

COPY



**MINISTÉRIO DA ECONOMIA E DO EMPREGO**  
**GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES**  
**(GPIAA)**

## **FINAL ACCIDENT REPORT**

**Operator – Private**

**Aircraft – BINGO**

**EC-EG4**

**Cerval**

**4th May 2010**

**FINAL ACCIDENT REPORT Nr. 03/ACCID/2010**

**NOTE**

This report is a process conducted for the purpose of accident prevention which includes the collection and analysis of information, the determination of causes and, when appropriate, the making of safety recommendations, in accordance with annex 13 to the Convention on International Civil Aviation, with Regulation (EU) No 996/2010 of the European Parliament and of the Council, October 20, 2010, and with paragraph 3 of art. 11 of Dec.-Law No. 318/99 of 11 August. It is not the purpose of any such accident investigation and the associated investigation report to apportion blame or liability.

*This report has been released in Portuguese and English Languages.  
In case of conflict, Portuguese version will take precedence.*

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## Synopsis

The aircraft took off from the Cerval aerodrome, on Northern Portugal, to carry out a local VFR flight with a pilot and a passenger on board. The sky was clean and the wind was blowing from the North-West with 10 Kts of intensity. After 45 minutes of flight, when it was 1200 feet AGL at south of the aerodrome, the engine of the aircraft began to lose power, accompanied by sharp lowering of the temperature of the right cylinder.

The pilot was unable to lead the aircraft to the runway, due to the high rate of descent and the nose wind. The emergency landing was planned for a land of small dimensions. During the descent, the pilot detected the presence of an electric cable and decided to change speed for altitude to avoid the collision with the cable.

After have passed over the electric cable, the pilot actuated the parachute of the aircraft. The parachute inflated and the aircraft began to descend in a nose down attitude until landed on the backyard of a Villa.

The aircraft suffered damage to propeller blades, engine cowling, and wings.

The pilot and the passenger suffered slight injuries.

An investigator of GPIAA travelled to the site of the accident.

The investigation concluded that the engine failure was due to absence of the spark plug on right cylinder.

## 1. FACTUAL INFORMATION

### 1.1. History of flight

On 4<sup>th</sup> May 2010, by 08:15 UTC<sup>1</sup>, a micro light aircraft, registration EC-EG4, took off from runway of Cerval to perform a leisure flight in VFR conditions, carrying on board two Spanish citizens, one male pilot of 35 years old and a female passenger of 18 years old. On site, the sky was clean and the wind was blowing from Northwest with approximately 10 Kts intensity.

The take-off from runway of Cerval was normal and the aircraft began to turn towards the South. After 45 minutes of flight, when the aircraft was at 1200 feet of altitude, gave up the partial loss of engine power. The pilot checked the engine instruments and detected that the right cylinder temperature was lowering quickly.

In the meantime the pilot has directed the aircraft to the aerodrome of Cerval but, upon reaching 1000 feet of altitude, he found that was impossible to reach the runway and decided to make an emergency landing on a flat terrain, with about 400 square meters.

The approach to the field was made at a speed of 100 km/h and with approximately 600 feet of rate of descent. The aircraft was already close to the ground, about 100 feet AGL, when the pilot had to increase the angle of attack, to avoid an electric cable, which caused the speed to drop to about 60 km/h.

At this time, the pilot decided to activate the parachute system. With the parachute inflated the aircraft lost the ability to translational starting to descend in an attitude of nose down, until hit the ground.

The pilot and the passenger suffered minor injuries and came out of the aircraft by own means. The passenger was assisted by medical services and transported later to the hospital of Tuy (SP) for to be observed.

The aircraft suffered damage on the propeller blades, engine cowling, and wings.

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<sup>1</sup> All times referred in this report is UTC (Universal Coordinated Time). Legal Time = UTC + 1.

## 1.2. Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor/None	1	1	

## 1.3. Damage to aircraft

The aircraft suffered substantial damage.

## 1.4. Other damage

There was no third party damage reported.

