



**COMISIÓN DE
INVESTIGACIÓN
DE ACCIDENTES
E INCIDENTES DE
AVIACIÓN CIVIL**

Report A-027/2015

Accident involving a Piper PA-28-181
aircraft, registration D-ELMN,
in the municipality of Toses (Girona)
on 8 September 2015



GOBIERNO
DE ESPAÑA

MINISTERIO
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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 of the accident object of the investigation, and its probable causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.5 of Regulation (UE) n° 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1.4 and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

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

This report was originally issued in Spanish. This English translation is provided for information purposes only.

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Abbreviations

° ' "	Sexagesimal degrees
°C	Degrees centigrade
AEMET	Spain's National Weather Service
C.G.	Center of Gravity
CAMO	Continuing Airworthiness Management Organization
E	East
ft	Feet
GPS	Global Positioning System
hPa	Hectopascal
in	Inches
km	Kilometers
Km/h	Kilometers per hour
lb	Pounds
LBA	Luftfahrt- Bundesamt. Germany's Civil Aviation Authority
LT	Local time
m	Meters
MHz	Megahertz
N/A	Not affected
N	North
NOTAM	Notice To Airmen
PPL(A)	Private Pilot License (Aircraft)
QFE	Atmospheric Pressure (Q) at Airfield Elevation
QNH	Atmospheric Pressure (Q) at Nautical Height
SE	Southeast
SEP	Single Engine Piston rating
SW	Southwest.
TULM	Ultralight Pilot License
W	West

Synopsis

Owner and Operator:	Private
Aircraft:	Piper PA-28-181, registration D-ELMN
Date and time of incident:	8 September 2015 at 17:20 LT ¹
Site of incident:	Toses (Girona)
Persons onboard:	2; 1 pilot and 1 passenger, killed
Type of flight:	General aviation – Private
Phase of flight:	En route - Cruise
Date of approval:	24 february 2016

Summary of the accident

On Tuesday, 8 September 2015, a Piper PA-28-181 aircraft, registration D-ELMN, suffered an accident when it crashed to the ground in a mountainous area in the vicinity of the municipality of Toses (Girona).

The aircraft, along with two others, had taken off from the San Luis aerodrome (Menorca) on a private flight to the La Cerdanya aerodrome in Girona.

As it neared the Cerdanya aerodrome, the aircraft made a left turn while flying in a valley. During this turn the aircraft impacted the side of a mountain.

The pilot and passenger were killed and the aircraft was destroyed and caught fire.

The investigation has determined that this accident was caused by improper pre-flight planning that did not take into consideration the difficulty of successfully exiting the valley at the altitude at which the aircraft was flying, resulting in a turn to the left and in the collision with the side of the mountain.

¹ Unless otherwise specified, all times in this report are local.

1. FACTUAL INFORMATION

1.1. History of the flight

On 8 September 2015, a Piper PA-28-181, registration D-ELMN, took off from the San Luis aerodrome (Menorca) at 15:31 en route to the La Cerdanya aerodrome (Girona) on a visual private flight that was expected to last 2:10 hours.

This aircraft was the first in a three-airplane formation, with a Eurostar EV97, registration D-MFSB, in second place and a Wassmer WA 40, registration D-EOSI, in third. The formation had filed a flight plan with callsign D-ELMN. The accident aircraft was the leader of the formation, charged with communicating with the various air traffic stations that provided it with traffic information and guidance along the way.



Fig. 1. Aircraft D-ELMN, inside the red circle, recorded by the camera

According to information provided by the crews of the other two aircraft in the formation, the accident crew did not report any malfunctions in the aircraft or any other emergency.

Images were recovered from a camera installed on the second aircraft (D-MFSB) that showed the final moments of the accident aircraft's flight.

These images show how the aircraft, which was flying very close to the ground in a valley, started a turn to the left, a few seconds after which it directly impacted some trees located on the left slope of the valley. The impact was followed by an explosion and a fire.

The occupants perished and the aircraft was destroyed as a result of the impact and the subsequent fire.



Fig. 2. Aircraft D-ELMN, inside red circle, prior to the impact

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal	1	1	2	N/A
Serious				N/A
Minor				N/A
None				N/A
TOTAL	1	1	2	

1.3. Damage to aircraft

The aircraft was destroyed as a result of the impact and the subsequent fire.

1.4. Other damage

Several pine trees were damaged by the aircraft's impact. Due to the high moisture content in the vegetation, the damage caused by the fire was limited to the aircraft.

