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Report
ULM A-006/2017

Accident involving a Tecnam P96 G 100 aircraft, registration EC-ZGK, in the vicinity of the Loring airfield (El Molar, Madrid, Spain) on 31 March 2017

GOBIERNO DE ESPAÑA
MINISTERIO DE FOMENTO

Informe técnico

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SUBSECRETARÍA
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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) nº 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, minutes and seconds
°C	Degrees centigrade
AESA	National Aviation Safety Agency
GPS	Global Positioning System
h	Hours
hp	Horsepower
Km/h	Kilometers per hour
LT	Local time
m	Meters
N	North
UTC	Coordinated Universal Time
W	West

Synopsis

Operator:	Private
Aircraft:	Tecnam P96 G 100, registration EC-ZGK
Date and time of accident:	31 March 2017 at approx. 20:30 LT[2]
Site of accident:	Vicinity of the Loring airfield in El Molar (Madrid, Spain).
Persons onboard:	2 occupants, 1 pilot & 1 passenger. Both seriously injured.
Type of flight:	General Aviation-Private
Phase of flight:	Takeoff-Initial climb
Date of approval:	20 December 2017

Summary of accident:

On Friday 31 March 2017, a Tecnam P96 Golf 100 aircraft, registration EC-ZGK, suffered an accident while on a local flight in the vicinity of the Loring airfield in the town of El Molar. There were two persons onboard.

After takeoff, as the aircraft was on the initial climb, the engine cover accidentally opened and the pilot decided to return to the airfield. Upon realizing he would not reach the field, he performed an emergency landing in a crop field. During the landing run, the aircraft impacted a stone wall, which caused it to flip over.

The occupants were seriously injured and the aircraft sustained heavy damage.

2 All times in this report are local unless otherwise specified. On the date of the accident, local time was equivalent to UTC+2.

1. FACTUAL INFORMATION

1.1 History of the flight

On Friday 31 March 2017, a Tecnam P96 Golf 100 aircraft, registration EC-ZGK, took off from runway 24 at the Loring airfield with the intention of making a local flight with a planned duration of fewer than 15 minutes, departing from and landing at the same field. There were two occupants onboard. The pilot stated that they had delayed the departure to wait for the wind conditions to improve, as there had been strong winds all day. While they waited, the pilot and the passenger, who is also a pilot, checked the condition of the aircraft and the pilot conducted the pre-flight check.

After taking off, and while turning left for the crosswind leg, at an altitude that the pilot estimated to be higher than 100 m, the engine cover began to open on the left side in the direction of motion, resulting in a constant and uncontrolled banging as the cover was bent from the front to the back.

The pilot assessed the situation and fearing that the cover could strike the propeller, or that it might detach and impact the cockpit and the occupants, or the tail assembly, whose cloth elevator could easily have been damaged, he decided to cut the engine to reduce the cover's motion and return to the runway without flaps. After completing the turn, he realized that he could not make it to the airfield, so he decided to make an emergency landing in a crop field immediately below his position. Once the aircraft touched down, it traveled a little over 16 m before impacting a stone wall that separated the field from a road. This impact caused the aircraft to turn over, ending up upside down on the other side of the road.

Both occupants suffered serious injuries though one of them was able to exit the aircraft under his own power. The aircraft was destroyed.