## 1.5. Personnel information

The pilot was entitled with an Ultra light Pilot License, issued by Spanish Civil Aviation Authority and from his documents the following references were taken:

Personal References		Flight Experience		Medical Examination	
Sex:	Male	Total:	286:00	Class:	2
Age:	35	On type:	N/A	Date:	28-08-2009
Nationality:	Spanish	Last 90 days:	N/A	Validity:	2011
Flight License:	PU	Last 30 days:	N/A	Limitations:	NIL
Issued by:	DGAC (SP)	Last 7 days:	N/A		
Validity:	10-09-2010	Last 24 hours:	N/A		

## 1.6 Aircraft information

It was a Micro light aircraft equipped with an engine HKS 700E, debiting a maximum power of 60 HP at 5800 r/min, and with a propeller of three blades.

The loss of speed with flaps was 48 km/h.

Maintenance inspections were carried out by the pilot at each 25, 50.100 and 200 hours of flight.

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The spark plugs were checked on 25/04/2010 during the inspection of 25 hours. At that time the aircraft had accumulated 274 flight hours.

Reference	Airframe	Engine	Propeller
Manufacturer:	I.C.P. srl	HKS	N/A
Model:	I.C.P. Bingo	700E	N/A
Serial Nr.:	04-06-52-160	N/A	N/A
Year of manufacture:	2004	N/A	N/A
Total Hours:	286:00	286:00	286:00
Flight Time TSN/TSO:	36:00	36:00	36:00
Last inspection:	25-04-2010	22-03-2010	
MTOM:	450 kg		

The plane was equipped with an emergency parachute "ALPHA" (fig. nº 1) developed for use in ultra light aircraft and some light aircraft. The equipment had 9 kg of mass and was limited to 475 kg payload and speed of 250 km/h. The Manual of the equipment (Spanish version) says that the parachute should be installed in a location that does not adversely affect the Centre of gravity of the aircraft.



Figure Nº 1 - Parachute

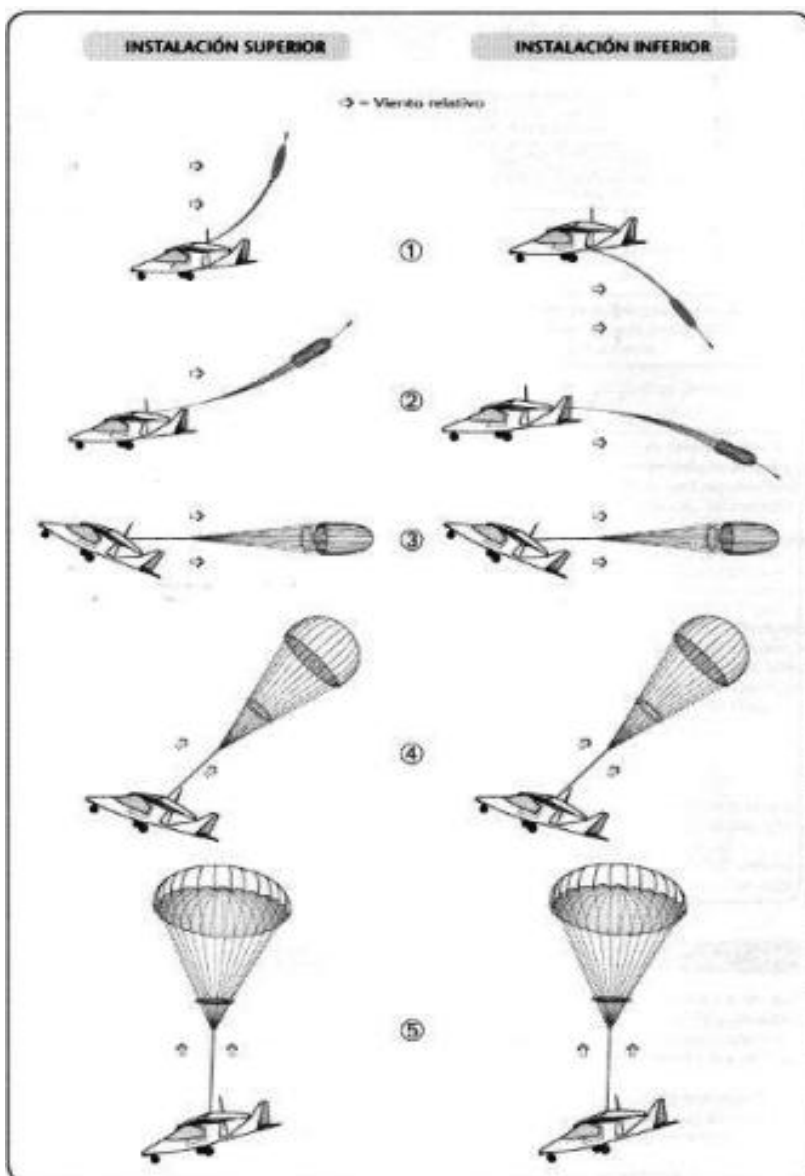
The system consists of an inflatable parachute and a bottle containing solid fuel. A dual ignition system minimizes the possibility of accidental actuation of the bottle. The ignition is initiated through the percussion of a fulminant that ignites the fuel.

