

# CIAIAC

COMISIÓN DE  
INVESTIGACIÓN  
DE ACCIDENTES  
E INCIDENTES DE  
AVIACIÓN CIVIL

## Report ULM A-022/2016

Accident involving a MISTRAL STANDARD aircraft, registration EC-ZHH, in the vicinity of the Los Alcores aerodrome (Mairena del Alcor, Seville, Spain) on 24 October 2016.



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DE ESPAÑA

MINISTERIO  
DE FOMENTO

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SUBSECRETARÍA

COMISIÓN DE INVESTIGACIÓN  
DE ACCIDENTES E INCIDENTES  
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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**

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°C	Degrees centigrade
ACC	Area control center
AEMET	National Weather Agency
AESA	National Aviation Safety Agency
AIS	Airport Information Service
APP	Approach
E	East
ENAIRE	Spain's air navigation manager
EW	Empty weight
FSO	Flight safety office
Ft	Feet
h	Hours
hPa	Hectopascals
kg	Kilograms
Km/h	Kilometers per hour
Kt	Knots
LEAH	ICAO code for Aerohispalis – Mairena del Alcor aerodrome (Spain)
LECS	ICAO code for Seville ACC (Spain)
LEZL	ICAO code for Seville airport (Spain)
m	Meters
MAF	Multi-axis fixed wing
MTOW	Maximum takeoff weight
N	North
N/A	Not applicable
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
S/N	Serial Number
TULM	Powered ultralight license
UTC	Universal Time Coordinated
W	West

**Synopsis**

Owner and Operator: Private  
Aircraft: MISTRAL STANDARD, EC-ZHH  
Date and time of accident: Monday, 24 October 2016 at 19:15 local time<sup>1</sup>  
Site of accident: vicinity of the Los Alcores aerodrome  
(Mairena del Alcor, Seville, Spain)  
Persons onboard: 1, pilot, seriously injured  
Type of flight: General aviation - Private  
Date of approval: 25 October 2017

**Summary of the accident:**

According to information provided by an eyewitness, the pilot had flown three patterns with a touch and go on runway 05. Upon completing the fourth pattern, the pilot flew low over the runway and started climbing sharply with a slight turn to the right before quickly turning sharply left, with the apparent intention of returning to the runway. During the turn to the left, the aircraft fell to the ground. The pilot was seriously injured and the aircraft was heavily damaged.

The pilot had purchased the fuselage and wings and was rebuilding the original aircraft (amateur-built). At the time of the accident, the aircraft was missing the doors, several instruments and other components. No evidence was found that the aircraft's systems or control surfaces malfunctioned, despite the aircraft's unfinished state, which may have rendered it not airworthy. The aircraft had fuel onboard.

It was concluded that the accident occurred due to the pilot's improper execution of the return maneuver to the runway by making a sharp left turn from which he could not recover.

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<sup>1</sup> All times in this report are local unless otherwise specified. To obtain UTC, subtract 2 h from local time.

## 1. FACTUAL INFORMATION

### 1.1. History of the flight

The owner had purchased the fuselage and wing structure (it was an amateur-built aircraft) and was rebuilding it with help from two mechanics. They made several repairs, covered the wings in cloth, installed an engine purchased separately, etc. The aircraft was not finished yet, which may have made it not airworthy. They had not done any testing and there was no weight and balance information for the aircraft.

According to the statement from one of the mechanics, on the day of the accident, at about 19:15, the pilot arrived at the hangar, greeted them and said he was going to taxi the aircraft. The pilot then took the aircraft out of the hangar, which is when the mechanic heard the engine at full power. So he went out of the hangar and saw the aircraft on a takeoff run from runway 05. The mechanic stated that the pilot flew three or four patterns at the aerodrome, and that upon starting the last one, he flew low over the runway, climbed with a slight turn to the right and tried to return by dropping the left wing, apparently intending to go back to the runway. The aircraft dove to the ground 200 m away from the runway 23 threshold, digging into the ground, with the nose and the tips of the left wings half buried (see *Photograph 1*).



