



**AIRCRAFT ACCIDENT REPORT**

**OCCURRENCE NUMBER 03/1768**

**RANS COYOTE S6SE**

**ZK-CMC**

**LOBURN**

**17 JUNE 2003**

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

agl	above ground level
CAR	Civil Aviation Rule(s)
E	east
ft	foot or feet
km	kilometre(s)
m	metre(s)
mg (/l)	milligrams (per litre)
mm	millimetre(s)
mph	(statute) miles per hour
NZST	New Zealand Standard Time
PPL(A)	Private Pilot Licence (Aeroplane)
RAANZ	Recreational Aircraft Association of New Zealand
S	south
UTC	Coordinated Universal Time
VHF	very high frequency

## AIRCRAFT ACCIDENT REPORT

### OCCURRENCE No 03/1768

<b>Aircraft type, serial number and registration:</b>	Rans Coyote S6ES, 10011424, ZK-CMC
<b>Number and type of engines:</b>	One Rotax 503
<b>Year of manufacture:</b>	2002
<b>Date and time:</b>	17 June 2003, 1700 hours <sup>1</sup> (approx)
<b>Location:</b>	Loburn, North Canterbury Latitude <sup>2</sup> : S 43° 12.53' Longitude: E 172° 30.01'
<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>	RAANZ intermediate pilot certificate
<b>Pilot-in-command's age</b>	22 years
<b>Pilot-in-command's total flying experience:</b>	77 hours, 39 on type
<b>Information sources:</b>	Civil Aviation Authority field investigation
<b>Investigator in Charge:</b>	Mr S J Walker

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

<sup>2</sup> WGS 84 co-ordinates

## Synopsis

The Civil Aviation Authority was notified of the accident at 1800 hours on Tuesday 17 June 2003. The Transport Accident Investigation Commission was in turn notified shortly thereafter but declined to investigate. A CAA site investigation was commenced the next day.

The pilot was on a local flight with a passenger. The microlight aeroplane was seen to enter a spin from which it did not recover. The first persons on the scene found that both the pilot and passenger had been killed.

## 1. Factual information

### 1.1 History of the flight

- 1.1.1 At approximately 1620 hours ZK-CMC took off normally from Rangiora aerodrome, with the pilot and passenger on board.
- 1.1.2 An experienced microlight pilot, who owns an airstrip in Loburn approximately six kilometres north of Rangiora, initially observed the aircraft flying toward his airstrip from the south at about 400 ft. He recognised it as ZK-CMC. After it crossed over the airstrip centreline it went into a very steep turn to the left.
- 1.1.3 This manoeuvre continued through one and three quarter turns, at the end of which the aircraft abruptly rolled out of the turn and “flicked”. The witness reported that it then wobbled and the pilot “waved his wings”. He commented that he thought that the pilot “must have been very accomplished or showing off”.
- 1.1.4 The aircraft then approached the airstrip and completed a full-stop landing after a long flat approach. The strip owner said “it was very slow and seemed to hang in the air”. When just six feet from the ground, it sank very quickly and landed heavily, “like it ran out of airspeed”.
- 1.1.5 After taxiing past the hangar, without the occupants acknowledging the airstrip owner, and idling at the end of the runway for some five minutes, ZK-CMC took off at 1634 hours.
- 1.1.6 The owner of the airstrip generally observed several aircraft approach and land there each week. He commented that the whole arrival and departure process of ZK-CMC was unusual.
- 1.1.7 A farmer in North Loburn reported that at approximately 1700 hours he saw a microlight aircraft making medium turns and performing what appeared to be forced landing practice over his property. The aircraft was flying between 100 and 500 ft, and made repeated approaches to a paddock full of cattle, some two kilometres from the accident site.

- 1.1.8 Between 1630 and 1645 hours, the owner of another property in North Loburn was feeding her stock when she noticed a small yellow and white aircraft performing turns.
- 1.1.9 Some time later this same aircraft flew directly overhead in a northerly direction. It appeared to be at a low altitude but was not alarming or concerning to the witness, and the engine sounded “perfect”.
- 1.1.10 Once the aircraft had passed overhead she heard the engine note change, which caught her attention. She looked up to see the aircraft “stopped in the air” approximately 700 m away and at 200-300 ft agl. She reported that the engine sound stopped completely.
- 1.1.11 She saw the nose drop abruptly and the aircraft enter a spin to the left. She recalled that it probably spun through two revolutions before being obscured by a row of pine trees.
- 1.1.12 The final part of the descent was seen by two other witnesses, one of whom was approximately 600 m away from the accident site. She reported first noticing the aircraft close to the ground in a steep nose-down attitude. She heard no perceptible sound from it as it dived toward the ground.
- 1.1.13 The accident occurred in daylight, at approximately 1700 hours NZST, at North Loburn, at an elevation of 400 feet. Grid reference 260-M34-694775; latitude S 43° 12.53', longitude E 172° 30.01'.

