

Technical report

A-014/1998

**Accident involving Akrotech G-202 aircraft,
registration F-WSLB, near Girona Airport
on 3 May 1998**



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Foreword

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances in which happened the event being investigated, with its causes and its consequences.

In accordance with the provisions of Law 21/2003 and Annex 13 to the Convention on International Civil Aviation, the investigation has exclusively a technical nature, without having been targeted at the declaration or assignment of blame or liability. The investigation has been carried out without having necessarily used legal evidence procedures and with no other basic aim than preventing future accidents.

Consequently, any use of this report for purposes other than that of preventing future accidents may lead to erroneous conclusions or interpretations.

This report has originally been issued in Spanish language. The English translation is provided for information purposes only.

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Abbreviations

00 °C	Degrees Celsius
00° 00' 00"	Degrees, minutes and seconds
Ac	Altostratus
ACC	Area Control Centre
ADF	Automatic Direction Finder
AIP	Aeronautical Information Publication
APP	Approach Control
ATC	Air Traffic Control
CAT I	Category I ICAO
Ci	Cirrus
CRM	Crew Resource Management
CTE	Commander
CTR	Control Zone
Cu	Cumulus
CVFR	Controlled Visual Flight Rules
CVR	Cockpit Voice Recorder
DH	Decision Height
DME	Distance Measuring Equipment
E	East
EPR	Engine Pressure Ratio
EM	Emitter
ETA	Estimated Time of Arrival
FAP	Final Approach Point
FDR	Flight Data Recorder
ft	Feet
g	Acceleration due to gravity
GPWS	Ground Proximity Warning System
h. min: seg	Hours, minutes and seconds
hPa	Hecto-pascal
IAS	Indicated Air Speed
IFR	Instrumental Flight Rules
ILS	Instrumental Landing System
IMC	Instrumental Meteorological Conditions
INTA	National Institute of Aerospace Technology
Kms	Kilometres
Kts	Knots
Kw	Kilowatts
lbs	Pounds
m	Metres
MAC	Mean Aerodynamic Chord
mb	Milibars
MDA	Minimum Descent Altitude
MDH	Minimum Descent Height
METAR	Meteorological Actual Report
MHz	Megahertz
MM	Middle Marker
N	North
N/A	Not Applicable
NDB	Non Directional Beacon
MN	Nautical mile
OM	Outer Marker
P/N	Part Number
PF	Pilot Flying
PNF	Pilot Not Flying
QNH	Air pressure adjustment to make the altimeter mark the altitude of the airport above sea level during landing and take off

Abbreviations

RVR	Runway Visual Range
S/N	Serial Number
S	South
Sc	Stratocumulus
Shp	Shaft Horsepower
SVFR	Special Visual Flight Rules
TWR	Control Tower
U T C	Universal Coordinated Time
VIP	Very Important Passenger
VMC	Visual Meteorological Conditions
VOR	VHF Omnidirectional Radio-Range
W	West

1. FACTUAL INFORMATION

1.1. History of the Flight

The aircraft, with only the pilot on board, had taken off from Gerona Airport to carry out aerobatic flight practice, as it had been doing throughout the week in collaboration with two other aircraft, belonging to the "Midi Pyrénées Voltige" Aeroclub of Fonsorbes (France) that had been moved to the aforementioned airport to perform aerobatic exercises.

These aerobatic exercises were supported from the ground by an instructor via a radio frequency authorised by the airport control tower.

About ten minutes following the take off, at around 13:10 h local time, and after having performed performing a series of programmed manoeuvres, the aircraft made an unexpected turn, out of the programmed sequence, descending in inverted attitude, practically vertical, and rotating around the axis of descent, according to witness testimonies.

After the aircraft impacted with terrain, a fire broke out which was later put out by airport fire-fighters.

As a result of the impact and post-impact fire, the aircraft pilot died, and the aircraft was destroyed.

1.2. Injuries to Persons

Injuries	Fatal	Serious	Minor/None
Crew	1		
Passengers			
Others			

1.3. Damage to Aircraft

The aircraft was destroyed as a result of the impact with terrain and the post-impact fire.

1.4. Other Damage

None was identified.