**Photograph 1.** Aircraft after the accident

### 1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Other
Fatal				
Serious	1		1	
Minor				N/A
None				N/A
<b>TOTAL</b>	<b>1</b>		<b>1</b>	

### 1.3. Damage to aircraft

The aircraft sustained significant damage (see Section 1.15).

### 1.4. Other damage

The perimeter fence was broken by the emergency teams when they reported to the scene so as to be able to immediately render assistance to the pilot.

### 1.5. Personnel information

The pilot, a 65-year old Spanish national, had a TULM<sup>2</sup> license issued by AESA in 1997 and a MAF (multi-axis fixed wing) rating that was valid until 30 November 2017. He had a class-2 medical certificate that was valid until 13 May 2017.

According to information provided by the pilot, he had been flying for over 20 years. He estimated he had a total of 4000 flight hours on multi-axis fixed-wing airplanes. He did not have experience on this model in particular. No information was available on his flight logs, with the exception of a certificate from the flight director at the aerodrome, which was issued for license renewal purposes and stated that from 10/4/2011 to 25/08/2015 the pilot had flown 199.3 h as pilot in command of a MAF, as recorded in his flight log.

According to AESA records, he had two aircraft registered under his name: an amateur-built Challenger II, serial number 0240/170 and registration EC-ZPR, and a co-owned microlight, model S-6ES-582, serial number S-6A-128 and registration EC-DC8. Both aircraft have a swept-back wing design.

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2 TULM Powered ultralight license – Ultralight pilot (depending on license abbreviation)

## 1.6. Aircraft information

The amateur-built ultralight aircraft, a MISTRAL STANDARD, registration EC-ZHH and serial number 02045/1709, was manufactured in 2002. It is a biplane aircraft with a fixed tricycle gear. The top wing is swept forward. The wing structure consists of two spars, one each on the leading and trailing edges, consisting of metal tubes joined by wooden ribs. The wing is covered in cloth. The top and bottom wings are joined by two braces, with the bottom wing doubling as the aileron, as it can pivot around a point near the leading edge as far as allowed by the rear attachment near the trailing edge (see *Photograph 2*). Each bottom wing has a tab on the trailing edge (adjustable by maintenance) that helps the wing return to its neutral position. This aircraft does not have flaps.



**Photograph 2.** Bottom wing and attachments

According to the information in AESA's registration registry, its maximum takeoff weight (MTOW) was 450 kg and its empty weight (EW) was 195 kg. The engine on the original aircraft was a Rotax 582, S/N 5381528, with a two-blade propeller. The Hobbs meter on the instrument panel indicated 547.6 h.

The aircraft documentation obtained from AESA included the Registration Certificate, the original Special Restricted Certificate of Airworthiness issued following construction, in 2002, and the Approved Maintenance Program from the same date. AESA had a record of the certificate of airworthiness being renewed just once,

through AESA's Flight Safety Office in Cuatro Vientos (FSO6) in 2005 (valid until 2007). All of this documentation was in the name of the original builder and owner.

### 1.7. Meteorological information

According to information from AEMET, there are no data for the Los Alcores aerodrome (Carmona, Seville). Given the prevailing conditions, the data from the nearest stations, Carmona-Villegas and the San Pablo-Seville Airport (LEZL), could be valid. On 24 October 2016 at around 19:15, the data for these stations were as follows:

- Wind
  - » Direction: E, 070-090° at both stations
  - » Speed: 9 km/h (4.9 kt) in San Pablo and 12 Km/h (6.5 kt) in Carmona
  - » Maximum gusts: around 20 km/h (10.8 kt) from the east.

Assuming average wind values in the area of Mairena del Alcor of about 10 km/h (5.4 kt) from 80°, there would have been a headwind component in the landing direction of 8.6 km/h (4.7 kt) and a crosswind component of 5 km/h (2.7 kt).

- Visibility: good visibility on the surface.
- Cloud cover: scattered clouds in two layers with bases at approximately 3000 and 5000 feet.
- Temperature: 21° C in San Pablo and around 19° C in Carmona.
- QNH: around 1008 hPa.
- Relative humidity: around 80%.
- Significant weather phenomena: some precipitation had been recorded the previous morning. There were no convective clouds in the area.

