



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

Report A-032/2017

Accident involving a Bell 412SP aircraft, registration EC-MMC, operated by Babcock International Group PLC, and a CASA 1131 aircraft, registration N1950M, at the aerodrome of Mutxamel (Alicante, Spain) on 30 December 2017



GOBIERNO
DE ESPAÑA

MINISTERIO
DE FOMENTO

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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

AEMET	Meteorological State Agency
AGL	Above ground level
APP	Approach control
CAVOR	Ceiling and Visibility OK
CPL (A)	Commercial pilot license (airplane)
CPL (H)	Commercial pilot license (helicopter)
CTR	Controlled Traffic Region
E	East
FAA	Federal Aviation Administration of the United States
Ft/min	Feet per minute
ft	Feet
h	Hours
hPa	Hectopascals
ICAO	International Civil Aviation Organization
IR	Instrument rating
Km	Kilometers
Km/h	Kilometers per hour
Kt	knots
LEAL	ICAO code for the Alicante airport (Spain)
LEMU	ICAO code for the aerodrome of Mutxamel
m.	Meters
METAR	Airport weather routine report
MHz	Megahertz
min	Minutes
N	North
RWY	Runway
S	South
SP	Single pilot
TMA	Terminal Control Area
UTC	Universal time coordinated
VFR	Visual flight rules

Synopsis

Operator:	Babcock International Group PLC	Private
Aircraft:	Bell 412SP registration EC- MMC	CASA 1131 registration N1950M
Persons on board:	10, 2 slightly injured and 8 uninjured	1, killed
Type of flight:	Aerial work – commercial – firefighting	General aviation – private
Flight rules:	VFR	VFR
Date and time of incident:	30 December 2017 at 17:42 local time ¹	
Site of accident:	Aerodrome of Mutxamel (Alicante, Spain)	
Date of approval:	7 June 2018	

Summary of event:

On 30 December 2017, an accident occurred at the aerodrome of Mutxamel (Alicante) involving a Bell 412SP helicopter, registration EC-MMC, and a CASA 1131 biplane, a Bucker Bü 131 Jungmann, registration N1950M.

During the final approach phase to the aerodrome, the two aircraft collided, as a result of which the biplane lost control and impacted the ground. The pilot died after the accident as a result of the injuries sustained. The crew of the helicopter made an emergency landing and of its ten occupants, two were slightly injured. The rest were uninjured.

The investigation has determined that the cause of the accident was the failure of the biplane's pilot to detect the helicopter on the final approach to runway 30 at the Mutxamel aerodrome. The biplane was further back in the approach to land on the same runway.

Contributing to the accident was the deficient or zero use of communications, as well as a failure to adhere to the aerodrome traffic circuit by the pilot of the Bucker.

¹. All times in this report are local. To obtain UTC, subtract 1 h from local time.

1. FACTUAL INFORMATION

1.1. History of the flight

On Saturday, 30 December 2017 at 17:42 local time, there was a mid-air collision between a Bell 412SP helicopter, registration EC-MMC, and a CASA 1131 biplane, registration N1950M, while on final approach to runway 30 at the aerodrome of Mutxamel (Alicante).

The helicopter, operated by the company Babcock International Group PLC, was returning to the aerodrome after taking part in firefighting activities, while the biplane was on a private flight in the vicinity of the airport.

During the final approach, the rear of the helicopter was impacted, causing it to lose its tail rotor. As a result, the helicopter destabilized, although the crew managed to make an emergency landing in a level attitude and a clockwise yaw motion.

The biplane lost its right wings upon impacting the helicopter, as a result of which the pilot lost control of the aircraft, which crashed into the ground in an inverted position.

Two occupants in the helicopter sustained minor injuries. The biplane pilot was taken to a hospital with serious injuries and subsequently died.