1.5. Personnel Information

1.5.1. Pilot in Command

Age/Sex: 37 year/Male
Nationality: French
Licence: Private Pilot aeroplane, issued in 1983
Glider Pilot, issued in 1986
Total flight time: 445 h
Total flight time as pilot
in command: 336 h

1.6. Aircraft Information

1.6.1. Airframe

Make: AkroTech
Model: G-202
Manufacturing Number: 27
Registration: F-WSLB
M.T.O.W.: 725 kg
Owner: Midi-Pyrénées Voltige
Operator: Midi-Pyrénées Voltige

1.6.2. Certificate of Airworthiness

Number: E035/98
Type: Prolonged testing
Issue Date: 17/04/98
Expiration Date: 16/04/99

1.6.3. Maintenance Record

There is no information about the aircraft maintenance.

1.6.4. *Engine*

Make: Lycoming

Model: IO 360

No other information about the engine was obtained.

1.7. **Meteorological Information**

The meteorological conditions were adequate for visual flight. The pilot was informed on take-off of QNH 1007, and wind 230/15 knots.

1.8. **Aids to Navigation**

Not applicable.

1.9. **Communications**

Two minutes after take off and properly authorised by the control tower, he changed frequency in order to contact the on-ground supervisor. The supervisor attested that during the first ten minutes of flight he made several contacts with the pilot without any problem. However, when he observed that the aircraft was making a turn out of the logical sequence, he tried to contact again with it without getting any response.

1.10. **Aerodrome Information**

The international Airport of Gerona-Costa Brava is located 12 km from the city at an altitude of 142 m with a 2400 × 45 meter runway, and an orientation of 15/195 degrees from the North.

1.11. **Flight Recorders**

The aircraft did not have flight recorders. They are not mandatory for this type of aircraft.

1.12. **Wreckage and Impact Information**

At the accident site, wreckage was found of an aircraft in an inverted position with its fuselage, and the horizontal and vertical stabilisers completely burnt. The engine was

slightly buried and the wheels, located on the sides of the engine, had come off. The wings were intact and practically undamaged by the fire. There was no sign of the aircraft sliding across the ground after impact.

1.13. Medical and Pathological Information

The aircraft occupant died in the post-impact fire.

1.14. Fire

After the impact, there was an explosion followed by a fire that destroyed the fuselage and the tail, being put out by airport fire-fighters who were alerted when the aircraft fall was observed.

1.15. Survival Aspects

Given the characteristics of the accident, the pilot had practically no chance of survival.

The post-impact fire made rescue impossible, according to the testimonies of witnesses that attempted it.

1.16. Test and Research

1.16.1. *Witness Testimonies*

A witness that was taking a walk with his family in the area of the accident, stated that he *"heard the engine of an aerobatic airplane"* and he *"saw how at about 200 or 300 metres over the ground an aerobatic aircraft was falling in a spin to the ground, face down, so that the aircraft wheels were on the upside. During the descent, the aircraft traced a vertical downwards trajectory, making closed circles around the axis of the fall."* He said that he *"ran toward the site where the impact was expected."* *"After a few seconds, the aeroplane impacted in some near-by fields, exploding and starting a fire among the wreckage of the aircraft."* The witness went toward the aircraft with the intention of aiding the occupants, but could not because of the fire that was engulfing the fuselage.

On the other hand, the witnesses of the accident could not appreciate variations in the position of the flight control surfaces or in the sound of the engine as the aircraft was descending.

1.16.2. *Other Research*

The aircraft belonged to the "Midi Pyrénées Voltige" Aeroclub of Fonsorbes (France). Three aircraft of this club had been moved to the Gerona airport to perform aerobatic exercises for a week.

At the moment of the accident, the pilot was carrying out a positive (right-hand) quick barrel roll in climb, with an angle of 45°. He had already carried out this manoeuvre several times during the flight.

The pilot of the involved aircraft belonged to the aforementioned aeroclub since 1986 and was an experienced pilot. No one knew of his having any type of illness that would affect his ability to carry out flights.

On the other hand, the pilot had breakfast early that morning and, at the time of the accident (13:10 h local time), he had not yet had anything for lunch, while his normal schedule was to have lunch within 12:00 h and 12:30 h.

About twelve months before the accident, the involved aircraft had been acquired, brand-new, by the aeroclub from a "kit", whose construction was monitored by one of the witnesses, an aeronautical engineer and a member of the aforementioned aeroclub.

Some aerobatic flights had been carried out throughout the week with the involved aircraft without there having been any mechanical problems.

The G-202 aircraft, with a monocoque structure, is sold by AkroTech Aviation as an aircraft with advanced acrobatic features and is manufactured as a "kit" of carbon fibre parts produced by Composites Unlimited who has designed and produced the jigs, moulds and tools necessary to make easier the parts and elements assembly. The prototype was first-flown at the end of 1995 and the first of the series in 1996.