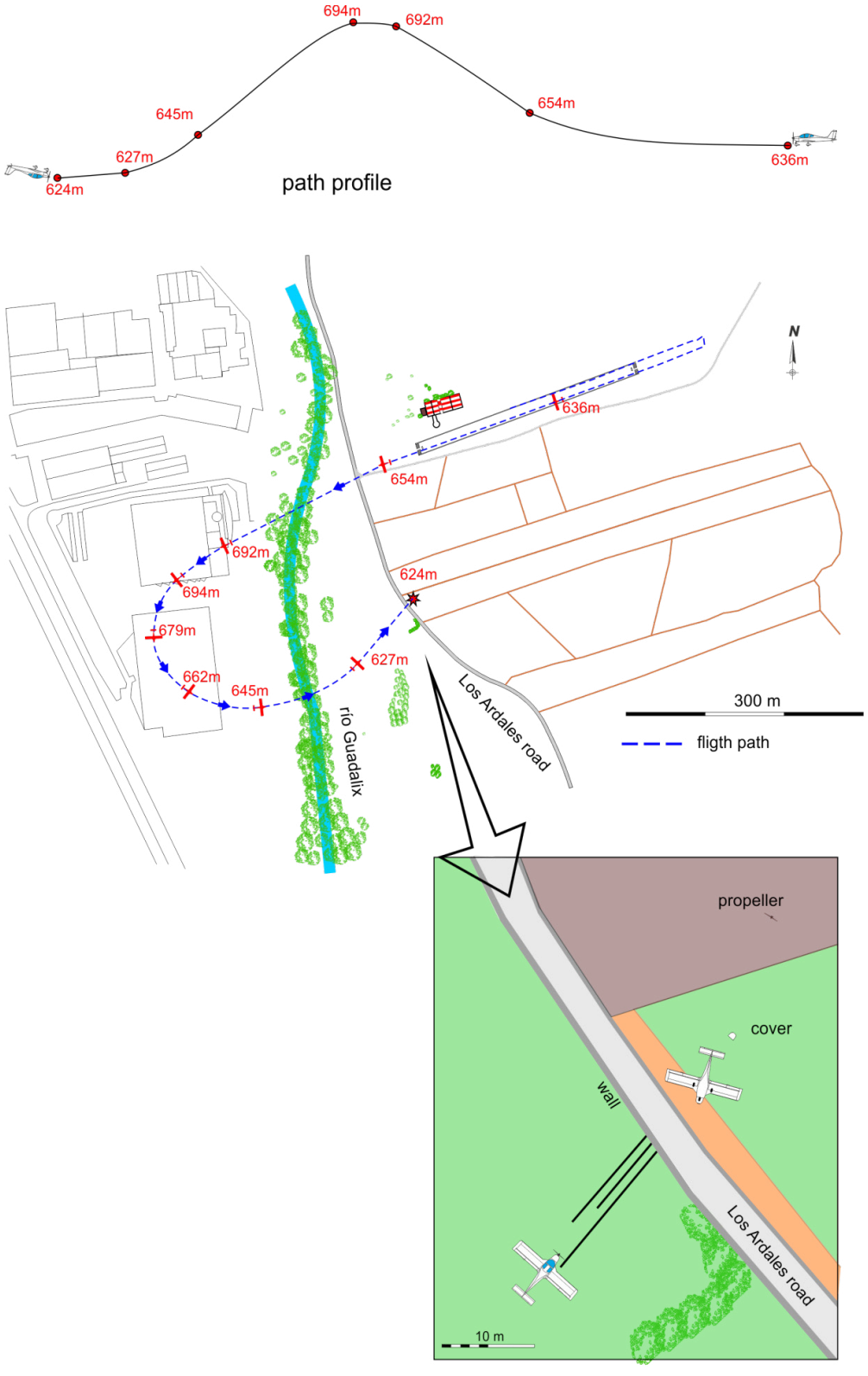

Fig. 1 – Diagram showing location of aircraft wreckage and flight path

1.2 Injuries to persons

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

1.3. Damage to aircraft

The aircraft was destroyed.

1.4. Other damage

Damage to the stone wall

1.5. Personnel information

1.5.1 Information on the aircraft's pilot

The pilot, a 56-year old Spanish national, had an Ultralight Pilot License, issued by the National Aviation Safety Agency (AESA) in 1998, with Weight Shift and Fixed-Wing Multiaxis ratings, both valid, the latter until 31 January 2018.