1.2. Injuries to persons

1.2.1. Aircraft EC-MMC

Injuries	Crew	Passengers	Total in the aircraft	Other
Fatal				
Serious				
Minor		2	2	
None	2	6	8	
TOTAL	2	8	10	

1.2.2. *Aircraft N1950M*

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

1.3. **Damage to aircraft**

Both aircraft sustained serious damage as a result of the accident.

Aircraft EC-MMC sustained damage to the main rotor blades and fuselage. The tail rotor detached and the skids collapsed upon landing.

Both right wings and the propeller on aircraft N1950M broke, and there was damage to the fuselage.

1.4. **Other damage**

There was damage to the metal perimeter fence at the aerodrome.

1.5. **Personnel information**

1.5.1. *Crew of of aircraft EC-MMC*

The captain of aircraft EC-MMC, a 45-year old Spanish national, had a CPL (H) license issued by Spain's National Aviation Safety Agency on 6 July 2001, and Bell 212/412/IR/SP ratings that were valid until 31 January 2019.

He also had a class-1 medical certificate that was valid until 23 October 2018. He had a total of 2240 flight hours, 1642 of which had been on the type.

The copilot of aircraft EC-MMC, a 37-year old Spanish national, had a CPL (H) license issued by Spain's National Aviation Safety Agency on 9 December 2010, and Bell 212/412/IR/SP ratings that were valid until 30 April 2018.

He also had a class-1 medical certificate that was valid until 11 February 2018. He had a total of 374 flight hours, 149 of which had been on the type.

1.5.2. Pilot of aircraft N1950M

The pilot of the Bücker, a 65-year old British national, had a commercial pilot license (CPL(A)) license issued by the Federal Aviation Administration of the United States on 30 April 1996. He also had a third-class medical certificate that was valid until 30 June 2018. According to section 61.23 of Part 61 of Title 14 of the Code of Federal Regulations, this certificate allows exercising the privileges of a private pilot certificate.

He had approximately 3500 flight hours at the time of the accident. He had been using that aerodrome for several years, and specifically with the accident aircraft since 2013.

According to the information provided, the pilot renewed his license by way of a flight test conducted on 6 September 2017 with an FAA-certified flight instructor. This renewal was valid for two years.

1.6. Aircraft information

1.6.1. Aircraft EC-MMC

The aircraft operated by Babcock International Group PLC, registration EC-MMC, a Bell 412SP with serial number 33209, had a certificate of airworthiness issued by Spain's National Aviation Safety Agency on 7 June 2016. The airworthiness review certificate was valid until 10 April 2018.

The most recent maintenance tasks, involving washing the compressors and structure, power test and greasing, had been carried out on 11 December 2017 with 12339 h on the aircraft.

1.6.2. Aircraft N1950M

The Bücker 131 aircraft, registration N1950M and serial number E3B-315, was a two-seat aircraft that was equipped with a LYCOMING O-360-A4-M engine. It had a special certificate of airworthiness of experimental category issued by the Federal Aviation Administration of the United States on 3 May 1995 and unlimited validity.

Investigators were unable to locate the aircraft logbook either at the pilot's home or among his belongings at the hangar where the aircraft was parked. The airworthiness information provided by the FAA indicated that when the aircraft was purchased on 2 August 2013, work was done to remove the coating on the wings, ailerons and central section, inspect the ribs, spars and fastening components, and repair ribs and supports. Since then, the accident pilot had flown about 500 hours on the aircraft.

Figure 1 shows an image of the Bücker 131 aircraft.



Figure 1. Aircraft N1950M

According to the aircraft manual, its landing speed is 82 km/h, with the following aerobatic capabilities: rolls, loops, slips, spins and the combination of the mentioned maneuvers.