Since documentation of the involved aircraft was not available, the design load factor was obtained from catalogues and found to be ± 10 G.

Information has been found of two other accidents with this type of aircraft that occurred on 3 May 1999 in the aerodrome of Ancenis (France) where the canopy was lost in flight but the landing was successful without it, and other, occurred in July 2001, in which the aircraft suffered an in-flight break-up.

2. ANALYSIS

2.1. Progress of the Flight

According to the transcription of the communications with the airport control tower, the aircraft took off at 12.50 (local time) for its first flight of the day, to carry out programmed aerobatic exercises, controlled by an on-ground supervisor that stayed in contact with it through a radio frequency authorised by the control tower.

According to the aforementioned supervisor testimony *"after performing the aerobatic manoeuvres programme for 10 minutes, and while he carried out a sequence of specified manoeuvres, he made a turn out of the logical sequence."* Then, he tried to contact the pilot to know what was happening and he did not obtain any response. *"Subsequently, the aircraft began to tumble; from his place he could not appreciate whether any type of manoeuvre was performed to avoid the fall."* Independently of the manoeuvres he was performing, when an experienced aerobatic pilot makes an unexpected turn can be due to a loss of the aircraft control because of some type of physical alteration caused by a spatial disorientation or having been subjected to a high number of G's. The latter seems to be the most probable cause and would explain that the supervisor call did not get any response and the fact that no reaction to avoid the fall was observed.

From the testimony of the witnesses that were taking a walk on the field, it is deduced that the aircraft fell in an inverted spin, with the engine running and at a descent speed that must not have been very high since it gave the witness time enough to *"run out toward the place where the impact was expected."* Visual inspection of the aircraft wreckage confirms that the impact took place in an inverted attitude, and no further displacement could be detected. It is assumed, since the wings had no apparent breaks and the engine was slightly buried, but not the nose, that the vertical speed was low and the angle of the aircraft with the ground was almost null and the wings were levelled.

2.2. Remarks about Physical Incapacitation

The causes that can provoke a sudden incapacitation during flight can be divided into two groups. On one hand, there are those pathologies that can provoke the pilot's incapacitation in an abrupt and unexpected manner, such as an acute myocardial infarction (heart attack), but leaving evident signs in the body which would appear in the autopsy report. On the other hand, there are symptoms like spatial disorientation and loss of consciousness when exposed to high accelerations, closely related to the types of manoeuvres that are performed in an aircraft.

In this case it is unlikely that spatial disorientation is the cause, although it can affect any pilot, even those with a lot of flying experience, because it involves an aerobatic

pilot accustomed to performing the same manoeuvres and on the other hand also because it does not provoke a loss of consciousness, making the incapacitation neither complete nor as sudden.

Although tolerance to high accelerations varies from one person to another, it is true that accelerations higher than positive 5 G's in the longitudinal axis and held (accelerations easily reached in aerobatic manoeuvres) can cause a loss of consciousness in the pilot, and in some cases, if reached very suddenly, without any premonitory signs, such as loss of vision.

In the present case it would be logical to think that an aerobatic pilot knows the symptoms and has a higher tolerance acquired through repeated manoeuvres (training); however, three fundamental factors must be kept in mind:

1. Loss of consciousness can appear without previous loss of vision if the acceleration is reached very quickly.
2. Individual tolerance decreases when manoeuvres with positive and negative accelerations are linked.
3. There are organic factors, some considered banal such as fatigue, common colds, hipo-glycemia, etc. that cause the pilot capacity to decrease and not be the same from one day to another.

During the aerobatic figure that the pilot was performing, it can be assumed that at a certain moment the number of G's tolerated by the pilot was surpassed, resulting in a loss of consciousness (no response to the supervisor's call and no manoeuvres to recover or balance the aircraft) and in a loss of control of the aircraft that stalled and subsequently entered into an inverted spin until impacting with the terrain.

3. CONCLUSIONS

3.1. Findings

- According to the testimonies of the president and members of the aerobatics club to which the pilot belonged, he was an experienced pilot and had all his documents in order.
- The aircraft had a valid Certificate of Airworthiness and had been carrying out flights throughout the week without any malfunction.
- During the first 10 minutes of the flight there was normal radio contact from the ground.
- An unexpected manoeuvre was observed and an attempt was made to make radio contact with the pilot, without receiving any answer.
- The aircraft began to fall spinning.