According to information provided by the pilot himself, he had extensive flying experience on both weight-shift and three-axis ultralight aircraft, with over 3000 total hours on the latter, of which 1800 hours had been on the type. He had been flying that airplane since 2002.

He also had a class-2 medical certificate, which was valid until 17 February 2018.

1.6. Aircraft information

The aircraft, a TECNAM P 96 G 100, registration EC-ZGK, is a two-seat amateur-built ultralight that was constructed in 2002, with serial number 02014-1678. It is outfitted with a 100 HP ROTAX 912 ULS engine and a DUC three-bladed tractor propeller. The aircraft is 6.4 m long and 2.3 m high, with an 8.7-m wingspan.

The aircraft had a special restricted Certificate of Airworthiness issued by the National Aviation Safety Agency (AESA) that was valid until 18 October 2018.

According to records provided by the owner, on 17 October 2016 the aircraft had undergone a scheduled 200-h/24-month maintenance check. This check involved an inspection of the moving parts, the wing roots, the main and front gear, brakes, fiber, flaps and controls, and the cable for the rudder control. As for the engine, the oil was replaced, as were the filter and spark plugs, and the water, fuel and exhaust systems were checked. The attachment springs were replaced.

1.6.1 System for opening and closing the engine cover

The engine is protected by a cover consisting of a top panel and a bottom panel joined by latches.

The system for closing and opening the engine cover features four latches situated symmetrically on both sides of the cover. Each latch has a top and bottom locking buckle. The top locking buckle contains the moving part of the locking lever, at the top of which there is a catch that must be inserted into the tab located on the bottom buckle, such that it is locked by means of a cam lock that runs across it and is housed in a collar plate in the latching crown.

