

**AIRCRAFT ACCIDENT REPORT**  
**OCCURRENCE NUMBER 03/1675**  
**RAND KR-2**  
**ZK-CSR**  
**25 KM SOUTH WEST OF WOODBOURNE**  
**8 JUNE 2003**



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

C	Celsius
CAA	Civil Aviation Authority
E	east
ft	foot or feet
km	kilometre(s)
nm	nautical miles
NZST	New Zealand Standard Time
S	south
UTC	Coordinated Universal Time

## AIRCRAFT ACCIDENT REPORT

### OCCURRENCE No 03/1675

<b>Aircraft type, serial number and registration:</b>	Rand KR-2, AACCA/623, ZK-CSR
<b>Number and type of engines:</b>	1 Revmaster R2100-D
<b>Year of manufacture:</b>	12 May 1984
<b>Date and time:</b>	8 June 2003, 1645 hours <sup>1</sup> (approx)
<b>Location:</b>	Avon Valley, 25 km SW of Woodbourne Latitude <sup>2</sup> : S 41° 41.7' Longitude: E 173° 39.5'
<b>Type of flight:</b>	Private
<b>Persons on board:</b>	Crew: 1
<b>Injuries:</b>	Crew: 1 Fatal
<b>Nature of damage:</b>	Aircraft destroyed
<b>Pilot-in-command's licence</b>	Private Pilot Licence (Aeroplane)
<b>Pilot-in-command's age</b>	32 years
<b>Pilot-in-command's total flying experience:</b>	195.4 hours, 59.5 hours on type
<b>Information sources:</b>	Civil Aviation Authority field investigation
<b>Investigator in Charge:</b>	Mr Michael A Carrelli

---

<sup>1</sup> Times are NZST (UTC + 12 hours)

<sup>2</sup> NZ Geodetic datum 1949 co-ordinates

## Synopsis

The Civil Aviation Authority was notified of the accident at 1650 hours on Sunday 8 June 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 flight to over fly a military encampment and then return to Woodbourne. At the commencement of the second pass over the camp the aircraft commenced a turn to reverse track, when it entered a spin from which the pilot was unable to recover before striking the ground. The first person on the scene found the pilot dead.

## 1. Factual information

### 1.1 History of the flight

- 1.1.1 The aircraft took off from Woodbourne, the pilot's intention being to fly over a military field training camp some 25 km to the south-west, and return to Woodbourne.
- 1.1.2 At the camp, various witnesses saw the aeroplane as it flew up the valley where the camp was located, at an estimated height of 500 feet above ground level.
- 1.1.3 On completing this run, the aircraft banked steeply to the left, initially to an angle of about 90 degrees, paused, reduced bank to about 80 degrees, then "flicked" into a spin to the left.
- 1.1.4 The spin continued to ground level, with no visible sign of any recovery attempt. The pilot was found to be dead when the first persons from the camp reached the wreckage.
- 1.1.5 The accident occurred in daylight, at approximately 1645 hours NZST, in the Avon Valley, at an elevation of 850 ft. Grid reference 260-O29-648458, latitude S 41° 41.7', longitude E 173° 39.5'.

### 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	0	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 Private Pilot Licence first issued on 5 September 1995, and a current class 1 medical certificate. His most recent biennial flight review was completed on 10 March 2002.

1.5.2 Up until 8 June 2003 the pilot had flown 195.4 hours in total of which 59.5 hours were on the KR-2

## **1.6 Aircraft information**

1.6.1 The aircraft, an amateur built Rand KR-2 serial number AACCA/623 was built in 1984. The pilot purchased the machine from its third owner in May 2001.

1.6.2 Up until 8 June 2003 the aircraft had accrued a total time in service of 651 airframe hours. The most recent maintenance was a 100 hour check performed at 638 airframe hours on 3 February 2003. An annual review of airworthiness had been carried out in conjunction with this check.

1.6.3 The engine, a Revmaster R2100-D serial number 2379, had run 651 hours since new.

1.6.4 A cabin heater had been installed on the aircraft; this consisted of a shroud fitted around the exhaust pipe. This particular installation had proved to be rather ineffective in heating the cabin, so to improve this, the owner repositioned the shroud to a different location on the exhaust pipe. However, in its new location, the shroud was positioned around a slip joint. The flight on which the accident occurred was the first flight after this change in configuration.