The equipment was designed to be used at very low altitudes<sup>2</sup>.

<sup>2</sup> An intervener in a rescue situation is convinced that triggered the parachute at less than 50 meters above the ground.

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After the parachute inflation the speed of the aircraft will tend to decrease to zero. The rate of descent will be about 5 to 10 meters per second (15 to 30 km/h). Depending on many variables it is likely that arise some pendulum movements during inflation. If the actuating altitude is low, between 30 to 150 meters, the pendulum movement can be not completed before the plane reached the Earth. In these cases the airplane can touch the ground on an abnormal attitude which could result in injuries in its occupants.



**1.7 Meteorological information**

The sky was clean. The wind blew from 340/10 kts.

**1.8 Aids to navigation**

N/A.

**1.9 Communications**

The aircraft was not equipped with communications system.

### 1.10 Landing area information

The aircraft "landed" on the backyard of a Villa, a place where there were nearby, high trees, powerlines and latticework doors vineyards.



Figure nº 2 – position of the aircraft.



Figure nº 3 – detail of parachute.

### 1.11 Flight recorders

The aircraft was not equipped with flight recorders.

### 1.12 Wreckage and impact information

The aircraft struck the ground in a nose down attitude.

The tips of the propeller blades were slightly bent indicating windmill motion.

The engine lacked the spark plug of the right cylinder. The fairings had been damaged.

The wings were damaged.

The wheel of the left train was missing.



Figura nº 4 – grupo moto propulsor.

### 1.13 Medical and pathological information

N/A.

### 1.14 Fire

There was no fire.

### **1.15 Survival aspects**

The pilot activated the emergency parachute that worked effectively. After the opening of the parachute, the aircraft descended leaning forward. The contact with the ground was made over the engine, positioned ahead of the cockpit.

The crash was witnessed by local people that immediately gave the alert. The pilot and passenger came out from the aircraft by own means.

A medical team and two ambulances came to the site of the accident, about 5 minutes after the alert. The pilot did not need special care. The passenger was transported to the hospital of Tuy, at her request.

### **1.16 Tests and research**

The spark plug of the right cylinder was not found at the scene of the accident and has been concluded that jumped during the flight. The absence of the spark plug caused the lack of ignition and the consequent failure of the engine.

### **1.17 Organizational and management information**

N/A

### **1.18 Additional information**

The pilot felt that the parachute was not well placed in relation to the Centre of gravity, which caused the plane descend in an attitude of nose down. The pilot delayed the opening of the parachute because he was feared to be dragged by the wind, in the direction of high-voltage power lines or trees existing in the area.

## **2. ANALYSIS**

### **2.1 Operational procedures**

When the engine failed, the aircraft was flying over a terrain with obstacles that made it difficult the selection of a place with reasonable conditions to an emergency landing.

The option of the pilot fell in a backyard of small dimensions, near houses, high trees, power lines and latticework doors vineyards. During the approach, the pilot was confronted with the presence of a high voltage line and saw in contingency to climb to avoid the contact of the aircraft with a cable. During the manoeuvre the speed of the aircraft fall to critical values, close to the stalling speed, committing the landing conditions. Against this background, the pilot decided to activate the parachute system of aircraft which functioned effectively.

The landing of the aircraft was made in an attitude of nose down, over the engine that, given the proximity of the cockpit, will have had a direct relationship with slight injuries suffered by the two occupants.

The attitude of the aircraft during the contact with the soil can be related with the installation of parachute in a position behind the centre of gravity, a fact admitted by the pilot.