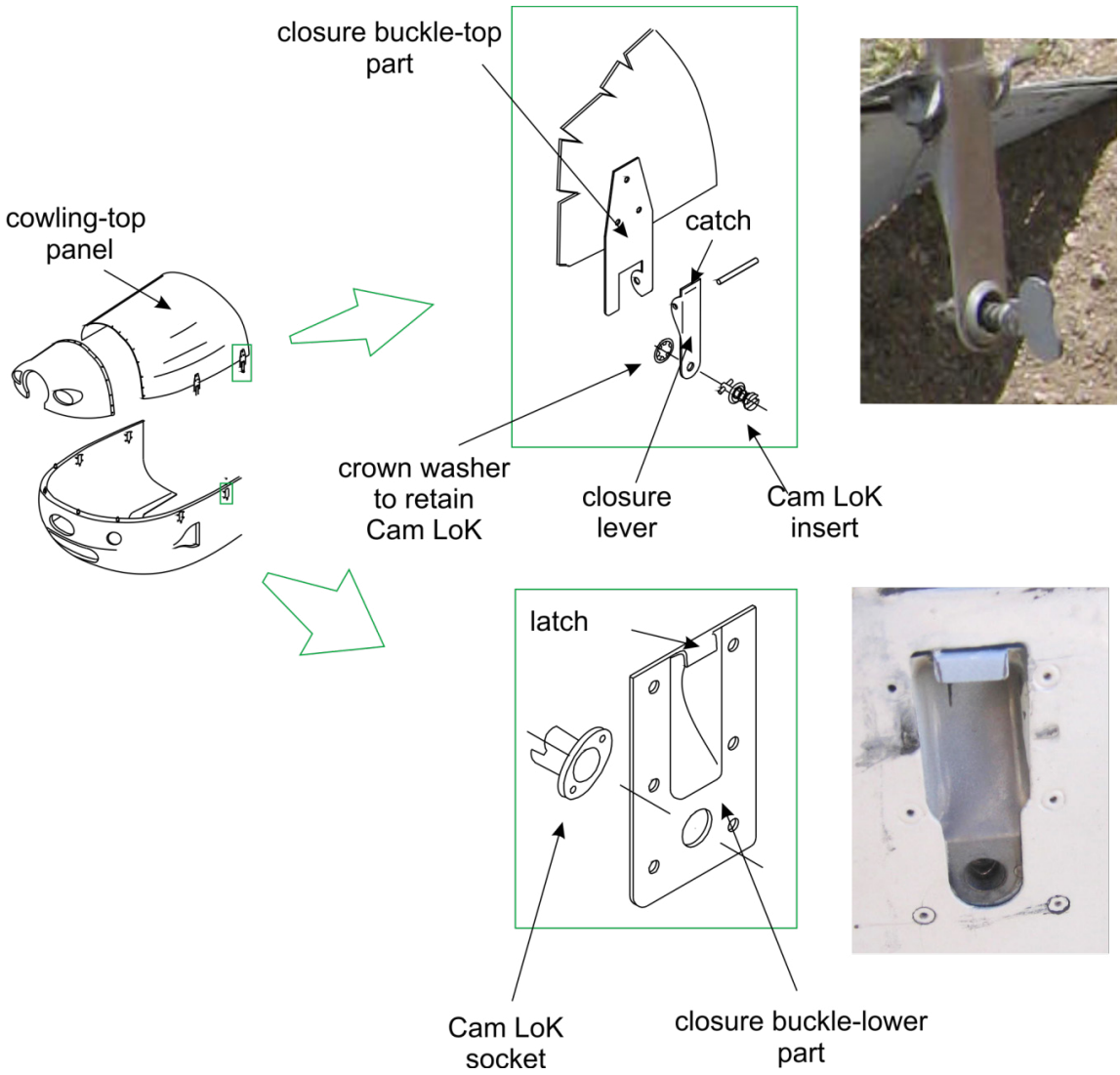

Fig. 2 – Close-up of engine cover closing and opening system

1.7. Meteorological information

According to data provided by the flight manager at the airfield, in the afternoon the wind was between 30-40 km/h, varying in direction between 30-40°. At the time of the accident, the wind had died down and was practically calm.

According to information published on the website of the National Geographic Institute, sunset in the province of Madrid on the day of the event was at 20:38.

1.8. Aids to navigation

Not applicable.

1.9. Communications

There were no communications or emergency calls.

1.10. Aerodrome information

The Loring airfield is within the town limits of El Molar (Madrid), at an elevation of 580 m. It has one dirt runway in a 06/24 orientation that is 315 m long and 25 m wide.

1.11 Flight recorders

The aircraft was not equipped with a conventional flight data or cockpit voice recorder. The applicable aviation regulation does not require this type of aircraft to carry any kind of recorder.

It did have a Garmin GPSMAP295 GPS unit, which provided information on the accident flight.

1.12. Wreckage and impact information

The aircraft wreckage was located some 200 m away from the runway 06 threshold, next to the Los Ardales road (no street number), at coordinates 40° 39' 28.4" N 3° 35' 48" W and an elevation of 624 m.

It is a broad, irregularly shaped area located south of the airfield. To the west of this area runs the Guadalix River from north to south, and to the east it is crossed from practically northwest to southeast by the Los Ardales road. Although the area is flat and used to plant crops, there are also parts covered by trees, especially all along the river, with scattered trees between the river and the road (see Fig. 1).

Along the east side of the plot where the aircraft landed was a stone wall approximately 1.2 m high, which separated the field from the road.

Three tracks of different lengths were found in this plot, indicating the path taken by the landing gear as the aircraft traveled on the ground before reaching the stone wall. The stones had been knocked loose from this wall in an irregular pattern over a section of wall approximately 6 m long.

Figure 3: Tracks on the ground and hole created in the wall

All of the wreckage was confined to one point, with the exception of the engine cover, which was behind the tail of the airplane, and the propeller and hub assembly, which was 18.40 m away from the nose, toward the airfield. One of the propeller blades, which had a large dent, had in turn detached from the propeller assembly.