## **1.7 Meteorological information**

1.7.1 The reported weather at the time of the accident at Woodbourne Airport, 25 km north-east of the accident site, was: surface wind variable at 3 knots; visibility 50 km; cloud "few<sup>3</sup>" at 8000 ft; temperature 15° C; dew point 6° C; no precipitation. The 2000 ft wind was northerly at 5 knots.

## **1.8 Aids to navigation**

1.8.1 Not applicable.

## **1.9 Communications**

1.9.1 Not applicable.

---

<sup>3</sup> 1-2 oktas (eighths of sky cover)

## **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 had struck the ground in an approximate 35 degree nose-down attitude, with wings level. Because the structure was mainly wood and foam, covered by glass reinforced plastic, substantial disintegration occurred on impact.

1.12.2 Fragments had been projected up to 10 meters forward from the impact point. The engine had moved well aft, substantially reducing the occupiable space in the cabin.

1.12.3 The fixed pitch wooden propeller had one blade snapped off on impact, with the other sustaining only minor damage, suggesting low power at impact.

1.12.4 During the wreckage examination, it was found that each of the left and right rear wing spar-to-fuselage attach points had one bolt missing out of the four required on each side. Also, the left aileron bell crank exhibited evidence of slight rubbing over a long period of time, but there was no indication that either of these had any bearing on the accident.

1.12.5 The pre-impact integrity of the rudder, ailerons and the elevator runs was positively established.

## **1.13 Medical and pathological information**

1.13.1 Post-mortem examination revealed that the pilot died of traumatic injuries sustained at the time of impact.

1.13.2 Toxicological tests found a blood carbon monoxide saturation level of 23%.

1.13.3 The carbon monoxide level was in the range where impairment of the pilot's cognitive and motor skills was likely.

## **1.14 Fire**

1.14.1 There was no fire.

## **1.15 Survival aspects**

1.15.1 The impact was not survivable.

## **1.16 Tests and research**

1.16.1 Strip examination of the engine revealed no pre-impact deficiency that would have affected normal running of the engine, but did find that the heater shroud had

been placed over a slip joint in the exhaust system. The slip joint caters for thermal expansion and contraction, thus gastight integrity is not assured.

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

1.17.1 Not applicable.

### **1.18 Additional information**

1.18.1 Not applicable.

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

1.19.1 Not applicable.

## **2. Analysis**

- 2.1 There was no evidence to show that there was any pre-accident failure of the airframe or engine.
- 2.2 The carbon monoxide level in the pilot's blood was in the range where the pilot's judgment and operating ability were likely to be impaired. The sudden application of an extreme bank angle was not normal, and this was followed by immediate entry into a spin.
- 2.3 There was no apparent attempt to recover from the spin before the aircraft struck the ground, also suggesting that the pilot was not functioning normally. In any case, even had rotation been arrested, there was not enough height to recover from the ensuing dive.
- 2.4 The source of the carbon monoxide was the slip joint in the exhaust system, over which the cabin heater shroud had been mounted, giving a direct route for exhaust gases to enter the cockpit. The degree of contamination was probably substantial, given the blood concentration and the short airborne time (estimated 15-20 minutes).

## **3. Conclusions**

- 3.1 The pilot was properly licensed.
- 3.2 The aircraft had been subjected to regular maintenance, and appeared to be airworthy prior to the accident.
- 3.3 The aircraft did not recover from an unintended spin and collided with the ground.
- 3.4 There was evidence of high blood carbon monoxide saturation levels which would be very likely to cause pilot in-flight incapacitation.
- 3.5 The accident was not survivable.

#### **4. Safety actions**

- 4.1 The CAA Manager of Sport and Recreation will write an article to be published in both *New Zealand Sport Flying* and *New Zealand Recreational Pilot* magazines, highlighting the dangers of carbon monoxide, and the importance of engineering practices when constructing cabin heaters which use the exhaust pipe as the heating medium.

Report written by:

Authorised by:

Michael A Carrelli  
Safety Investigator

Richard White  
Manager Safety Investigation

Date 14/1/2004