

**AIRCRAFT ACCIDENT REPORT**  
**OCCURRENCE NUMBER 03/2986**  
**STEEN SKYBOLT**  
**ZK-JET**  
**ARARIMU, SOUTH AUCKLAND**  
**21 OCTOBER 2003**



### **Glossary of abbreviations used in this report:**

amsl	above mean sea level
AWIB	aerodrome and weather information broadcast
CAA	Civil Aviation Authority
CAR	Civil Aviation Rule(s)
E	east
ft	foot or feet
kg	kilogram(s)
km	Kilometre(s)
lb	pounds(s)
MHz	Megahertz
NZDT	New Zealand Daylight Time
S	south
T	true
UTC	Coordinated Universal Time
VHF	very high frequency
WGS 84	World Geodetic System 1984

## AIRCRAFT ACCIDENT REPORT

### OCCURRENCE No 03/2986

<b>Aircraft type, serial number and registration:</b>	Steen Skybolt, AACAA 570, ZK-JET
<b>Number and type of engines:</b>	1 Lycoming AEIO-360-A1D
<b>Year of manufacture:</b>	1992
<b>Date and time:</b>	21 October 2003, 1840 hours <sup>1</sup> (approx)
<b>Location:</b>	Ararimu, South Auckland Latitude <sup>2</sup> : S 37° 08.06' Longitude: E 175° 03.36'
<b>Type of flight:</b>	Private
<b>Persons on board:</b>	Crew: 1 Passengers: 1
<b>Injuries:</b>	Crew: 1 fatal Passengers: 1 fatal
<b>Nature of damage:</b>	Aircraft destroyed
<b>Pilot-in-command's licence:</b>	Commercial Pilot Licence (Aeroplane)
<b>Pilot-in-command's age:</b>	28 years
<b>Pilot-in-command's total flying experience:</b>	2637.5 hours, 29.4 on type
<b>Information sources:</b>	Civil Aviation Authority field investigation
<b>Investigator in Charge:</b>	Mr M A Carrelli

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<sup>1</sup> Times are NZDT (UTC + 13 hours)

<sup>2</sup> WGS 84 coordinates

## Synopsis

The Civil Aviation Authority was notified of the accident at 1910 hours on 21 October 2003. The Transport Accident Investigation Commission was in turn notified shortly thereafter, but declined to investigate. A CAA site investigation was commenced the following day.

The pilot was on a private aerobatic flight with one passenger. The final manoeuvre was a vertical climb. As the aircraft turned to descend it was observed to enter a spin from which it did not recover before striking the ground. The first persons on the scene found both occupants had been killed.

### 1. Factual information

#### 1.1 History of the flight

- 1.1.1 The aircraft was prepared for flight by the pilot, who was accompanied by a passenger. The aircraft was refuelled and uplifted 52 litres at 1814 hours, and proceeded to take off from Ardmore Aerodrome at 1832 hours.
- 1.1.2 The aircraft was seen by numerous witnesses on the ground, conducting aerobatics in the vicinity of Ararimu, some 15 km south-south-east of Ardmore. The last manoeuvre that it performed was a vertical climb. As the aircraft turned to descend it entered into a spin from which it did not fully recover before striking the ground.
- 1.1.3 The accident occurred in daylight, at approximately 1840 hours NZDT, at Ararimu, at an elevation of 557 feet. Grid reference 260-S12-930499, latitude S 37° 08.06', longitude E 175° 03.36'.

#### 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	1	0
Serious	0	0	0
Minor/None	0	0	

#### 1.3 Damage to aircraft

- 1.3.1 The aircraft was destroyed.

#### 1.4 Other damage

- 1.4.1 Nil.

## **1.5 Personnel information**

- 1.5.1 The pilot held a valid Commercial Pilot Licence (Aeroplane), endorsed with Instrument, C Category Instructor, and Aerobatic Flight ratings. The Aerobatic Flight rating had been issued two days before the accident. Rule 91.701 authorises the holder of an aerobatic rating to carry a passenger on aerobatic flight, and to operate down to a minimum of 3000 ft above ground level. However, aerobatic manoeuvres may be conducted down to 1500 ft above ground level while not carrying passengers
- 1.5.2 The pilot held a current Class 1 medical certificate with no endorsements. He weighed 93 kg.
- 1.5.3 Up until 21 October 2003 the pilot had flown 2637.4 hours in total. Of these hours 29.4 were on the Steen Skybolt. The pilot had 30 minutes of aerobatic time on type with two persons on board. The remaining hours were solo and dual circuits, general flying, cross country and solo aerobatics.
- 1.5.4 The pilot had done most of his dual aerobatic training on Slingsby T67b and Cessna 152 Aerobat aircraft.
- 1.5.5 The passenger, seated in the forward cockpit, weighed 124 kg. He was on a pleasure flight and was not a pilot.