**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 current RAANZ intermediate pilot certificate and a current Class 2 medical certificate. His pilot certificate authorised him to carry passengers.
- 1.5.2 Up to 12 June 2001, the pilot had completed 32.85 hours dual flight instruction and 5.3 hours solo flight toward a PPL(A). This training was carried out in

Cessna 152 and 172 aircraft. From 22 June 2002, the pilot transitioned completely to flying microlight aeroplanes; after two instructional flights totalling 1.5 hours, he logged a further 71 hours solo.

- 1.5.3 The pilot's last PPL instructor commented that the pilot was competent and there were no characteristics or tendencies that he was concerned about.
- 1.5.4 The microlight club safety officer, an experienced microlight pilot, had counselled the pilot after he was seen flying after dusk, and preparing to operate a microlight aircraft on which he had not been trained or authorised to fly. He commented that the pilot tended to be "energetic" and exhibited an overconfident approach to his flying.
- 1.5.5 The pilot had taken colleagues flying on numerous occasions. One colleague, who knew both the pilot and passenger well, reported that the pilot had a tendency to be very adventurous and was known to be a "thrill-seeker". This became apparent to him when he accompanied the pilot on a flight. The pilot stalled the aircraft at 500 ft, a manoeuvre on which his colleague remarked as "very exciting". With his passenger's agreement, the pilot then flew to 2000 ft and purposely "flicked" the aircraft into a spin. The colleague, who was also a PPL(A) student and involved in microlight flying, was aware that the pilot was experiencing difficulty regaining control of the aircraft, and 500 ft was lost in the recovery. The pilot gesticulated to the effect that this had been a "close call".
- 1.5.6 The pilot was diagnosed with depression in November 2001, and had been receiving therapy and taking prescription medication to treat the condition, and was responding well. Relatives and acquaintances of the pilot commented that he was now full of energy and excited about his ongoing recovery from his illness, which had been very debilitating. See also 1.13.

## **1.6 Aircraft information**

- 1.6.1 ZK-CMC was a Rans Coyote S6ES three-axis, class 2 microlight aeroplane built in New Zealand in 2002. It was first registered on 9 December 2002 after receiving a microlight flight permit. It was maintained thereafter in accordance with the Civil Aviation Rules and RAANZ policy.
- 1.6.2 ZK-CMC was fitted with a Rotax 503 twin cylinder two-stroke engine and a carbon fibre propeller. The aircraft structure was primarily a welded tubular steel frame covered by Dacron® fabric. There were two seats in side-by-side configuration, with dual controls enabling the aircraft to be operated from either seat.
- 1.6.3 The plastic fuel tanks with a total capacity of 68 litres were located in each wing. Fuel was unleaded gasoline, premixed with two-stroke oil at a 50:1 fuel-oil ratio
- 1.6.4 The aircraft's total recorded time in service was 107.7 hours.

## **1.7 Meteorological information**

1.7.1 The weather conditions were calm with good visibility, although the sun had just set.

1.17.2 Weather conditions were not considered to be a factor in this accident.

## **1.8 Aids to navigation**

1.8.1 Nil.

## **1.9 Communications**

1.9.1 ZK-CMC had a Microair VHF transceiver installed. No reports of any transmissions from ZK-CMC were received during the investigation.

## **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 accident site was adjacent to Loburn Whiterock Road in a flat, otherwise unremarkable area of pasture. The aircraft struck the ground in a steep nose-down attitude and did not rebound after impact.

1.12.2 All of the aircraft structure was accounted for at the site. Examination of the flight controls indicated pre-impact integrity.

1.12.3 Damage consisted of destruction of the engine bay and forward cockpit area, and deformation of the wing and centre fuselage. Propeller damage was consistent with no rotation at impact.

1.12.4 Fuel totalling 25 litres was drained from the fuel tanks. The carburettor float bowls were removed and were found to contain fuel, with no contamination evident.