Time of sunset: the sunset at coordinates 37° 19' 46'' N 5° 43' 25'' W was at 19:36.

### 1.8. Aids to navigation

No aids to navigation were used during the flight.

### 1.9. Communications

There were no communications. According to information provided by the Seville area control center (ACC) (LECS), at 19:28 it received a report from the emergency

response unit of Andalusia informing of an accident involving an ultralight at the Los Alcores aerodrome. This emergency service had notified the Civil Guard, and medical and firefighting personnel. The supervisor was informed so that he could warn approach (APP) control personnel of the possibility of helicopters operating in the area due to the accident.

### 1.10. Aerodrome information

The restricted-use<sup>3</sup> aerodrome of Los Alcores<sup>4</sup> is located in the township of Mairena del Alcor (Seville), at coordinates 37° 19' 46'' N 5° 43' 25'' W. The aerodrome has one asphalt runway in a 05/23 orientation that is 640 m long and 20 m wide. It is at an elevation of 140 ft.

In order to operate aircraft at this aerodrome, certain rules have to be followed and users are required to sign a form stating that they are aware of and will comply with said rules. Those rules of particular relevance to this investigation are provided below:

- *A pilot must have a valid pilot license, certificate of fitness and medical certificate, as well as a flight logbook, in order to fly any aircraft. The aircraft must have an Identification Card, Certificate of Airworthiness, Civil Liability Insurance and Aircraft Station License, as well as a record of flight hours and engine logbook. The aircraft's owner is solely responsible for renewing these documents, the originals of which must be made available at all times to authorities if requested.*
- *In order to make any flight, a Flight Manager or his authorized replacement must be present at the Aerodrome, as required by the NATIONAL AVIATION SAFETY AGENCY, who shall determine the fitness of the pilot wishing to fly, as well as the weather conditions for flying.*
- *The use of a radio tuned to aircraft band 129.825 is required. All movements, from the initial engine start-up until final engine shutdown, must first be reported on this band.*

### 1.11. Flight recorders

The aircraft was not equipped with flight recorders, nor was it required to be.

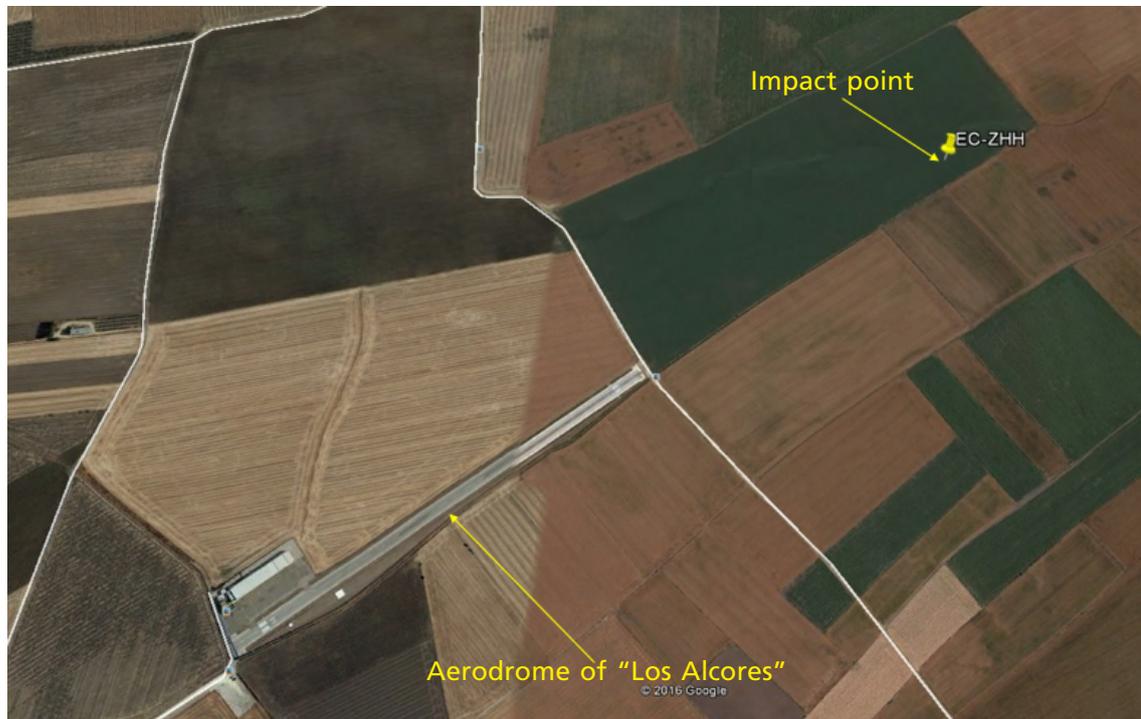
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3 Royal Decree 862/2009, civil aerodromes/heliports where operations involving the commercial transport of passengers, cargo or mail, including air taxis, are not authorized. They may, therefore, host all other operations, such as private, sports or corporate aviation, flight schools, base maintenance, firefighting, medical, maritime rescue, emergency and general aerial work.