1.7. Meteorological information

The AEMET does not have a weather station in Mutxamel, the closest station being the observatory in the city of Alicante, located 12 km southwest. The readings from this station for 17:42 were as follows:

- Average wind of 7 km/h, gusting to 17km/h from the west.
- Temperature: 20° C
- Humidity: 47%
- Pressure: 1024 hPa

The METARs for the Alicante Airport (from 12 minutes before and 18 minutes after the accident), some 20 km southwest, were as follows:

METAR LEAL 301630Z 30018KT CAVOK 20/09 Q1023 NOSIG=

METAR LEAL 301700Z 30016KT CAVOK 20/09 Q1024 NOSIG=

Sunset on 31 December in that area was at 17:50. Based on the information

obtained, the visibility when landing on runway 30 between approximately 15 minutes before sunset until sunset is highly reduced due to the position of the sun.

According to an eyewitness who was at the aerodrome, the wind was in the direction of the runway centerline at between 10 to 15 kt. There was no turbulence, bad visibility or factors influencing the flight.

1.8. Aids to navigation

Not applicable.

1.9. Communications

At the time of the accident, neither aircraft was in contact with air traffic control units. They also were not equipped with voice recorders. As a result, there is no record of the communications between the crews of the two aircraft. However, there is information provided by eyewitnesses involving the communications between the helicopter and other aerial sources, as well as during the approach to the aerodrome (see Section 1.16).

1.10. Aerodrome information

The aerodrome of Mutxamel (LEMU) is in the town of Mutxamel, 10 km northeast of Alicante. It is at an elevation of 437 ft and it has one asphalt runway in a 12/30 orientation and measuring 1000x23 m. The radio frequency of the aerodrome is 123.50 MHz.

It is a restricted aerodrome under the responsibility of the Community of Valencia. It is located in the south sector of Valencia TMA and inside the CTR of Alicante airport, in category D airspace.

1.11. Flight recorders

Neither of the aircraft involved was equipped with a conventional flight data recorder or cockpit voice recorder. The relevant aviation regulation does not require that any type of recorder be installed on these aircraft.

Aircraft EC-MMC, however, did have a fleet tracking system that recorded time, geographic coordinates, altitude, heading and speed information.

1.12. Wreckage and impact information

The Bücker 131 aircraft collided as it descended with the rear left of the helicopter such that both of its right wings made contact with the tail assembly, causing the tail rotor on the helicopter to break and detach. The Bücker 131 then impacted the main rotor blades, and its right wings detached. The main rotor blades broke, and the helicopter's horizontal stabilizer was damaged by the propeller on the Bücker 131.

The photos in Figure 2 show the final condition of both aircraft.



Figure 2. Aircraft after the accident

The Bücker 131 crashed to the ground in an inverted position some 60 m away from the runway 30 threshold, damaging as it fell the metal perimeter fence of the aerodrome. It came to stop approximately facing northwest.

After the two aircraft collided, the pilot of EC-MMC managed to regain control of the helicopter, making an emergency landing with the skids impacting the ground. The pilot landed on a strip some 40 m away from the runway threshold, coming to a stop facing slightly to the southwest.

Scattered fragments from both aircraft were found on a plot next to the aerodrome, located along the runway extension; specifically, fragments from the tail rotor and a main rotor blade tip, as well as wood fragments from the biplane's propeller blades and the two right wings.

1.13. Medical and pathological information

According to the medical information provided, the pilot of the Bücker, who was seated in the back seat of the airplane, suffered head, chest and abdominal trauma.

After being treated at the site of the accident, he was taken to a hospital, where he later died as a result of his injuries.

Two of the occupants of aircraft EC-MMC sustained minor injuries, which were treated at the accident site.

1.14. Fire

There was no fire in either aircraft or in the environment.

1.15. Survival aspects

Although the safety harness of the Bücker pilot was verified to be in good condition and the cockpit was not significantly deformed, the characteristics of the accident resulted in serious injuries that were incompatible with life.

Two of the helicopter's ten occupants received minor injuries and were treated onsite. The safety harnesses were verified to be working correctly and fulfilled their retention function. The aircraft did not sustain any damage that endangered the life of the occupants.

The actions of the helicopter pilot, who kept control of the aircraft and made an emergency landing in a horizontal attitude, were essential to the occupants' survival.

