Aviation Safety Investigation Report 199500124

Aero Lab Inc
Skybolt

22 January 1995

Readers are advised that the Australian Transport Safety Bureau investigates for the sole purpose of enhancing transport safety. Consequently, Bureau reports are confined to matters of safety significance and may be misleading if used for any other purposes.

Investigations commenced on or before 30 June 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with Part 2A of the Air Navigation Act 1920.

Investigations commenced after 1 July 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with the Transport Safety Investigation Act 2003 (TSI Act). Reports released under the TSI Act are not admissible as evidence in any civil or criminal proceedings.

NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

Aviation Safety Investigation Report

199500124

Occurrence Number: 199500124 **Occurrence Type:** Accident
Location: 9 km S Bega
State: NSW **Inv Category:** 3
Date: Sunday 22 January 1995
Time: 1625 hours **Time Zone** ESuT
Highest Injury Level: Fatal
Injuries:

	Fatal	Serious	Minor	None	Total
Crew	1	0	0	0	1
Ground	0	0	0	0	0
Passenger	0	0	0	0	0
Total	**1**	**0**	**0**	**0**	**1**

Aircraft Manufacturer: Aero Lab Inc
Aircraft Model: Skybolt
Aircraft Registration: VH-JIG **Serial Number:** N70
Type of Operation: Non-commercial Pleasure/Travel
Damage to Aircraft: Destroyed
Departure Point: Frogs Hollow Airfield NSW
Departure Time: 1615 ESuT
Destination: Frogs Hollow Airfield NSW

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	Private	57.3	723

Approved for Release: Tuesday, September 3, 1996

Factual Information

The pilot took off from Frogs Hollow Airfield in an amateur-built Skybolt biplane to carry out aerobatic routines. Witnesses advised that the aircraft climbed to approximately 3,000 ft above the airfield and commenced manoeuvres that included stall turns, one and two turn spins, a flick roll and loops. The pilot then carried out one turn through 360 degrees rolling the aircraft about its longitudinal axis during the turn. The pilot then flew an inverted 360 degree turn. After a pause, he climbed vertically, carried out either a stall turn or wingover and entered an 'erect' or upright spin. After one turn of the spin, the aircraft's attitude was seen to change from 'erect' to inverted.

Witnesses advised that as the aircraft descended, the spin may have changed in direction and as it got closer to the ground, the nose began to drop. At about 1,000 ft above ground level the aircraft was observed to be spinning to the right. The rate of rotation began to decrease, with the nose dropping through the vertical. The aircraft then entered an erect spiral dive from which it was recovering when it impacted the ground and caught fire. The impact was not survivable.

The wreckage and wreckage trail indicated that at impact, the aircraft was approximately 40 degrees nose down, right wing low, rotating to the right, with some forward momentum. This is consistent with witness evidence that indicated that the aircraft was probably in the early stages of recovery from a spiral dive.

The engine noise was reported to be normal until immediately prior to impact when power was removed, re-applied, then removed again. Examination of the wreckage did not disclose any evidence of pre-impact distress with the engine, the airframe or systems.

The weather was fine, with scattered high cloud, and was not considered to be a factor in the accident.

The aircraft was properly certificated, had been properly maintained and serviced and had a valid maintenance release.

The aircraft had been refuelled with sufficient fuel for the flight and was correctly loaded with respect to its centre of gravity. The pilot had carried out a pre-flight inspection of the aircraft during which he had set the altimeter to record height above the airfield, known as QFE.

The pilot's licence and medical certificate were valid.

The pilot commenced flying in 1959 and over the next 35 years had flown 722 hours. He was reported to have been a competent, self-taught aerobatic pilot. There was no record of the pilot receiving formal aerobatic training except for a brief period of instruction in spin recovery when he was endorsed on the Skybolt. The pilot's licence did not have an endorsement permitting him to conduct low-level aerobatic manoeuvres below 3,000 ft. He had not been a member of the Australian Aerobatic Club.

He had flown 83 flights totalling some 60 hours in the Skybolt in the three years that it had been based at Frogs Hollow. Most of that flying had been in the first year when he flew 47 flights. In the second year he flew 22 flights, and in the year prior to the accident, 14 flights. He flew most weekends and regularly flew a variety of single-engine aircraft that were based on the field. The majority of his Skybolt flights averaged approximately 30 minutes duration and involved essentially the same aerobatic routine as carried out prior to the accident, with the exception of the inverted spin.

The pilot had been observed to carry out a small number of inverted spins but these had always been commenced at approximately 6,000 ft above ground level. Witnesses advised that on these occasions the aircraft was seen to generate high rates of descent and rotation, and took an estimated 2,000 ft to enter a nose-down spin and subsequently recover to level flight. The pilot had not been observed to attempt an inverted spin from the 3,000 ft height from where he normally commenced his aerobatic routines. The last time he was observed to do an inverted spin was six months prior to the accident.