### **2.2 Aircraft**

#### **2.2.1 Engine**

The failure of the engine occurred after 45 minutes of flight, accompanied by sharp lowering of the temperature of the cylinder. During the observation of the engine, done at the place of the accident, has been detected that lacked the spark plug of the right cylinder. The absence of the spark plug caused the decompression of the cylinder, the lack of ignition and the consequent failure of the engine.

The spark plugs had been set aside for verification, in 4/25/2010, at the time of the 25 hours inspection. From this date, the engine had accumulated 14 hours work.

The investigation considers that the spark plug had jumped due to poor grip, in conjunction with vibrations from the engine.

#### **2.2.2 Parachute**

The use of aircraft's parachutes should be considered only in situations involving high risk and low probability of survival, such as the collisions in the air, structural failure, loss of control, pilot incapacitation and engine failures over very rough terrain which was the case.

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Despite the parachute has fulfilled its function effectively, the two occupants suffered slight injuries which seem to be related to the attitude of the aircraft at the time of contact with the floor, a fact which deserves to be analyzed.

The parachute must be installed in a position that does not affect the centre of gravity of the aircraft, in accordance with the Manual. Although the Manual does not specify the reason for this installation we believe that is related to the aircraft flight envelope and, ultimately, with his control in flight. On the other hand, if the parachute is installed away from the centre of gravity the aircraft will tend to descend leaning to the side of the CG.

Although the use of airplane parachute is unusual it is important to consider whether their use requires adjustments to each flight, depending on the number of occupants, i.e. the position of centre of gravity.

Investigation admits that the parachute was installed for the condition of the aircraft flying with only pilot. It turns out that, with two occupants, the aircraft's CG moved closer to the front that resulted in a nose down attitude, during the descent assisted by parachute. Adjusting the position of the parachute to a position closer to the Centre of gravity would have countered the tendency of the aircraft put the nose down what would be more favorable for the two occupants.

Another hypothesis to justify the attitude of the aircraft is that the parachute has been activated at very low altitude, which would not have allowed the aircraft's position to stabilize before touching the ground. This possibility is provided in the Manual of the parachute. (see paragraph 1.6).

### **3. CONCLUSIONS**

#### **3.1 Findings**

1. The pilot had a valid licence and was duly qualified to operate the aircraft;
2. The maintenance of the aircraft was carried out by the pilot.
3. The engine failure was accompanied of the lowering of temperature on the right cylinder.
4. The parachute of the aircraft was activated by the pilot close to the ground.
5. The aircraft struck the ground over the engine.
6. The right cylinder spark plug was missing.
7. The aircraft suffered damage on the propeller, engine cowling, and wings.
8. The two occupants of the aircraft suffered slight injuries.
9. No third party damage was reported

#### **3.2 Causes of the accident**

The accident was due to the loss of engine power by absence of the right cylinder spark plug.

## **SAFETY RECOMMENDATIONS**

The investigation identified the cause of the accident but was unable to determine the reason why the spark plug was missed from the engine. However, points to the possibility of spark plug having been poor tight that, associated with the vibrations of the engine, could justify the occurrence. On the other hand, is the first time that we are faced with the opening of a parachute of emergency installed in the aircraft and used as a last resort. The unusually of the case and the fact to have contributed to the survival of the two occupants of the aircraft deserve to be highlighted.

Nevertheless, the investigation highlights that the installation of the parachute should be made in accordance with the manufacturer's recommendations. Indeed, the manufacturer recommends that the parachute be installed near the centre of gravity, certainly for the sake of balance, but also to allow better conditions to landing – with the aircraft in a landing attitude – which is more favourable to the (s) its occupant (s).

This report does not sustain recommendations.

Lisbon, 26th of October 2011

The Investigator in Charge,



Fernando Lourenço

ACRONYMS

AGL	Above Ground Level
SP	Espanha
CG	Centre of gravity
DGAC	Dirección General de Aviación Civil
HP	Horse power
INEM	Instituto Nacional de Emergência Médica.
MTOM	Maximum Take of Mass
N/A	Not applicable
NIL	Nothing none
PU	Ultra light pilot
KG	Kilograms
Kts	Knots
VFR	Visual Flight Rules