1.12.5 The airspeed indicator was examined under a microscope. There was a mark on the face of the gauge adjacent to 22 mph. This mark matched the profile of the rear of the pointer and is consistent with the pointer striking the gauge face at the time of impact.

1.12.6 Both ignition switches were found to be in the “off” position. The emergency personnel who attended the scene shortly after the accident stated that they did not disturb these switches.

1.12.7 The flaps were found selected to the 30-degree position and the throttle was in the closed position.

- 1.12.8 There was no evidence to suggest that the aircraft weight or centre of gravity were outside the manufacturer's specified limits

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

- 1.13.1 Post-mortem examination showed that the occupants died of injuries consistent with a high-energy impact.
- 1.13.2 Toxicological tests revealed the presence of 0.8 mg/l of the drug Citalopram®, an antidepressant, in the pilot's blood.
- 1.13.3 Citalopram hydrobromide is a highly selective and potent serotonin reuptake inhibitor which acts on the neurotransmitters within the central nervous system. It is this action, and associated side effects, that can result in "cognitive/motor performance impairment (caution with operating hazardous machinery)"<sup>3</sup>. The pilot was prescribed 60 mg of Citalopram® per day; 40 mg is considered to be an average dosage.

### **1.14 Fire**

- 1.14.1 Fire did not occur.

### **1.15 Survival aspects**

- 1.15.1 The accident was not survivable owing to the high decelerative forces involved. The occupants were restrained by combination lap and shoulder harnesses, but the minimal cockpit structure meant that there was little crushable structure forward of the occupants. Any significant longitudinal impact in this type of aircraft usually results in the destruction of the cockpit area with consequential effects on the occupants.

### **1.16 Tests and research**

- 1.16.1 The engine was removed from the wreckage and sent for a strip inspection at an engine overhaul facility. There was no evidence of any pre-existing mechanical discrepancy which could have contributed to the accident. The engineers who carried out the strip inspection remarked that the engine was in very good condition.

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

- 1.17.1 Nil.

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## **1.18 Additional information**

- 1.18.1 In general terms, microlight aviation in New Zealand is regulated under CAR Part 103. Administrative responsibility is delegated to organisations approved by the Director of Civil Aviation. Any person wishing to pilot a microlight aircraft under the authority of a microlight pilot certificate must be a member of an approved microlight organisation. Before any microlight pilot certificate is issued, the applicant must complete a medical declaration and undergo a medical examination. This declaration is presented to the microlight instructor/examiner when the applicant takes his flight test for the issue of any microlight pilot certificate.
- 1.18.2 The pilot held a Class 2 medical certificate, which is a requirement for a CAR Part 61 pilot licence. The Class 2 medical certificate demands a higher threshold of medical assessment than the Part 103 microlight pilot medical examination and declaration. The pilot's logbook contained a record of the pilot's intermediate flight test on 25 March 2003, where the instructor accepted the Class 2 medical certificate as meeting the medical requirement for the microlight pilot certificate.
- 1.18.3 The Class 2 medical assessment application form completed by the pilot in October 2000 did not contain any declarations in respect of the symptoms of any mental illness such as depression. This illness was diagnosed in November 2001, after the issue of the Class 2 medical certificate.
- 1.18.4 The CAR applicable at the time the pilot's mental illness was diagnosed prescribed certain conditions to be met in respect of medical deficiencies, as follows:

### **“61.35 Medical requirements**

(b) A person holding a pilot licence issued under this Part ... shall not exercise the privileges of that licence, and a person acting as pilot of an aircraft under Subpart C shall not fly an aircraft solo,—

while that person has a known medical deficiency, or increase of a known medical deficiency, that would make that person unable to meet the medical standards for his or her medical certificate, ... or foreign medical certification, as the case may be;

until that person is assessed fit again by an Aviation Medical Assessor.”

- 1.18.5 In June 2002 the Civil Aviation Act was amended to include: Part 2A Medical Certification, superseding rule 61.35. Section 27C *Changes in medical condition of licence holder* prescribes that (paraphrased):
- (1) Any licence holder becoming aware of a previously undetected medical condition that may interfere with the safe exercise of the privileges to which the medical certificate relates must inform the Director as soon as practicable and may not exercise those privileges.

(2) Any aviation examiner or medical examiner or operator becoming aware of a previously undetected medical condition in the licence holder, that may interfere with the safe exercise of the privileges to which the medical certificate relates, must inform the licence holder and the Director as soon as practicable.

