, or in the vicinity of any flying control components. Examination of the cockpit of a sister aircraft suggested that G-VECB would not have been particularly vulnerable to control jamming by loose articles in the cockpit during aerobatic manoeuvres. The fire extinguisher and other items of equipment which had burst from the cockpit all exhibited patterns of damage consistent with them having been secure in their stowages at the time of impact. Consequently, none of these items could have caused any control restrictions in flight. The first aid kit was still in place in its stowage in the main wreckage.

Survivability

The aircraft was equipped with both four point full harnesses and conventional lap straps. Only the former was in use at the time of the accident, the latter being tucked away behind the pilot's seat. Impact overload failures of the pilot's four point harness had occurred in the aluminium alloy fittings of the left shoulder strap adjustment buckle and at the right lap strap attachment buckle. In each case, the failures had occurred where the side members of the buckles transferred loads into the adjoining sections of harness webbing. The four point lap strap attachment to the fuselage had also failed on the left side, due to extensive structural disruption and break-up during the main impact. Laboratory testing of the failed components did not reveal any inherent weakness in the material from which the buckles had been constructed. The accident was almost certainly non-survivable, and the performance of the seat harness system was not likely to have been a factor influencing the survival outcome in this case.

Pilot training and experience

The pilot had gained his Private Pilot's Licence in 1994 using a flying training organisation based at Goodwood. Once qualified, he had primarily flown the Piper PA28 aircraft type. In August 2001 he undertook an aerobatics training course of some eight hours flying time on the Robin R2160 with a different flying training organisation, also at Goodwood. The course consisted of basic instruction in aerobatics, which was undertaken at medium heights with suitable height margins for safe

recovery at the conclusion of each manoeuvre. The course did not include any instruction in the performance of aerobatics at low heights, and such flying did not form part of the standard training syllabus.

As part of the aerobatics training course syllabus, an instructor had briefed the pilot on the importance of only carrying out aerobatics at a suitably high height, commensurate with the pilot's limited level of training and aerobatics experience.

Analysis

There were differences in the witness accounts as to which direction the aircraft had performed the final rolling manoeuvre. Inspection of the ground impact marks suggested that the aircraft had been rolling to the left prior to impact, and that it had completed over three quarters of the roll.

All of the witnesses were consistent in their descriptions that the aircraft's nose had not been raised prior to the commencement of the roll. This omission would normally have led to a marked loss of height during the rolling manoeuvre, consistent with the loss of wing lift when inverted, unless the pilot were to apply suitably vigorous corrective action.

Once a downward trajectory had been allowed to develop during the manoeuvre, recovery from such a low starting height would not have been possible.

Engineering inspection of the aircraft found no indication of any unserviceability, jammed flight control or loose article that might have lead to a loss of control.