1.16. Tests and research

1.16.1. Analysis of aircraft wreckage

The collision between the two aircraft caused the tail rotor of aircraft EC-MMC to detach, the tail rotor drive shaft to break, damaged the horizontal stabilizer, tailcone and all four main rotor blades, and collapsed the skids.

The photo in Figure 3 shows the tail rotor and the condition of the horizontal stabilizer and main rotor blades after the accident.



Figure 3. Aircraft EC-MMC

On the Bücker, the top and bottom right wings, propeller blades and engine cowling broke. There was also miscellaneous damage to the fuselage and in the cockpit.

Figure 4 shows the final condition of the Bücker.



Figure 4. Aircraft N1950M

1.16.2 Information provided by eyewitness

The eyewitness was in the aerodrome. He was a pilot who had also been involved that day in firefighting operations.

After returning to the aerodrome and landing on runway 30, he remained in the cockpit of his aircraft for about 4 minutes with the radio on, during which time he did not hear any communications. He saw the Bücker take off at 17:10 and did not hear the pilot make any reports during takeoff.

He saw the airplane fly acrobatic maneuvers after taking off.

After exiting his aircraft, he went to the cafeteria area, which was located on the other side of the runway. He then saw the Bücker carry out acrobatic maneuvers over the transition from the downwind leg to the base leg for runway 30.

He also stated that approximately half an hour later, he saw the aircraft execute a 180° left turn at an altitude of 1500 to 2000 ft AGL, after which he did a slip with the left wing down and the nose at a 35-40° right angle. After this he levelled off some 100 ft above the helicopter and continued descending until the impact.

He thought that the Bücker probably touched the main rotor on the helicopter with its right wing, since it was thrown clear and rolled three times before impacting the ground upside down. The helicopter's nose dropped 45°, after which it rotated three times horizontally to the right from the impact site. It then rotated two more times, after which a cloud of dust impeded his view.

He then ran to the site of the accident. Upon reaching it, he saw that the pilot of the Bücker was being assisted by the occupants of the helicopter. He looked inside the cockpit of the Bücker and saw that the radio was on and tuned to 123.500 MHz. He then turned everything off (master switch, battery, etc.).

He also stated that he had been in radio contact with the accident helicopter earlier that day, and had experienced no problems.

1.16.3 Information provided by the captain of aircraft EC-MMC

The captain of aircraft EC-MMC stated that during the firefighting activities they conducted that day, they refueled and rested at the aerodrome of Castellón. They did not have any problems with the radio communications they had with other aerial resources or with Valencia APP.

When returning to the base in Mutxamel, they had tuned the COM1 unit to the aerodrome frequency (123.500 MHz). They reported their position in Campello² and heard nothing on the frequency. If there had been a message, they would have heard it from there. The passengers in the helicopter who were monitoring the aerial band also heard nothing.

They also reported being on the final leg upon reaching the aerodrome. Their speed on the base leg was approximately 70 kt, with a descent rate of 200-300 ft/min. He thinks the impact with the aircraft was at about 35 kt. The nose of the helicopter moved left and rose a little. At that point they did not know they had collided with an airplane. He thought there had been a mechanical failure or that they may have struck the aerodrome fence. After this the nose turned right, rotating 90° in half a second, and after another second and a half, the helicopter was vertical, with the nose down in a nearly 90° attitude. He pulled back on the cyclic and raised the pitch. They were at an elevation of approximately two stories off the ground, and at that point he had to avoid impacting with the nose and try landing on the skids.

². Approximately 6 km east of Mutxamel

He lowered the pitch, centered with the cyclic and tried to close the throttle by twisting the grips. Once horizontal, the helicopter dropped and they touched down.

Once they stopped, the copilot pulled the levers and shut off the engines. He instructed the passengers to remain inside, since the rotor was making noise. After this he disconnected the battery and they exited the helicopter. They then saw the accident biplane and called 112.

The airplane was losing fuel, so they told the personnel to move away from it. After this, an ambulance arrived, followed by firefighters and police.