1.5. Personnel information

The pilot, a 43-year old German national, had a private pilot license (PPL(A)) issued by Luftfahrt-Bundesamt (LBA)², with a single-engine piston (SEP) rating that was valid until 29 February 2016. He also had a medical license that was valid until 20 February 2017. According to his fellow pilots, he had approximately 250 flight hours, of which about 200 had been flown on the accident aircraft.

² LBA Germany's Civil Aviation Authority

The passenger had an ultralight pilot license (TULM).

1.6. Aircraft information

1.6.1. General information

The Piper PA-28-181, registration D-ELMN, was outfitted with a Lycoming O-360-A4M engine with serial number RL-9471-36E. This aircraft was manufactured in 1978 and had serial number 28-7890456.

It had an Airworthiness Review Certificate issued by the Luftfahrt-Bundesamt that was valid until 4 December 2015.

The last maintenance inspection of the aircraft, a 100-hour check, was conducted on 24 November 2014 with 4392 flight hours on the aircraft. This inspection contains 161 items involving checks of parts of the propeller assembly, the engine, the fuselage, the empennage, the wings, the landing gear, the controls, the inside of the cockpit and the gauges located in the cockpit. This inspection was performed by the CAMO DE.MG.0103 Wilhelm Tank GmbH & Co. Mariensiel KG as per the maintenance program approved by the LBA.

It is not known how many flight hours the airplane had at the time of the accident since all of the documentation, which was onboard the aircraft, was destroyed in the fire that broke out after the impact.

1.6.2. Load and balance

Since the aircraft's documentation was destroyed in the fire, it was not possible to precisely determine the aircraft's actual load and balance.

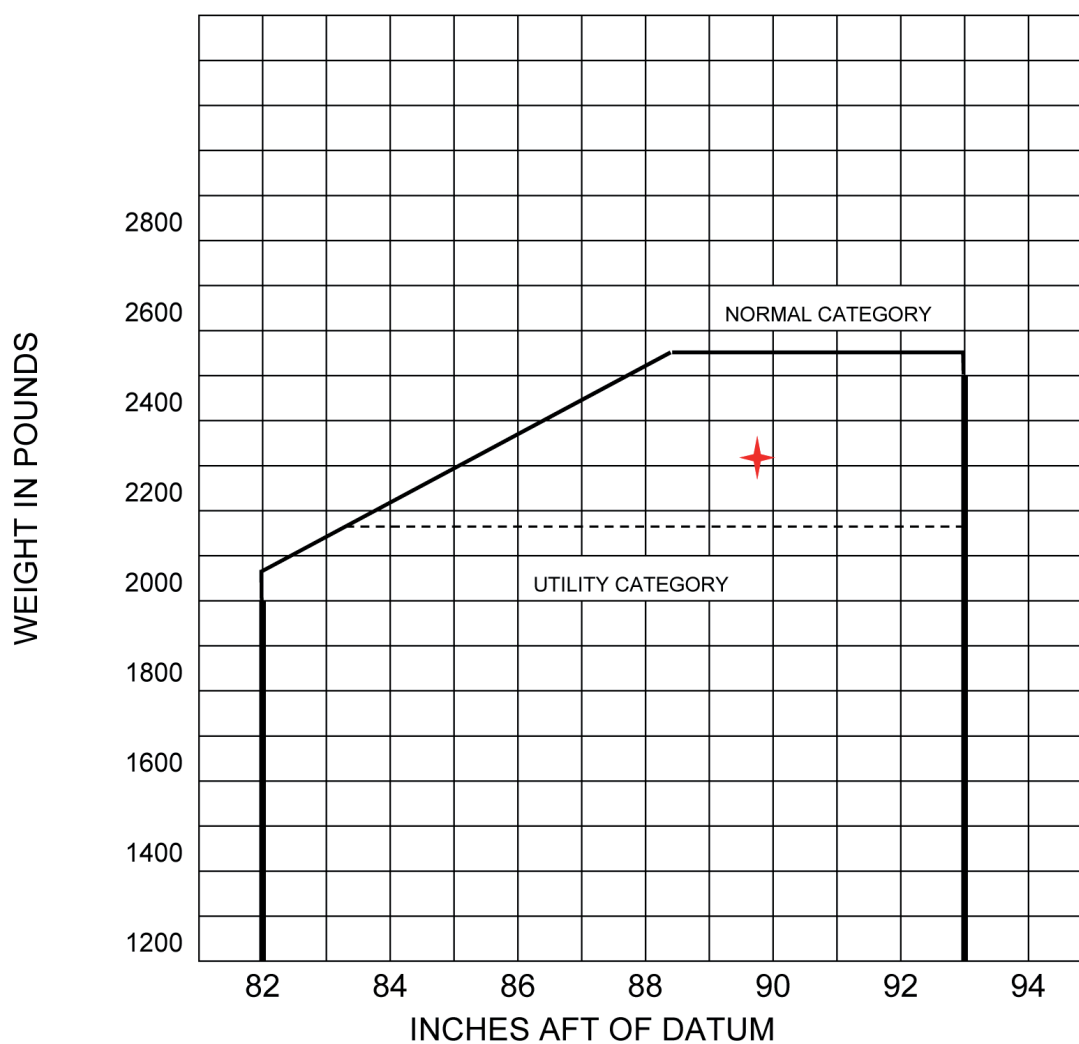
Below is an estimate of the aircraft weights used to attempt to determine its load and balance.