## **1.6 Aircraft information**

- 1.6.1 Registration ZK-JET was issued in 1991 to Steen Skybolt serial number AACA 570, the building of which was completed in 1992.
- 1.6.2 The aeroplane had initially been issued with a Permit To Fly on 1 April 1993 which expired on 7 August 1996. An Airworthiness Certificate in the category Special-Experimental was issued on 5 October 1996 and expired on 18 September 2000. When this expired there was a period where the aeroplane operated without a valid certificate due to a paper work oversight. A non-terminating Airworthiness Certificate in the category Special-Experimental with the condition to operate in accordance with CAR 91.105 was issued on 7 February 2002.
- 1.6.3 Up until 21 October 2003 ZK-JET had accrued a total time in service of 682.7 hours. The most recent maintenance was the approved maintenance schedule 100 hour/annual review of airworthiness inspection performed at 609.1 hours on 29 October 2002.
- 1.6.4 The engine, a Lycoming AEIO-360-A1D serial number L-20177-51AC, had run 682.7 hours since new. The most recent maintenance was a 100 hour/annual check carried out at 609.1 hours on 29 October 2002.
- 1.6.5 The passenger cockpit was fitted with dual controls.
- 1.6.6 The aircraft flight manual specified that the aircraft had a permissible maximum all-up weight of 1900 lb for normal operations. This weight was restricted to 1650lb for aerobatic operations.

- 1.6.7 The all-up weight of the aircraft at the time of the accident was calculated as approximately 1900 lb, 250 lb over the maximum for aerobatic flight. The centre of gravity was close to the rear limit.

## **1.7 Meteorological information**

- 1.7.1 A ridge of high pressure extended over the North Island from the east during the afternoon and evening of 21 October 2003. The Auckland region had a fine day with only a few afternoon cumulus clouds and north-east breezes at 12 knots near the surface. Winds at the 2000-foot level were also north-east and approximately 15 knots, while at higher levels the winds turned progressively from north-east through north to north-west and only occasionally exceeded 25 knots.

- 1.7.2 Sun data for Ararimu at 1840 hours were: azimuth 265° T, altitude 11°.

## **1.8 Aids to navigation**

- 1.8.1 Not applicable.

## **1.9 Communications**

- 1.9.1 The VHF radio was found tuned to 118.1 MHz (Ardmore Unicom) with 121.0 MHz (Ardmore AWIB) on standby. The transponder was selected to code 2200 and in the standby position. The normal transponder squawk code for operation in a General Aviation Area is 1400.

- 1.9.2 The Ardmore Unicom recorded the aircraft take off call at 1832 hours. Air traffic control records did not show any other radio or transponder transmissions. The aircraft was not detected by primary radar.

## **1.10 Aerodrome information**

- 1.10.1 Not applicable.

## **1.11 Flight recorders**

- 1.11.1 Not applicable.

## **1.12 Wreckage and impact information**

- 1.12.1 The aircraft struck the ground in slightly right-wing-low and slightly nose-down, attitude at a high rate of decent. The right lower mainplane separated on impact, with consequential dislocation of the upper mainplane, and during the resulting 19 metre ground slide through thick bush, the left lower mainplane struck a tree and separated.

- 1.12.2 Although the engine was torn from its mountings, it remained in its general location relative to the rest of the fuselage, with the control runs and electrical wiring remaining connected.

- 1.12.3 The two-bladed wooden propeller had one blade sheared off at the hub and the other blade had separated at mid span indicating that it was turning at impact. However the power output of the engine could not be determined.

1.12.4 The fuselage and empennage were essentially intact. The occupiable space at the forward cockpit seating location had been reduced sufficiently from the forward and right side to cause serious lower limb injuries. The rear seating position had minor reduction from the right side only. The canopy was unbroken.