1.16.4 Information provided by the copilot of aircraft EC-MMC

The copilot stated that they had been activated that morning at approximately 07:50, and that the squad arrived at the aerodrome at 08:48. He and the captain did the pre-flight inspection, finding nothing unusual.

Later, during the firefighting activity, they refueled and rested at the aerodrome of Castellón. During the return, he handled the communications. They were in contact with Valencia APP and as they were exiting the Valencia TMA, they were instructed to go to another fire, though in the end this was not confirmed and they continued to Mutxamel.

To communicate with the aerodrome, he used the COM1 unit with the fire frequency on standby. They flew along the coastline and he reported their position upon nearing Campello on 123.500 MHz and received no reply, even though in Campello, and even farther out, Mutxamel can be heard perfectly. They were at an altitude of approximately 1000 ft AGL.

They made a wide right base for runway 30, though he did not recall their exact altitude. The goal was to make a shallow approach and hover over the runway 30 threshold. Their position and landing lights were on.

He then reported "A-2 firefighting helicopter on short final" (in Spanish), which was when the accident took place. Their descent rate was 200 ft/min and their speed 45 kt.

The altitude at the moment of impact between the aircraft was about 30-40 ft, and they were lined up with the runway centerline. It did not seem very violent. After the impact, they turned 2 or 3 times, though he could not say for sure how many. The helicopter was vibrating considerably and they could not see the instruments. The helicopter went vertical and banked to the right, but the captain controlled the helicopter to level it. They then impacted the ground and the helicopter came to a

sudden stop. He did not think that the main rotor touched the ground. Once the aircraft stopped, the captain told them to remain inside because the rotor blades were very low.

After exiting the helicopter, they helped the pilot in the Bucker. He was not wearing a helmet, which he thought came off due to the impact. The airplane's engine was making noises, so he disconnected the battery.

None of the members of the squad was able to see the airplane during the approach. The squad leader and his assistant were wearing headphones, and they later told him they had heard the reports he had made on the radio from the helicopter, but heard nothing else.

He also stated that the visibility at the aerodrome was very low because of the sun's position at that moment.

1.16.5 Information provided by a friend of the pilot of aircraft N1950M

He flew routinely with the pilot of the Bucker.

He stated that the pilot used to talk on the radio in English. The aircraft's cockpit was much noisier than one with a closed cockpit due to the engine, so two years earlier the pilot had replaced the boom microphones with throat microphones in order to improve communications. A throat microphone picks up vibrations in the throat, unlike normal microphones that also pick up ambient and wind noises.

They communicated on 123.500 MHz and did not change frequency when making local flights. He thought the pilot had been unfortunate not to hear the reports from the helicopter and to have had bad visibility due to the time of day, close to sunset. Visibility at that time is fairly low at both thresholds, a condition that lasts about 15 min.

1.16.6 Photograph taken by eyewitnesses outside the aerodrome

Figure 5 shows a photograph taken by eyewitnesses located outside the aerodrome grounds, specifically, south of the runway 30 threshold, moments before the accident.



Figure 5. Positions of the aircraft on final approach

The photo shows the aircraft involved descending during the final approach to runway 30.

The eyewitnesses also stated that they had seen the Bücker aircraft doing acrobatic maneuvers shortly before the accident.

1.16.7 LEMU visual approach chart

Figure 6 shows the visual approach chart for the Mutxamel aerodrome.

Indicated on the chart are the N, E, E1 and S reporting points.

Aircraft joining the pattern must report their position in the pattern. Arrivals via point E join the pattern on the right downwind leg for RWY 12 or on final for RWY 30.

