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Bureau d'enquête sur les accidents d'aviation BEAA  
Ufficio d'inchiesta sugli infortuni aeronautici UIIA  
Uffizi d'inquisiziun per accidents d'aviatica UIAA  
Aircraft Accident Investigation Bureau AAIB

# **Final Report No. 1968 by the Aircraft Accident Investigation Bureau**

concerning the accident

to the Christen Eagle II aircraft, registration N444MM

on 24 October 2004

in the municipality of Rarogne/VS

38 km east-north-east of Sion

**Ursache**

Der Unfall ist auf den Bruch des Fahrwerks bei einer Notlandung auf freiem Gelände nach einem Leistungsabfall des Motors zurückzuführen. Der Leistungsabfall war eine Folge der Verstopfung der Einspritzdüse des Zylinders Nr. 3.

## General information on this report

This report contains the AAIB's conclusions on the circumstances and causes of the accident which is the subject of the investigation.

In accordance with Annex 13 of the Convention on International Civil Aviation of 7 December 1944 and article 24 of the Federal Air Navigation Law, the sole purpose of the investigation of an aircraft accident or serious incident is to prevent future accidents or serious incidents. The legal assessment of accident/incident causes and circumstances is expressly no concern of the accident investigation. It is therefore not the purpose of this investigation to determine blame or clarify questions of liability.

If this report is used for purposes other than accident prevention, due consideration shall be given to this circumstance.

The definitive version of this report is the original in the French language.

All times in this report, unless otherwise indicated, are indicated in the standard time applicable to the area of Switzerland (local time – LT), corresponding at the time of the accident to Central European Summer Time (CEST). The relationship between LT, CEST and coordinated universal time (UTC) is:  $LT = CEST = UTC + 2 \text{ h}$ .

For reasons of protection of privacy and simplicity, the masculine form is used in this report for all natural persons, regardless of their gender.

## Final Report

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<b>Aircraft</b>	Christen Eagle II ( <i>experimental</i> ) aircraft	N444MM
<b>Operator</b>	Private	
<b>Owner</b>	Private	

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<b>Pilot</b>	Swiss citizen, born 1963		
<b>Licence</b>	Swiss private pilots' licence PPL(A) with extension ACR(A) American private pilots' licence, based on the Swiss licence		
<b>Flying hours</b>	<b>Total</b>	581:16	<b>during the last 90 days</b> 36:05
	<b>on the type involved in the accident</b>	160:00	<b>during the last 90 days</b> 31:30

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<b>Location</b>	Rarogne, 1.5 km east of the aerodrome		
<b>Coordinates</b>	631 100 / 128 750	<b>Elevation</b>	637 m AMSL
<b>Date and time</b>	24 October 2004 at 15:50 LT		

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<b>Type of use</b>	Private VFR
<b>Flight phase</b>	Climb after take-off
<b>Type of accident</b>	Loss of engine power, emergency landing

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### Injuries to persons

Injuries	Crew	Passengers	Other persons
<b>Fatal</b>	---	---	---
<b>Serious</b>	---	---	---
<b>Slight/none</b>	1	1	

**Damage to the aircraft** Landing gear, lower wings, propeller and fuselage

**Damage to third parties** Traces of impact in the field

## 1 Factual information

### Preliminaries

As part of a recreational day organised by a paragliding club at Rarogne aerodrome, aerobatic flights were offered to the participants on different aircraft, including the Christen Eagle II, registration N444MM.

On this Sunday, 24 October 2004, the aircraft was refuelled with 75 lt of fuel and carried out an initial flight lasting 14 min without any problems.

### History of the flight

At about 15:50 LT, the Christen Eagle lined up on runway 10 of Rarogne aerodrome for a take-off alongside a Cap 10 aircraft, positioned to the front and right. The passenger on board had taken up his position in front of the pilot.

Just after take-off, in the climb phase, the pilot of N444MM noticed a drop in engine power accompanied by detonations. At that time, the aircraft was at an altitude of approximately 1000 ft, flying in the direction of Viège. The pilot immediately began to make a 180° turn back towards the Rarogne runway. Throughout this manoeuvre, according to his statements, he tried, by repeated movements of the throttle, to regain power and ensured that the mixture lever was in the rich position. Judging that he would not reach the airfield, he decided to make an emergency landing in a field of alfalfa approximately 1.5 km east of the aerodrome. Before doing so, he managed to send out a distress message *Mayday Mayday Mayday* which was received by the Rarogne aerodrome manager.

Two witnesses noticed the emission of smoke in the form of small, successive dense clouds from the aircraft's exhaust silencer.

In view of the proximity of the site chosen for the emergency landing and the altitude of the aircraft, the pilot made a sideslip approach. Just before ground contact, the pilot cut off the fuel supply, causing the engine to stop. The wheels touched down normally. However, an irrigation channel crossing the roll axis caused the landing gear to break and the aircraft continued on its nose for about fifty metres before coming to a standstill.

Fire did not break out and the two occupants, uninjured, managed to exit the cockpit unaided.