1.12.5 Pre impact integrity of the flight controls was positively established.

### **1.13 Medical and pathological information**

1.13.1 Post-mortem examination of the pilot and passenger found that they died of traumatic injuries sustained at the time of impact.

1.13.2 There was no indication of a pre-existing condition that could have resulted in incapacitation or affected the pilot's ability to fly the aircraft.

1.13.3 Toxicological tests revealed nothing of significance.

### **1.14 Fire**

1.14.1 There was no fire.

### **1.15 Survival aspects**

1.15.1 The impact was not survivable.

1.15.2 A Pointer Model 3000 emergency locator transmitter, transmitting on 121.5 MHz and 243 MHz was fitted to the aeroplane and operated correctly on impact.

### **1.16 Tests and research**

1.16.1 The engine strip did not reveal any abnormalities.

### **1.17 Organisational and management information**

1.17.1 Not applicable.

### **1.18 Additional information**

1.18.1 The pilot was operating in General Aviation Area NZG275 which extends from 2500 to 3500 ft amsl. General Aviation Area NZG276 located above NZG275 extends from 3500 to 4500 ft amsl. At the time of the accident runway 05 Right was in use at Auckland, precluding the activation of NZG276, and thus restricting the aircraft to a maximum height of 3500 ft without specific clearance.

1.18.2 The maximum elevation of the ground in this area is 750 ft. Considering the limitations imposed by the rules and the airspace, there was no legal vertical window in which to conduct aerobatic manoeuvres with a passenger on board.

1.18.3 The rudder pedals for the pilot seated at the rear of the aircraft, were located on either side of the passenger seat, which was in the forward cockpit. The proximity of these rudder pedals to the seat was such that it was possible that a large person or loose seatbelts could easily snag the pedals and restrict their movement. Not having full rudder authority will be detrimental to a recovery from a spin.

## **1.19 Useful or effective investigation techniques**

1.19.1 Nil.

## **2. Analysis**

- 2.1 There was no evidence to show that there was any pre-accident failure of the airframe or engine. An engine failure or partial power loss should not have resulted in loss of control of the aircraft.
- 2.2 The ceiling of the airspace available for use was 3500 ft amsl. Therefore the pilot, in terms of the rules, had no vertical window in which to conduct any aerobatic manoeuvres.
- 2.3 The aircraft was being operated at approximately 250 lb over the maximum certificated all-up weight allowed for aerobatic operations.
- 2.4 The ground impact mark associated with the damage to the aircraft would suggest that it was no longer in a fully developed spin, but possibly at a point where it may have been recovering from the manoeuvre.
- 2.5 It is possible that the size of the passenger meant that he, or his seat belts, could have obstructed the rear cockpit pilot rudder pedals which are located on either side of the forward cockpit seat.
- 2.6 An experienced Steen Skybolt pilot stated that if the aircraft had gone into an unintended spin at the apex of the climb it would take some time to determine if it were an upright or inverted spin. Visually the two spins look very similar and the clues are in the forces being applied to the pilot and the slipstream noise. The low sun may also have increased pilot disorientation.
- 2.7 As the aircraft was flown at a weight greater than the maximum certificated for carrying out aerobatic flight, it is possible that the handling characteristics of the aircraft degraded to a point where the pilot unexpectedly lost control during the manoeuvre, and then the aircraft response during the recovery was less than optimum.
- 2.8 It was not possible from the evidence available, to determine a definite cause for this accident. However, probable causes were operation outside the approved aerobatic envelope, a mishandled manoeuvre at the apex of the climb followed by an ineffective recovery from the ensuing spin. Compounding factors are that this was only the second time the pilot had done aerobatics in this aircraft type with two persons on board, and the lack of height for recovery.



### 3. Conclusions

- 3.1 The pilot was properly licensed, rated and fit for the flight undertaken.
- 3.2 The aircraft had been subjected to regular maintenance and appeared to be airworthy prior to the accident.
- 3.3 The aircraft was operated outside of the certificated weight and balance limitations for aerobatic flight.
- 3.4 The aircraft did not recover from a (probably unintended) spin manoeuvre and collided with the ground.
- 3.5 The accident was not survivable.
- 3.6 It was not possible to determine a conclusive cause for the accident.

Report written by:

Authorised by:

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8 November 2004



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