3.2. Causes

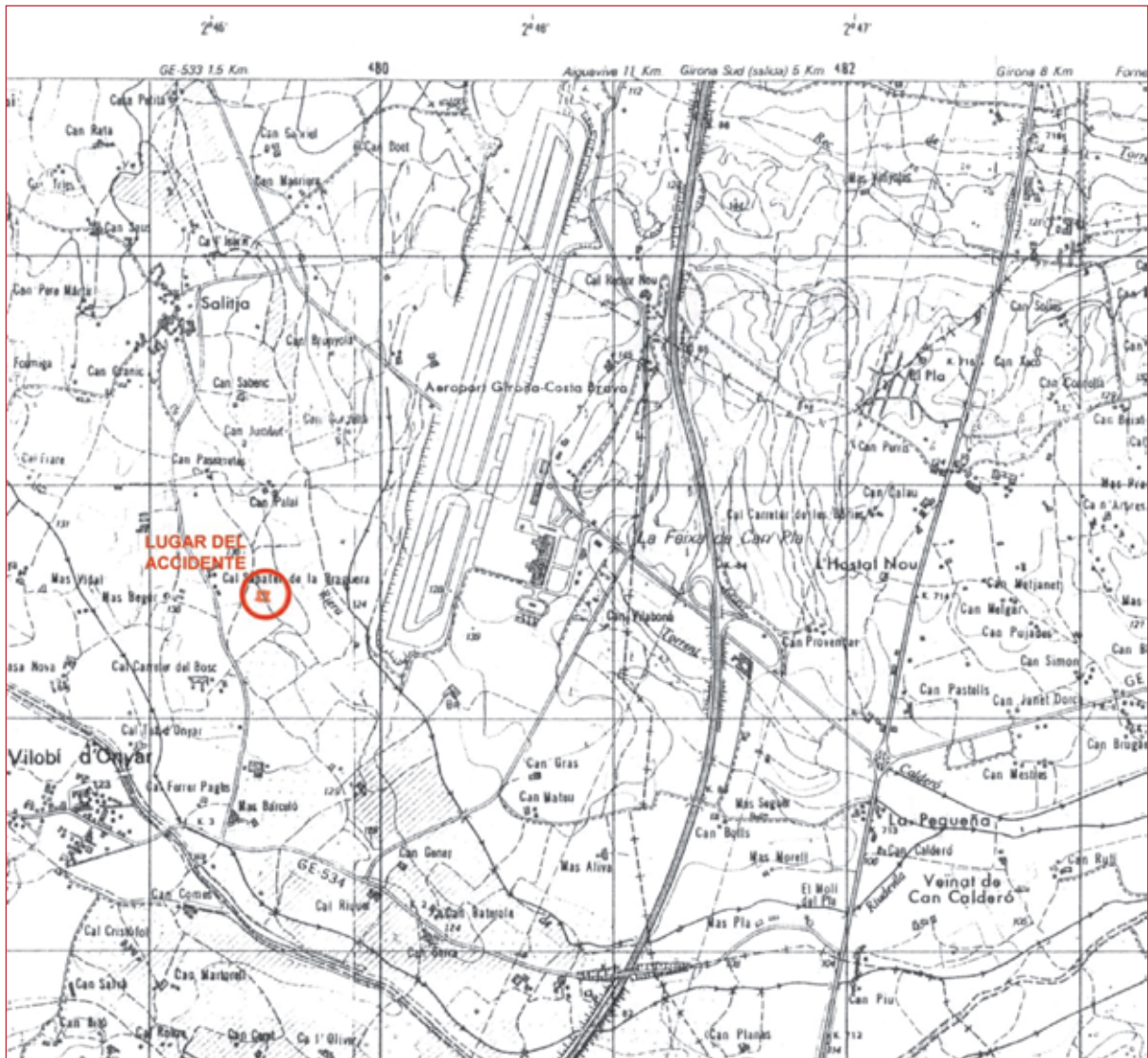
The probable cause of the accident is assumed to be the aircraft entering into an inverted spin when the pilot lost control of the flying controls due to some type of physical incapacitation produced during the course of the aerobatic manoeuvre that he was performing.

4. SAFETY RECOMMENDATIONS

None.

APPENDICES

APPENDIX A
Location of Accident Site



APPENDIX B
Photographs of the Aircraft Wreckage

PHOTOGRAPH N.° 1



*View of the aircraft in the crash area; the airport premises are in the background.
The aircraft is downwards*

PHOTOGRAPH N.º 2



Right rear view with an angle of 45°

PHOTOGRAPH N.º 3



Frontal view with the engine in the foreground