(3) Any registered medical practitioner becoming aware of a previously undetected medical condition in a licence holder, that may interfere with the safe exercise of the privileges to which the medical certificate relates, must inform a the licence holder that the Director will be advised, then advise the Director as soon as practicable.

(4) In advising the Director, the aviation examiner, medical examiner or registered practitioner is not subject to civil or criminal liability resulting from disclosure of this information.

1.18.6 Rule 91.311 *Minimum heights for VFR flight* prescribes that:

(a) Except as provided in paragraphs (b), (c), and (d), a pilot-in-command of an aircraft must not operate an aircraft under VFR—

(1) over any congested area of a city, town, or settlement, or over any open air assembly of persons, at a height of less than 1000 feet above the highest obstacle within a horizontal radius of 2000 feet from the aircraft position; or

(2) over any other area—

(i) at a height of less than 500 feet above the surface; or

(ii) at a horizontal distance of less than 500 feet from any obstacle, person, vehicle, vessel, or structure; and

(3) for any operation, at a height less than that required to execute an emergency landing in the event of engine failure without hazard to persons or property on the surface.

(b) Paragraph (a) does not apply to a pilot-in-command of an aircraft—

(1) conducting a take-off, or landing; or

(2) conducting a bailed landing or discontinued approach; or

(3) taxiing.

(c) Paragraph (a)(2) does not apply to a pilot-in-command of an aircraft if the *bona fide* purpose of the flight requires the aircraft to be flown at a lower height or at a lesser horizontal distance; and

(1) the flight is performed without hazard to persons or property on the surface; and

- (2) only persons performing an essential function associated with the flight are carried on the aircraft; and
  - (3) the aircraft is not flown at a height lower than that required for the purpose of the flight; and
  - (4) the horizontal distance that the aircraft is flown from any obstacle, person, vessel, vehicle, or structure, is not less than that necessary for the purpose of the flight, except that in the case of an aeroplane, the aeroplane remains outside a horizontal radius of 500 feet of any person, vessel, vehicle, or structure that is not associated with the operation.
- (d) Paragraph (a)(2)(i) does not apply to a pilot-in-command—
- (1) who is the holder of, or authorised by the holder of, a current instructor rating issued under Part 61 and who is conducting flight training or practice flights consisting of—
    - (i) simulated engine failure after take-off commencing below 1000 feet above the surface; or
    - (ii) simulated engine failure commencing above 1000 feet above the surface, providing that descent below 500 feet above the surface is conducted within a low flying area in accordance with 91.131; or
  - (2) who is the holder of a current instrument rating issued under Part 61 and who is conducting IFR training, testing, or practice flights under VFR, providing the pilot-in-command conducts the flight in accordance with 91.413, 91.423 and 91.425; or
  - (3) operating an aircraft within a low flying area in accordance with 91.131; or
  - (4) operating an aircraft at an aviation event in accordance with 91.703.

1.18.7 There is nothing in rule 91.311 or in Part 103, which provides some specific exemptions from 91.311, that permitted the pilot to operate at a height below 500 feet above the surface.

1.18.8 Since the beginning of 1990, there have been 12 deaths of passengers in microlight aircraft. Additionally, there have been several sport aviation (gliding and microlight flying) pilot deaths where in-flight incapacitation is known or suspected. Two examples are found in CAA accident reports 99/1, ZK-GTR and 01/2660, ZK-JME; and a third case involved a microlight instructor dying whilst on a dual instructional flight, requiring the student to fly the aircraft back to the aerodrome and land.

1.18.9 In some cases, the pilot involved had previously held a Part 61 pilot licence and/or a Part 67 medical certificate, but at some point had been assessed as permanently unfit to hold the medical certificate. The lower threshold of medical assessment for gliding and microlight flying enables such pilots to continue flying, and, where permitted by the relevant organisation's certification policies, to carry passengers.

1.18.10 Class 2 microlight aircraft are not required to have an Airworthiness Certificate, however they are required to have a Flight Permit issued by an authorised person. Rule 103.107 requires that a placard be fitted in the cockpit warning passengers that the aircraft does not require an Airworthiness Certificate.

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

1.19.1 Nil.

## **2. Analysis**

2.1 Post-accident examination of the aircraft found no pre-existing mechanical anomaly with the aircraft, engine or propeller.

2.2 Witness observations suggest that the aircraft stalled and spun, and the nature of the ground impact is consistent with these observations.