### Aircraft information

Manufacturer:	Private
Type and serial number:	CHRISTEN EAGLE II, MM1, <i>experimental</i>
First flight:	11.02.1989
Characteristics:	Biplane of hybrid construction, canvas-covered, with fixed landing gear
Engine:	4 cylinder piston, injection
Manufacturer and type:	Avco/Lycoming AEIO-360-A1D, 200 hp
Year of construction:	1986
Serial number:	L19617-51A
Injection system:	Bendix RSA-5AD1, S/N 71179
Propeller:	HARTZELL, P/N HC-CZYK-4/C7666A-2, S/N DN1696

Airworthiness certificate: SPECIAL, issued by the FAA on 30.10.1989  
Area of use: VFR by day, non-commercial operation  
Special rating: Occasional use of Swiss airspace for an aircraft in the *experimental* category registered in the United States, issued by the FOCA on 27.04.2004 and with an expiry date of 13.04.2005

### **Flying hours at the time of the accident**

Airframe: 388:36 hours  
Engine: 388:36 hours

On 17 April 2004, by 359 airframe and engine flight hours, maintenance has been attested by a private individual in accordance with the document *CFR 14 part. 43 appendix «D»*. This person was holder of a FAA (*federal aviation administration*) maintenance licence.

### **Findings on the engine**

An operating test of the engine was carried out on the test bench.

The experts' report mentions the following conclusions:

- No fault in installing the engine on the aircraft was found.
- The radiator pipe broke as a result of the accident.
- The oil drained represented 7.5 lt, for a total capacity of 8 lt.
- The oil pressure, oil temperature and cylinder temperature parameters were correct.
- The engine was running on 3 cylinders, causing vibration as well as emissions of smoke.
- The No. 3 cylinder injector was clogged by a rubber-like particle.
- Cleaning the No. 3 cylinder injector allowed the engine to operate normally.
- Inspection of the oil pressure and inlet filters revealed the presence of copper-plated particles which were judged to be insignificant.
- The spark plugs were functioning correctly.

### **Additional information**

In his statement, the pilot says that he had observed a drop in the oil pressure, without being certain of this. He stated that the mixture control had remained in the rich position and that the engine had not stopped.

## Weather conditions according to MétéoSuisse

### *Allgemeine Wetterlage*

*Ein Hochdruckgebiet, welches seinen Kern über dem Mittelmeer hat, bestimmt das Wetter in der Schweiz. Mit südwestlichen Höhenwinden werden weiterhin milde und sehr trockene Luftmassen gegen den Alpenraum geführt.*

### *Wetterverhältnisse im Unfallgebiet zur Unfallzeit*

<i>Wolken:</i>	<i>wolkenlos</i>
<i>Wetter:</i>	<i>--</i>
<i>Sicht:</i>	<i>über 30 km</i>
<i>Wind:</i>	<i>Südwest mit 3 Knoten, Windspitzen um 5 Knoten</i>
<i>Temperatur/Taupunkt:</i>	<i>20 °C / 04 °C</i>
<i>0°C Grenze:</i>	<i>12 500 ft AMSL</i>
<i>Luftdruck:</i>	<i>QNH LSZH 1014 hPa, QNH LSZA 1019 hPa, QNH LSGG 1015 hPa</i>
<i>Sonnenstand:</i>	<i>Azimut 222°, Höhe 22°</i>
<i>Gefahren:</i>	<i>keine erkennbaren</i>

### Translation:

#### General situation

A high-pressure area centred over the Mediterranean was affecting the weather in Switzerland. High-altitude south-westerly winds continued to push masses of mild, very dry air towards the Alps.

#### Weather conditions at the time and place of the accident

Cloud:	no cloud
Weather:	--
Visibility:	more than 30 km
Wind:	south-west, approximately 3 kt, gusting to 5 kt
Temperature/dew point:	20 °C / 04 °C
0° C isotherm:	12,500 ft AMSL
Pressure:	QNH LSZH 1014 hPa, QNH LSZA 1019 hPa, QNH LSGG 1015 hPa
Position of the sun:	azimuth 222°, elevation 22°
Hazards:	none

## **2 Analysis**

### **2.1 Technical aspects**

The expert report on the engine enabled the reason for its malfunction to be identified.

The No. 3 cylinder injector was blocked by a rubber particle, the origin of which could not be determined. The obstruction in the concerned injector caused the engine to malfunction and, consequently, caused a considerable reduction in its performance, but did not cause it to stop.

Testing the engine on the test bench revealed no other anomalies.

### **2.2 Operational aspects**

The decision to opt for an emergency landing was justified, especially as the terrain chosen for the landing was close.

The environment appeared favourable for the emergency landing because the size of the field would allow the aircraft to come to a standstill.

From his position, the pilot could not see the drainage ditch which crossed the axis of his landing. The channel was about 20 cm wide and was partly covered with alfalfa.



### 3 Conclusions

#### 3.1 Findings

- The pilot was the holder of a private pilots' licence for aircraft PPL(A).
- The pilot possessed the ACR (A) extension issued on 22.06.2004.
- The pilot was the holder of a valid American private pilots' licence (Airplane single engine land) issued on the basis of his Swiss licence.
- The last medical examination was on 3 November 2003, with an expiry date of 26 November 2005.
- The pilot was in possession of a radiotelephony licence RTI (VFR).
- The aircraft belonged to the *experimental* category.
- The aircraft had special authorisation for occasional use of Swiss airspace for an aircraft in the *experimental* category registered in the United States, issued by the FOCA on 27.04.2004 and with an expiry date of 13.04.2005.
- At the time of the accident, the mass and centre of gravity were within the prescribed limits.
- The quantity of fuel onboard was sufficient to make the flight.
- The expert technical report revealed a malfunction of the cylinder No. 3 injector.
- The weather conditions did not influence the accident.
- This was the second flight of the day; the first, lasting 14 min, had taken place shortly before.

#### 3.2 Cause

The accident was caused by the landing gear breaking during an emergency landing in a field following a loss of engine power, due to obstruction of the No. 3 cylinder injector.

Berne, 17 October 2007

Aircraft Accident Investigation Bureau

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