Fig. 4 – Close-up of propeller assembly and detached blade

The accident aircraft had flipped over and was upside down and practically destroyed, with the exception of the tail empennage. Almost all of the damage was caused by the impact itself.

There was fuel remaining in the aircraft, part of which spilled onto the road.

Figure 5: Main wreckage of the accident aircraft

As for the locking latches on the engine cover, both of the latches on the right side had the moving part of the locking lever locked. On the rear latch, the locking buckle had detached, and on the front latch, the top part of the locking buckle was torn from its housing.

As for the buckles on the left side, they were in good condition and the moving part of the locking levers was released.

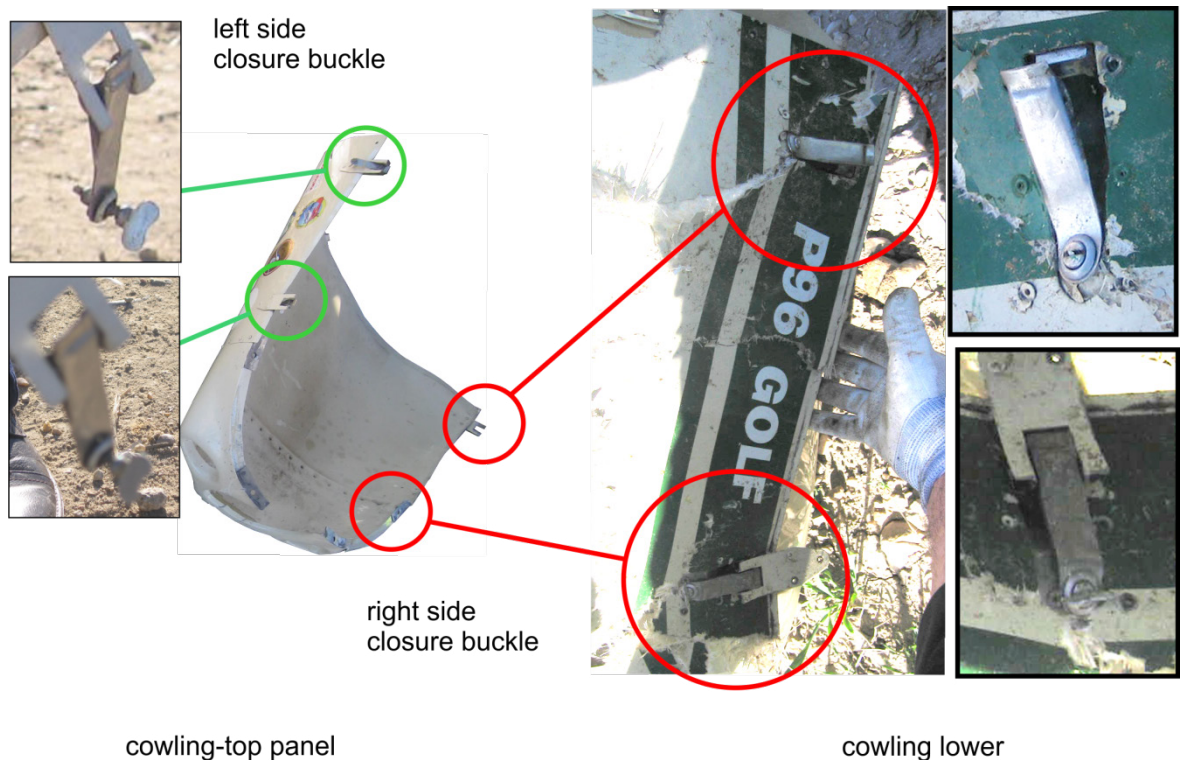

Fig. 6 – Close-up of the engine cover locking latches

1.13. Medical and pathological information

N/A

1.14. Fire

There were no signs of a fire during the flight or following the impact.

1.15. Survival aspects

The occupants exited the aircraft under their own power.