4 Currently the Aerohíspalis-Mairena del Alcor aerodrome (LEAH), as per information in the ENAIRE AIS.

### 1.12. Wreckage and impact information

The coordinates of the impact point were 37° 20' 04.68" N - 05° 42' 54.24" W (see *Photograph 3*).



**Photograph 3.** Aerial view of the aerodrome of Los Alcores, showing the aircraft's impact point

The aircraft impacted a crop field next to and northeast of the plot where the restricted-use aerodrome of Los Alcores is located. This field had used to grow sunflowers, which had already been harvested, meaning it was free of vegetation. It had a soil surface with no rocks and practically flat. Due to the heavy rains that had fallen in the days before the accident, the ground was extremely soft.

The aircraft's nose had dug into the ground, with its tail section up in the air such that the airplane's longitudinal axis was at a 35° or 40° angle with respect to the ground. The aircraft was facing toward the aerodrome, though slightly to its left. The airplane's longitudinal axis was on a course of about 215°.

The fuselage seemed to have maintained its shape (see *Photograph 4*). The aircraft had no doors, which were still being repaired. The nose leg had collapsed to the rear. The engine, a Rotax 582, S/N 4559776, was on the ground with the propeller hub half buried. The propeller's three blades were found broken, two at the root and the third at one end. The detached blade fragments were under the engine with the exception of one segment, which was found 10 m forward of the aircraft.



**Photograph 4.** Aircraft after the accident

The two left-side wings had marks at their ends indicative of having impacted the ground. There was mud on the outboard part of the leading edge and on the front outside edge of both wings. Both left-side wings retained their structural integrity and were attached to the airframe.

The top right wing also showed signs of having impacted the ground. The wing's structure was bent forward, and there was a crease in the area of the leading edge, approximately  $\frac{1}{4}$  of the length of the wing from the root. The bottom right wing was broken at its rear attachment point, but it was still connected to the fuselage at the forward attachment.

The tail assembly was practically intact.

Inside the cockpit, the seats were found in their position with no deformations. The seat harness in the left seat, which the pilot had been wearing, was cut. The instrument panel (see *Photograph 5*) was not the original on the aircraft, having been replaced by a panel taken from another aircraft of the same type and still bearing the latter's registration plate (EC-CB2<sup>5</sup>). Some instruments were still not installed, but the following were:

- Anemometer.
- Altimeter.
- Variometer.

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5 An AVIASUD MISTRAL STD, according to AESA's registration registry.

- Engine tachometer.
- Engine cooling liquid temperature.
- Exhaust temperature. It actually measured the exhaust gas temperature<sup>6</sup>, even though the gauge was labeled “cylinder head temperature”.
- Fuel quantity.
- Hobbs meter.