The aircraft was last weighed on 14 January 2011, according to which its basic empty weight was 1631.42 pounds. Each occupant was assumed to weigh 165 pounds. The weight calculation also assumed that each of the aircraft's occupants had baggage weighing some 12 kilos. The aircraft was also assumed to have taken off from the San Luis aerodrome with a full fuel tank (48 gallons).

	Weight (lbs.)	Arm Aft Datum (in.)	Moment (in-lbs.)
Basic Empty Weight	1631.42	89.4	145953.1
Front Seats	330	80.5	26565
Rear Seats	52.91	118.1	6248.671
Fuel (48 max)	288	95.0	27360
Total	2302.33	C.G.	89.52

Based on the above information, the aircraft's load and balance were within the margins specified by the manufacturer.

1.7. Meteorological information



According to Spain's National Weather Service (AEMET), the situation aloft was characterized by the presence of a pocket of cold air associated with a weak low-pressure area centered over the northwest of the Iberian Peninsula. The highest instability should have been more in the areas of Levante and Murcia than in Catalonia. On the ground the peninsular thermal low was very weak, meaning no large convergence zones were expected at low levels.

The satellite and radar images show the presence of intense convective cells in the areas of Castellón and the Balearic Islands, and some cells in the Pyrenees. As a result, the presence of convective cells, or even of some storm activity (not registered on radar), cannot be ruled out in the area of Toses.

The AEMET does not have data for the municipality of Toses, but considering the data from the automatic station in La Molina (about 10 km west), the satellite and radar images and adverse weather warnings, the most likely conditions in the area of the accident were:

- Wind:
 - o Direction: 120°.
 - o Speed: moderate, at 18 km//h.
 - o Maximum gusts: at 36 km/h .
- Visibility: good on the surface.
- Cloudiness: partly cloudy, convective clouds.
- Temperature: 14°C.
- QNH: 1018 hPa.
- Relative humidity: 76%.
- There was no significant precipitation or adverse weather warnings, but there might have been isolated storm activity in the area.

1.8. Aids to navigation

Not applicable. The flight was being carried out under visual flight rules.

1.9. Communications

The communications between the crew and air traffic control services were analyzed and found to contain no emergency reports made prior to the accident.

The crews of the other two aircraft in the formation confirmed that the accident aircraft had not made any distress calls before the accident on the contact frequency they were using.

1.10. Aerodrome information

The Cerdanya Aerodrome is located 2.3 km away from the municipality of Alp (Girona).

Its asphalt runway, measuring 1150 x 23 meters, is in a 07/25 orientation at an elevation of 3609 feet.

The arrival procedures for the aerodrome specify:

Aircraft arriving at the La Cerdanya aerodrome shall report the W, SW, SE or E reporting points marked on the Aerodrome Chart, indicating their altitude and intentions. Aircraft shall fly over the airfield at 5,100' QNH (1,491' QFE) before subsequently joining the start of the downwind leg of the associated South pattern.



Fig. 3. La Cerdanya aerodrome and accident site

If a NOTAM reports skydiving or acrobatic activity over the aerodrome, aircraft shall join the South pattern without flying over the aerodrome.

The pattern shall be flown at 4,600' QNH (991' QFE), avoiding flying over populated areas at all times.

If winds are calm, the preferred runway for landings shall be 07.

The accident occurred in the municipality of Toses, which is approximately 13 km away from the La Cerdanya aerodrome.

1.11. Flight recorders

The aircraft was not equipped with a conventional flight data recorder or with a voice recorder for the pilot's position. The relevant aviation regulation does not require this type of aircraft to have any type of recorder.

1.12. Wreckage and impact information

The accident took place in the town of Toses, specifically in a ravine located near Pla d'Anyella (1840 meters), within the Cadí-Moixeró Natural Park.

The crash site was on a hillside covered by pine trees, fir trees and bushes.

The main wreckage was found at coordinates 42° 18' 45.5" N - 01° 59' 6" E, which is at an elevation of 1679 m.