One of the occupants was able to exit the aircraft by his own feet, both being taken by ambulance to the nearest hospital

1.16. Tests and research

1.16.1 Eyewitness statements

The statements obtained from the aircraft's occupants themselves and from the airfield flight manager revealed the following:

On the day of the event, the pilot and his companion had spent the afternoon at the airfield. Their initial intention was to make a local flight lasting no more than 15 minutes, departing from and landing at the same airfield. Since, in their opinion, it was too windy, they decided to wait until the wind died down, and not to fly if it did not.

The pilot stated that he usually likes going out in the evening as the situation is more calmed and the light conditions seem finer to him.

The wind did eventually die down and they decided to proceed with the flight after the pilot conducted the pre-flight check.

After taking off, and while turning left for the crosswind leg, at an altitude that the pilot estimated to be higher than 100 m, the engine cover began to open on the left side in the direction of motion, resulting in a constant and uncontrolled banging as the cover bent from the front to the back.

In light of this situation, the pilot stated that he feared that the uncontrolled movement of the cover could cause it to strike the propeller, or to detach and impact the cockpit and the occupants, or the tail assembly, whose cloth elevator could easily have been damaged. So he decided to return to the runway, as he thought it very likely that any of these situations could occur, leading to a highly dangerous condition.

He then decided to cut the engine to reduce the vibrations of the cover, and to continue without the flaps to extend the range. After completing the turn to the downwind leg, he felt the airplane drop and lowered the nose (he thought that perhaps it was a leeward effect caused by the presence of some nearby warehouses that were along the extension of the runway centerline). He then realized he would not reach the airfield, and decided to make an emergency landing in a nearby crop field. As he was about to touch down, he noticed the presence of a stone wall and at the last moment, after traveling a few meters on the ground, he decided to lift the nose to avoid a full frontal impact with the wall.

Despite this maneuver, he could not prevent the aircraft from hitting the wall, after which it flipped over, ending up on the other side of the road.

When specifically asked, the pilot stated that he had done the pre-flight check and that he himself had removed and installed the cover. He did not know how it could have opened in flight, and could not rule out either the improper operation of the closing and locking system on the engine cover, or that the locking operation had been performed incorrectly.

1.17 Organizational and management information

N/A

1.18. Additional information

1.18.1 Flight Manual

The Normal Operating Procedures contained in the Aircraft Flight Manual include the steps to take when conducting the pre-flight check, differentiating between the check of the cockpit and the walk-around inspection. For the latter, it specifies to carry out a series of checks, including section R, which includes a check of engine-related items and which requires opening and closing the engine cover.

Previously, said Flight Manual details how to install and remove the engine cover:

Top cover:

1. Parking brake ON.
2. Fuel valve OFF.
3. Ignition switch OFF, key OFF.
4. Release the four latches by turning the butterfly cam locks on the cover counter clockwise and pushing in slightly.
5. Lift the entire engine cover, watching out for the propeller.
6. To install it, rest the cover horizontally, being careful to use the lugs as a reference.
7. Close the latches using light pressure, checking that they are correctly installed, and close the cam locks.

CAUTION: The cam locks are closed when the fin is in the horizontal position, and open when it is vertical. Verify that in the closed position, the catch is under the tab.

1.19. Useful or effective investigation techniques

N/A

2. ANALYSIS

2.1 General aspects

The Tecnam aircraft had taken off from runway 24 at the airfield with the intention of making a local flight lasting under 15 minutes, leaving from and arriving at the same airfield. There were two occupants onboard. They had delayed their departure until the wind, which had been blowing hard that day, died down. This occurred close to sunset, which on that day in Madrid was at 20:38. Even if part of the flight did take place after sunset, this circumstance is not deemed to have had any effect on the accident.

2.2 Of the wreckage

An inspection of the wreckage shows that the aircraft traveled just over 16 m on the ground, which indicates that it landed very close to the wall.