**Photograph 5.** Instrument panel on the accident aircraft (EC-ZHH)



**Photograph 6.** Close-up of the instrument panel with the Exhaust Temperature gauge

The control stick that controlled the roll and pitch moved freely in all directions. The elevator’s motion was consistent with the inputs made to the control stick. The

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6 The sensor was connected to the exhaust manifold.

bottom left wing moved when the control stick was moved to the side. There was no continuity to the right wing since the rear attachment was broken, though continuity was confirmed to the point where it had broken. The wing trim tab control was also broken.

There was continuity between the pedals and the rudder, which moved freely and consistently with the inputs made to the controls.

The fuel tank, made of fiber, was located behind the seats. It had not broken on impact and it still had fuel. It had a graduated scale with the capacity, and indicated a fuel quantity of about 25 liters. This indication was not correct, however, due to the aircraft's downward angle. The actual fuel quantity was estimated at between 10 and 15 liters.

When the aircraft was lifted, it was noticed that the engine mount had detached almost completely from the airframe at its anchor points. There was another fracture that ran the width of the fuselage, just behind the instrument panel.

### **1.13. Medical and pathological information**

N/A.

### **1.14. Fire**

There was no fire.

### **1.15. Survival aspects**

The pilot was wearing the safety harness, which was cut in order to remove him from the aircraft.

### **1.16. Tests and research**

N/A.

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

N/A.

## 1.18. Additional information

### 1.18.1 Pilot's statement

Several months after the accident, investigators were able to speak to the pilot, who had been hospitalized and who underwent several operations due to the broken hip he suffered. The pilot stated that he had had an ultralight pilot license since 1997, that he had been flying for over 20 years and that he had about 4000 flight hours on various aircraft (Coyote, Renegade Spirit<sup>7</sup>). He had no experience on the accident model, since he had just purchased it in Segovia and had moved it to the airfield to assemble it.

On the day of the accident, he stated that he had only intended to taxi it and test the brakes. He headed to the runway but there was a strong headwind, and by the time he realized it, he was airborne over the opposite threshold. He thought it hasty to return to the ground and decided to continue flying. Once in the pattern, he decided to continue and fly a couple of additional patterns. It was during the last pattern when, in his opinion, the headwind was strong. But as he was transitioning from the crosswind leg to the downwind leg, the left wing dipped as if stalled, and the right wing was lifted by the wind, causing the airplane to plummet to the ground.

### 1.18.2 Statement from eyewitness 1 (mechanic and ULM pilot)

He stated that on the day of the accident, he was alone at the aerodrome. He was in a hangar doing maintenance on another aircraft when the pilot showed up, between 18:30 and 18:45. The pilot told him he was going to taxi the aircraft to check the steering and brakes. He then heard him start the engine, and shortly afterward saw the aircraft proceed to the runway. He heard the pilot rev up the engine and heard the aircraft moving on the runway. He then realized that the pilot was going to take off. The aircraft rose rapidly. The pilot flew three patterns, with a touch and go maneuver on runway 05, and then started on the fourth pattern. This time he did not do a touch and go, but flew low over the runway. After flying over the end of the runway, he started to climb very sharply while turning gradually to the right, before turning sharply to the left.

It seemed to him that the pilot wanted to fly a "teardrop"<sup>8</sup> to make a 180° turn and return to the runway. During this turn, he watched as the aircraft plummeted to the ground, impacting almost vertically. He then started running to the location. When he reached the aircraft, the pilot was conscious and leaning forward. Along with the

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7 According to documentation from the Los Alcores aerodrome.

8 Maneuver that entails turning to one side and then the other (in a teardrop shape) in order to reverse course.

two guards who had also reported to the accident site, they saw that the pilot was in an awkward position in the cockpit and decided to evacuate him. To do this, they had to cut the safety harness, after which they removed him. They also took out the seat cushions, placed them on the ground and laid the pilot on top. They then notified emergency services, who had problems accessing the site due to the mud that covered all of the access roads.

This eyewitness stated that there was almost no wind on that day, that it was not raining at the time of the accident, though it had rained earlier in the day. The sky was overcast with low clouds, though not enough to prevent flying the traffic pattern.