2.3 Closing of the throttle, the turning of both ignition switches off, and the selection of flap suggests that the pilot could have been attempting to practice a low-altitude forced landing with a simulated total engine failure ("a dead stick" landing).

2.4 In a low-inertia, high-drag aircraft such as the Coyote, when the engine is shut off, it is essential that the nose is lowered in order to maintain airspeed. If not, a stall can quickly develop, and if stall recovery action is not prompt, the stall can lead to a spin. On an earlier flight, where the pilot deliberately induced a spin, it was noted that recovery took some 500 feet, and that the pilot appeared to have some difficulty in recovering from the manoeuvre.

2.5 The availability of engine power, in general, will not lessen the height required for spin recovery, and in many cases, application of power during a spin may cause the spin to flatten and become irrecoverable. In a normal recovery, power is not applied until the nose passes the horizon in the pull-out from the ensuing dive once the rotation has been arrested.

2.6 The pilot had done his initial stalling and forced landing practice on conventional aeroplanes with higher inertia and less drag than his microlight aeroplane, but in the almost 80 microlight hours he had flown, it is a reasonable expectation that he would have long since adjusted to the differences in rates of deceleration and the need to lower the nose to maintain airspeed when power is reduced or shut off.

2.7 Why the pilot may have initiated this unusual and potentially dangerous manoeuvre in the first place could be explained by possible side effects of the

medication that he was taking for his depression. The drug, Citalopram®, and the actual depression itself can both interfere with cognition and psychomotor skills. It is feasible, given his relatively high dosage of Citalopram®, that these could have affected the pilot's judgment, decision-making process and his ability to control the aircraft.

- 2.8 These possible side effects, combined with the pilot's new-found exuberance may have predisposed him to, on occasion, operate his aircraft outside the known margins of safety.
- 2.9 Had the pilot made the Director aware of the changes in the pilot's health, as required by Section 27C of the Civil Aviation Act, the Class 2 medical certificate would have been actively suspended until such time as the Director was satisfied that the pilot was again medically fit.
- 2.10 Class 2 microlight aircraft are required to carry a placard specifically advising any passenger that the aircraft does not require an airworthiness certificate; in regard to microlight pilot's medical certification, there is no such caveat.
- 2.11 As a result of this investigation, safety actions were initiated by the CAA Manager Sport and Recreational Aviation, and the Principal Medical Officer, in respect of safety education, placarding of microlight aircraft and raising awareness of the need for medical certificate holders to notify changes in health.

### **3. Conclusions**

- 3.1 The pilot was appropriately certificated for the flight.
- 3.2 The pilot held a Class 2 medical certificate, the validity of which was compromised by undeclared changes in his health since issue.
- 3.3 The aircraft had a valid flight permit.
- 3.4 There was no evidence of any pre-existing mechanical defect with the aircraft.
- 3.5 While being operated at low altitude, the aircraft stalled and entered a spin at a height too low for safe recovery.
- 3.6 The toxicology report revealed the presence of antidepressants in the pilot's bloodstream.
- 3.7 The pilot's judgment, cognitive processes and motor skills could have been impaired by this medication.
- 3.8 The pilot's decision to attempt a practice forced landing without power, and his subsequent failure to maintain control of the aircraft may have been as a result of this impairment.
- 3.9 The pilot had not notified CAA of the change in medical status.

#### 4. Safety actions

- 4.1 The CAA Manager Sport and Recreational Aviation is to stage a “roadshow” promoting awareness of human factor elements from past aircraft accidents and adequate operational training in respect of stall and spin recovery techniques.
- 4.2 A change to rule 103.107 is under consideration, proposing a requirement to add a placard in each class 2 microlight aircraft, warning that the pilot of the aircraft is not required to hold a Part 67 medical certificate or a Part 61 pilot licence, and suggesting that the passenger verify the pilot’s medical status. In addition, there are likely to be international changes in medical and licensing requirements for this sector of aviation.
- 4.3 An article is to be included in *Vector* to remind all certificate holders of their responsibilities under section 27C of the Civil Aviation Act. Also, the Principal Medical Officer has initiated a campaign to highlight responsibilities under section 27C to general medical practitioners and aviation medical examiners.

Report written by:

Authorised by:

(Signed)

(Signed)

S Walker  
Safety Investigator  
23 June 2004

Max B Stevens  
Deputy Director of Civil Aviation