The 6-m section of wall affected is slightly shorter than the 8.7-m wingspan of the aircraft, which indicates that the impact did not occur with the wings level.

Using the direction of the landing gear tracks on the ground as a reference, there was more damage to the left side of the wall than the right. This, combined with the fact that the left main gear leg was visibly bent more than the right leg, and that the left wing was also bent backward more than the right wing, indicates that the aircraft impacted the wall with a slight left bank attitude.

It was the front bottom part of the aircraft that impacted the wall, as demonstrated by the fact that the detached propeller blade exhibited a severe impact mark near the root, possibly caused when the blade impacted a rock in the wall, and by the impact marks and dents on the leading edges of the wings and on the bottom front of the engine area.

The damage to the propeller blades and hub was consistent with a direct impact against the wall, but with the propeller not turning, thus corroborating the pilot's statement that he had cut the engine.

As concerns the locking latches on the engine cover, those on the left side were in good condition, with the moving part of the locking levers released. As for the latches on the right side, the front one had its top locking buckle ripped from its housing, and the locking lever on the rear latch had detached from the locking buckle. In both cases the moving part of the locking lever was closed and locked.

Based on its condition, the investigators determined that the left side cover opened under the influence of the air current generated by the propeller, since its latches were not closed and locked. The cover remained attached to the aircraft thanks to the right-side latches, which were bent or detached after the impact, even though the closing lever remained locked. The pilot's statement confirms the fact that the left-side engine cover opened first.

2.3 Of the operation

The pilot stated that after taking off from runway 24, and while at an altitude of 100 m above ground level and turning left to fly the crosswind leg, he saw the engine cover start to lift up on the left side, vibrating uncontrollably as it bent from the front to the back.

Immediately afterward, and after assessing the likelihood that the situation would worsen considerably, he decided to cut the engine to reduce the uncontrolled vibrations of the cover and return to the airfield without flaps (for longer range). He subsequently realized that he could not reach the runway and made an emergency landing on a crop field located below his current location. The low altitude and the tree cover on one side of the field also hampered his choice in terms of the number of fields available. At the last moment, he noticed the presence of a stone wall that crossed his path, and stated that as a desperate measure, he tried to lift the nose of the aircraft to minimize the effects of the impact. His decision to cut the engine reduced the vibration of the engine cover significantly, and thus the gradual bending back of the cover, delaying its potential detachment, which could have led to an irreversibly dangerous situation. But it is also true that cutting the engine enormously limited the aircraft's maneuverability, which would have been needed later in order to reach a more suitable landing field or even, as in the situation at hand, to lift the nose of the airplane and clear the wall. In fact, the attempt to lift the nose, as the pilot stated, with no power and using only the elevator has no effect at all when traveling on the ground at low speed. The airplane struck the wall with all three landing gear wheels on the ground, as indicated by the presence of the tracks in the crop field, which continued up to the wall itself. Perhaps leaving the engine at idle, without cutting it, would have allowed him to strike a balance between reducing the vibrations of the engine cover and having enough power available if it was needed, as it eventually was.

3. CONCLUSIONS

3.1. Findings

- The aircraft's documentation was valid.
- The pilot had a valid license and medical certificate.
- The pilot had experience flying the aircraft type.
- The weather conditions were not limiting to the flight.
- The left side of the engine cover opened in flight.
- The locking latches on the left side of the engine cover were not closed and locked.
- The pilot cut the engine while just over 100 m above ground level.
- The pilot realized too late that there was a stone wall in the path of the emergency landing run.
- The aircraft's low altitude during the emergency did not afford many options in terms of landing field selection.
- The aircraft impacted the wall and flipped over.

3.2 Causes/Contributing factors

The accident occurred as a result of initiating a flight after failing to properly close and lock the left-side locking latches on the engine cover at the conclusion of the pre-flight inspection.

The following contributed to the accident:

- Completely turning off the engine.