### ***1.18.3 Statement from eyewitness 2 (rural policeman)***

Eyewitness 2 was with a colleague some 800 m north of the crash site. According to his statement, he was not watching the airplane, since it is common for airplanes to be flying in the area, but at one point he turned toward the south and saw the airplane plummeting downward and then impacting the ground almost vertically. Both colleagues then immediately climbed inside their vehicle and drove to the accident site. His statement agreed with the mechanic's in terms of the assistance rendered to the pilot, and he recalled hearing the pilot saying that he did not know what had happened. They cut his safety harness and took him out of the aircraft. Medical personnel had considerable problems accessing the site (even the off-road vehicle had problems reaching the aircraft, and had to be pushed), and the firefighters' truck got stuck, so they had to put the pilot in their off-road vehicle and transport him to the ambulance.

### ***1.18.4 Statement from the aerodrome owner and flight manager***

According to the aerodrome owner's statement, the pilot started using the aerodrome in January of that year. He had rented a hangar where he kept two aircraft, including the one involved in the accident. Neither aircraft was airworthy. The aircraft was amateur built and was still being rebuilt. The pilot had purchased the fuselage and the wing assembly second-hand on 13 May, and was rebuilding it with help from two mechanics, though it was still unfinished. The aircraft did not have a valid certificate of airworthiness or an insurance certificate. He had already warned him that he could not fly either aircraft, and urged him to legalize their status. He stated that the pilot was waiting for AESA to conduct the relevant inspection. This individual noted that the aerodrome had rules of operation that were required for all users (see *Section 1.10*, Aerodrome information). An essential requirement for operating at the airfield was a written acknowledgement of said rules, as well as committing to abide by them (the pilot had signed this form in September of 2016). On the day of the event, he had already left, and there was only a mechanic on site.

This individual also added that AESA had authorized the airfield as a restricted-use aerodrome in September 2016.

**1.18.5 *Statement from the mechanic who was helping the owner***

This individual stated that pilot had purchased the disassembled ULM in Avila in a private transaction and had driven it to Los Alcores by truck. He had been assembling it and asked him for help as needed. They made repairs, put the cloth on the wings, installed an engine purchased separately and so on. It was still unfinished; specifically, it was missing the doors and some instruments. It had not undergone testing and its weight and balance had yet to be determined. It had to be fully assembled then thoroughly inspected before the certificate of airworthiness could be renewed.

This person did not understand how the pilot could have taken it flying, since the airplane by no means finished. It had no doors, which he had taken to a shop to have them rebuilt. Some instruments, like the radio, still had to be installed. The aircraft had not been weighed and balanced. Once fully rebuilt, it would have to undergo a final check and then testing on the ground before flight testing could begin. The aircraft's airframe and the wings had been purchased by the accident pilot. He knew nothing about the documents of this purchase or about the aircraft's remaining documentation. He remembered the pilot telling him that he had lost the aircraft's documentation and had requested duplicates. He also added that the pilot later told him he had found it. He had purchased the engine online. This individual disassembled it and overhauled it, and then put it back together and installed it on the aircraft.

**1.19. Useful or effective investigation techniques**

N/A.

## 2. ANALYSIS

The owner had purchased the fuselage and wing assembly (it was an amateur-built aircraft) and was rebuilding it with help from two mechanics.

According to the mechanic's, and the pilot's own statement, on the day of the accident the latter arrived at about 19:15 and told the mechanic he was going to taxi the aircraft and test the brakes. The pilot then took the aircraft out of the hangar, after which the mechanic heard the engine at full power, so he went outside to see what was happening, and saw the aircraft taking off from runway 05. The pilot flew three or four patterns around the aerodrome and upon starting the last one, the mechanic stated that he flew low over the runway, climbed sharply and tried to return by dropping the left wing, as if intending to go back to the runway with a teardrop maneuver. The pilot stated there was a strong headwind, but that as he was transitioning from the crosswind leg to the downwind leg, the left wing dropped, as if stalled, and that the wind lifted the right wing, at which point the airplane dove to the ground. The aircraft fell vertically 200 m from the runway 23 threshold and dug into the ground, with the nose and the ends of the left wings half buried in the ground.