The aircraft first impacted a pine tree, severing much of its upper section, which fell to the ground alongside the base of the tree. As a result of the impact, the aircraft lost its left wing, which was found hanging from the lower branches of the same pine tree.

After losing its left wing, the aircraft continued turning about its longitudinal axis, falling to the ground in an inverted position. As it fell, it broke branches off other pine trees. Once on the ground it slid downhill before coming to a stop, at which point a fire broke out that consumed the entirety of the cabin.

The fuselage was almost entirely burned by the fire, which also reached the root of the right wing and the area of the fuel tank. The empennage was not affected by the fire.



Fig. 4. Left half wing (L) and debris from the pine tree and aileron (R)

Due to the severely damaged state of the wreckage, it was not possible to determine the positions or readings of the cockpit instruments, or to check the continuity and operation of the flight controls.

The engine and propeller remained attached to the aircraft and were affected by the fire. There were no signs of a failure or fracture prior to the accident.



Fig. 5. Aircraft wreckage

1.13. Medical and pathological information

The autopsy concluded that both the pilot and the passenger had died violently, with the immediate cause of death being the destruction of vital organs, and the fundamental cause being multiple trauma and burns.

1.14. Fire

A fire broke out after the impact that consumed almost all of the aircraft.

1.15. Survival aspects

Given the characteristics of the aircraft's impact against the ground, there was practically no chance for either the pilot or the passenger to survive.

1.16. Tests and research

1.16.1. Statement from the pilot of aircraft D-MFSB

Investigators spoke to the pilot of aircraft D-MFSB after the accident.

The pilot stated that they took off from the San Luis aerodrome in Menorca in a three-airplane formation. The first was D-ELMN, followed by D-MFSB and finally D-EOSI. The flight had been uneventful, and he stayed in constant visual contact with the accident aircraft, which was approximately 2 km ahead of him.

When they were east of Barcelona and heading to La Cerdanya, he started climbing to 6000 ft, and as they neared Ribes de Freser, where the ground starts to gain in elevation, he climbed to 8000 ft. He was flying above the accident aircraft but he could not tell whether aircraft D-ELMN was flying below the elevation of the mountains they had at either side. When they were a short distance away from the destination aerodrome, the pilot of D-ELMN tried to contact the La Cerdanya aerodrome to receive landing instructions, but they did not receive a response. They decided to wait a few minutes before attempting to establish contact with the aerodrome once more. He then saw how aircraft D-ELMN made a left turn and impacted the mountainside and caught fire. He tried to report the emergency on the distress frequency (121.50 MHz) while he circled over the site looking for a suitable place to land so he could try to help his colleagues. Seeing that it was impossible to land in the area, they proceeded to the La Cerdanya aerodrome with haste to report the accident.

The pilot confirmed that at no time did the crew of the accident aircraft report any problems with the aircraft.

1.16.2. *Statement from the pilot of aircraft D-EOSI*

He confirmed that before taking off, they checked the weather information at the destination aerodrome and created a flight plan for the three-airplane formation.

He took off from the San Luis aerodrome in third position in the formation.

In the instants before the accident, he estimated he was some 300 m behind the second aircraft in the formation and about 600 m away from aircraft D-ELMN. As for his vertical separation with the two preceding aircraft, he estimated he was 300 ft below the second aircraft in the formation and 200 feet higher than the accident aircraft.

He saw aircraft D-ELMN start a turn to the left but did not see the accident. At that moment he felt a strong downdraft, as a result of which he applied maximum power and avoided impacting the ground.

At no time did the crew of the accident aircraft report a problem.

They navigated using a Garmin 155 XL GPS unit and they had a flight planning system.

1.17. Organizational and management information

Not applicable.

1.18. Additional information

Not applicable.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. Meteorological situation

Based on the information shown in Section 1.7, the weather conditions present in the area were not limiting for this type of flight.

Visibility in the area was good, with no clouds that could affect the pilot in terms of seeing the mountaintops. The pilot did not consider the presence of convective clouds, indicative of turbulence in the area, and did not increase his separation above the ground, flying very close to it, as shown in the images recorded by the camera onboard the second aircraft in the formation. The pilot of the third aircraft confirmed the presence of turbulence and how, due to said turbulence, he had also been very close to suffering an accident due to flying too close to the ground.

2.2. Analysis of the aircraft wreckage and impact

The aircraft was making a turn to the left at the time of the initial impact. The turn caused the left wing to be lower than the right, resulting in the left wing striking the pine tree, detaching from the fuselage and remaining tangled in the branches. The rest of the aircraft continued on a downward left turn, striking the branches of other nearby pine trees and turning over on its longitudinal axis, impacting the ground in an inverted position. Still upside down, it continued sliding downhill before coming to a stop in a small clearing, where it began to burn. The fire spread quickly, possibly fed by the fuel still inside the aircraft.