The Skybolt is described as an easy to fly, docile aircraft. The owner /builder of another Skybolt aircraft advised that he recovered instantly to horizontal flight from an inadvertent inverted spin when he closed the throttle, let go of all controls and then pushed on the anti-spin rudder. The aircraft flicked upright and he was able to fly out of the manoeuvre.

However, even though they are built to the same plans, there are variations between aircraft. Each is built by a different builder and, being a biplane, is more subject to the effects of rigging tolerances than a conventional aircraft. When it was new, the aircraft was test flown to a more simplified procedure than that used for production aircraft manufactured to Federal Aviation Regulation 23 (FAR23). Therefore there is little available data in regard to this particular Skybolt's handling characteristics, nor is there any documented comparison of this particular aircraft against others built in Australia.

Prior to the accident flight the pilot flew with a colleague to a neighbouring airstrip. They walked the length of the sloping strip and the pilot was observed to be breathing heavily and appeared to be unfit. The colleague advised that this was the first time that he had observed the pilot to be other than fit and well.

Subsequent enquires found that the pilot had suffered from mild hypertension, for which he was reported to be taking Diazide or Renetic tablets, and that he was a mild hay fever sufferer. The post-mortem examination found no evidence of possible chest infection, but did disclose fibrous changes throughout the lungs that may have been due to pulmonary fibrosis, the causes of which are unknown.

As a condition of his licence,the pilot was required to wear glasses at all times while flying but was known to wear them selectively. He was not observed to be wearing them for this flight, nor were his glasses located in the wreckage.

Analysis

The pilot may have knowingly placed the aircraft into an inverted spin or he may have suffered disorientation from 'G' induced loss of consciousness, otherwise known as G-LOC. The investigation was not able to positively determine if either of these scenarios had occurred.

G-LOC may have been induced during the pull up prior to the stall turn or wing over manoeuvre that preceded the inverted spin. If the pull up induced G-LOC, the pilot would have had to remain fully conscious at least to the point where full rudder was applied to induce the stall turn or wing over. The subsequent changes to the aircraft's state may have occurred due to the pilot being disoriented and confused following a G-LOC episode.

However, the Skybolt aircraft has the reputation of being an easy aircraft to fly and the pilot was known to have successfully flown inverted spins in this aircraft. Witnesses to the flight did not describe the sequence to have been other than normal, except that the inverted spin was commenced at a lower height than before, and the recovery was not successful. Accordingly, it is possible that the pilot knowingly placed and held the aircraft in an inverted spin, intending to recover by allowing the nose to drop through the vertical until the aircraft was in an erect spiral dive, consistent with his previous routines.

The change in power during the final seconds of flight was most probably as a result of the pilot realising that he was too low and that an impact was inevitable. This realisation could have occurred regardless of whether the pilot had deliberately flown into the inverted spin, or due to G-LOC induced confusion.

The pilot may have been unwell on the day. However, he had continued flying and obviously did not consider his symptoms to be enough to stop him performing the planned aerobatic sequences.

It is conceivable that the perceived lack of fitness may have increased his susceptibility to G-LOC. However, the medications he was taking for mild hypertension and mild athsma are not considered significant.

It is not known why the pilot did not wear his glasses, nor is known what effect the lack of glasses had on the pilots ability to observe and react to the indications of attitude and altitude that were available to him.

The pilot had flown the Skybolt for only 14 flights, totalling less than 7 hours in the past year. This low level of currency would not be considered sufficient to maintain aerobatic competency, especially in light of the technically and physically demanding routines being attempted.

The pilot had not undertaken any formal instruction in aerobatic flying. Civil Aviation Regulations in force at the time of the accident required that acrobatic manoeuvres be completed 3,000 ft above the terrain. It is not known why the pilot commenced his manoeuvre at a height at which he should have been completing his recovery to level flight.

Conclusions

Findings

1. The aircraft was properly certificated and was serviceable.

2. The pilot held a valid licence and medical certificate, but he was not endorsed to conduct acrobatic manoeuvres below 3,000 ft.

3. Formal instruction in aerobatic flying had not been undertaken by the pilot.

4. The pilot had very low total and recent experience on the Skybolt aircraft.

5. The aircraft entered an inverted spin. The reason why this occurred was not determined.

6. The recovery procedure employed by the pilot did not ensure a rapid recovery to level flight.

7. The aircraft flew into the ground before recovery was effected.

Significant factors

1. The aircraft entered an inverted spin at a low height.

2. The pilot did not apply timely and effective recovery actions.