There was a gentle breeze that day (5.4 kt), 4.7 kt in the takeoff direction and a 2.7-kt crosswind. There was good visibility on the surface and at the altitude of the aerodrome's traffic pattern. The time of sunset was 19:36.

During the field investigation, no indications were found that the aircraft's systems or control surfaces had malfunctioned. There was continuity in the controls, with the exception of the right wing, which was broken at the rear attachment point, though continuity up to that point was confirmed. The fractures and damage found on the aircraft were consistent with what would be expected following an impact with the ground. The fuel tank did not break on impact and it was verified to still contain fuel. It is estimated that there were between 10 and 15 liters of fuel at the time of the accident. The engine was running at the time of the accident. The aircraft, however, was unfinished, as it was lacking doors and its weight and balance had yet to be determined, meaning it may not have been airworthy. Thus, it is possible that all this may have had an influence on the aircraft's stability and maneuverability.

The pilot, despite having extensive flying experience, had no experience on this model, which posed the additional problem of having one of its wings set in a swept-forward configuration.

The ultralight, amateur-built aircraft, a MISTRAL STANDARD with registration EC-ZHH and serial number 02045/1709, had been built in 2002. The engine on the original aircraft (according to the statements, the engine had been replaced) was a Rotax

582, S/N 5381528, with a two-blade propeller. The engine found after the accident was a Rotax 582, S/N 4559776, with a three-blade propeller. The Hobbs meter on the instrument panel read 547.6 h, but it is not known if this meter was the original, since the instrument panel installed in the aircraft still had the registration plate of the aircraft from which it had taken, and not of the accident aircraft. AESA had a record of the certificate of airworthiness being renewed once, in 2005 (valid until 2007), through the AESA Flight Safety Office in Cuatro Vientos (FSO6). All of this documentation was in the name of the original builder and owner. There was no updated documentation in the new owner's name or for the modifications made to the aircraft.

The aerodrome had rules of operation that all pilots had to acknowledge by signing a form, which the pilot had done in September 2016. These rules required that any aircraft flown have its documentation in order, and that before making any flight, the flight manager, or his designated substitute, had to be present at the aerodrome. The aerodrome's owner and flight manager stated that he had already warned the pilot that he could not fly either of his two aircraft because their documentation was not in order, and he urged him to legalize the status of both aircraft. On the day of the accident, the flight manager had already left and only the mechanic was present at the aerodrome.

### 3. CONCLUSIONS

#### 3.1. Findings

An analysis of all the information available has yielded the following conclusions:

- The aircraft was unfinished and the relevant tests had not been carried out prior to flying it.
- The aircraft did not have valid documentation
- The pilot had a valid license and medical certificate.
- The pilot indicated that he had about 4000 flight hours, of which 199.3 had been documented between 2011 and 2015.
- The pilot did not have experience on this aircraft or with other forward-swept wing designs.
- The pilot was not allowed to fly as per the aerodrome's rules, since the flight manager was not present, the aircraft was unfinished and its documentation was not in order.
- The time of the accident was close to sunset.
- On the day of the accident there was good visibility on the surface and at the altitude of the traffic pattern, and is thus deemed not to have played a role in the accident.
- On the day of the wind there was a gentle breeze with a low crosswind component. Thus the wind is not deemed to have played a role in the accident.
- No evidence was found of a technical or mechanical failure in the aircraft that would have caused the accident.
- There was fuel in the aircraft.
- The engine was running at the time of the accident.
- The aircraft was unfinished. It had no doors and its weight and balance had not been determined, meaning it may not have been airworthy. There was fuel in the aircraft.
- After making a low pass over the runway, the pilot climbed sharply while making a sharp turn to the left, probably executing a teardrop maneuver to return to the runway.

### **3.2. Causes**

The accident occurred due to the pilot's improper execution of the maneuver to return to the runway, during which he made a sharp left turn from which he was unable to recover.

#### **4. SAFETY RECOMMENDATIONS**

Having analyzed and determined the cause of the accident, this Commission does not deem it necessary to issue any relevant safety recommendations.