The damage to the aircraft was consistent with the left turn the aircraft was making, as evidenced by the images recorded by the camera located in the second aircraft in the formation.

Although the wreckage had been heavily damaged by the effects of the fire, no condition or situation was found that indicated the presence of a fault or malfunction prior to the impact.

The aircraft's load and balance calculation was within the limits specified by the manufacturer and is not believed to have played any role whatsoever in the event.

2.3. Analysis of the flight

According to the crews of the other two aircraft in the formation, the flight was unfolding normally. The pilot of the second aircraft kept the accident aircraft in sight during the entire flight.

Based on the statements of the other pilots in the formation, the accident aircraft was probably flying at 5500 feet, an altitude that is the same as the elevation at which it impacted the ground (1679 meters). It is likely that the proximity of the La Cerdanya aerodrome influenced the crew of the accident aircraft in terms of reducing their separation with the ground and flying very close to the altitude at which they would have had to join the aerodrome pattern (5100 feet). The other two aircraft in the formation were also flying dangerously close to the ground. The second aircraft, the highest of the three, was flying some 500 feet above the accident aircraft, and the third aircraft only 300 feet higher. As a result of flying so low, the third aircraft was almost involved in an accident itself since, as per the pilot's own statement, a strong downdraft nearly propelled them to the ground.

The natural exit out of the valley is at an approximate elevation of 1800 meters. It is possible that, upon reaching the vicinity of the exit, the pilot thought there was insufficient distance to climb and fly over the terrain with a suitable safety margin. Consideration must also be given to the fact that there was turbulence in the area, meaning he may have turned left in an effort to turn around.

All of this leads to the conclusion that the pilot's preparation in terms of the safety altitudes above the ground was deficient. Had the pre-planning been correct, the pilot may have been aware of the elevation at the outlet of the valley and maintained an altitude that would have allowed him to pass through this area with a margin of safety, even in the presence of turbulence.

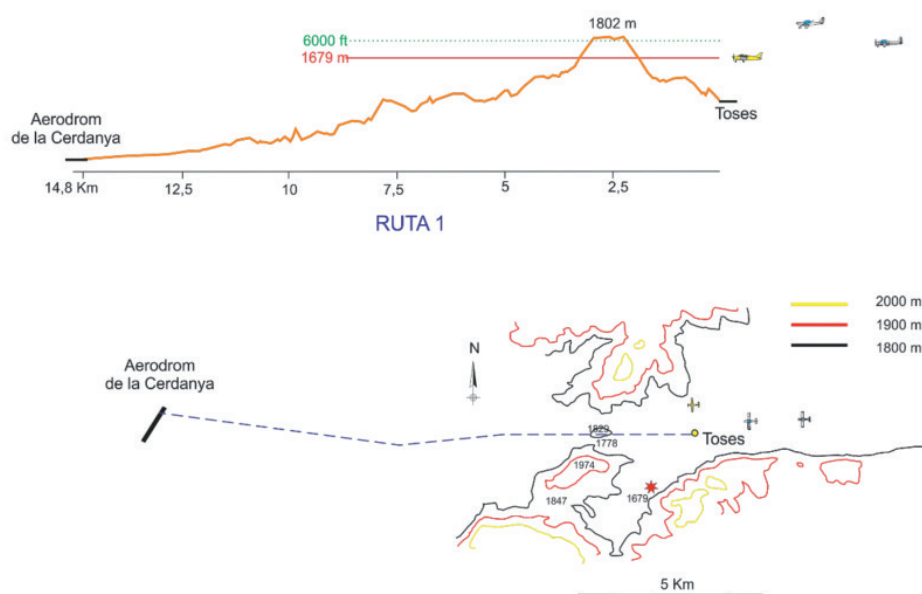


Fig. 6. Aircraft's flight path

3. CONCLUSIONS

3.1. Findings

- The weather conditions were not limiting for the visual flight.
- The aircraft was flying very close to the ground.
- There is no record of any fault or malfunction in the aircraft prior to impact.
- The aircraft's load and balance were within the limits specified by the manufacturer.
- The crew and the aircraft had all the documentation required for the flight.

3.2. Causes/Contributing factors

The accident was caused by improper pre-flight planning that did not take into account the difficulty of successfully exiting the valley at the altitude at which the aircraft was flying. As a result, the pilot made a left turn and collided against the side of the mountain.

4. SAFETY RECOMMENDATIONS

None.