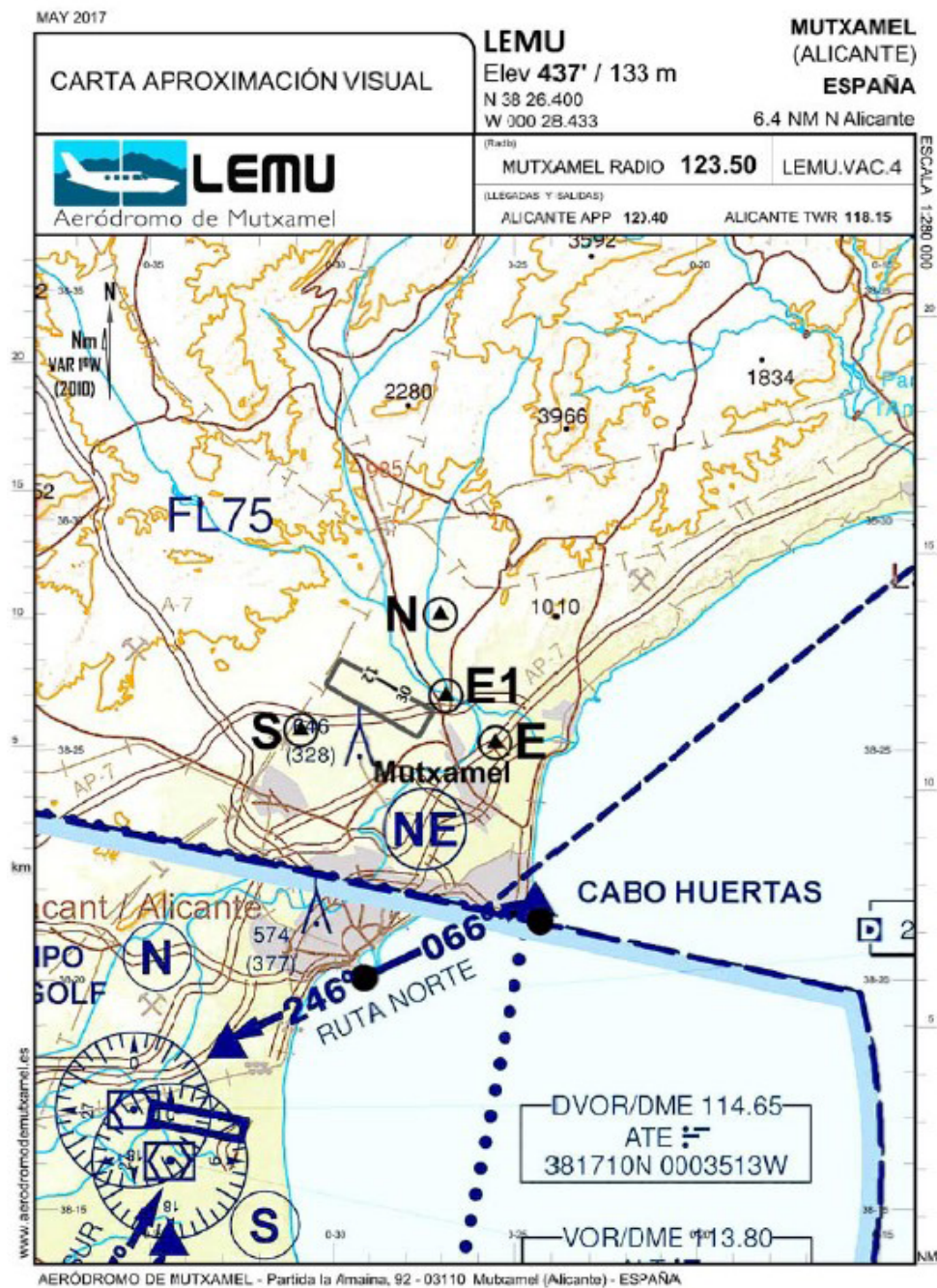


Figure 6. LEMU visual approach chart

1.16.8 Flight paths and final position of the aircraft

Shown in red in Figure 7 is the track followed by aircraft EC-MMC as it joined the final segment of the aerodrome pattern. The track was obtained from the fleet tracking data.

The dashed lines in the diagram show the traffic patterns at the aerodrome for airplanes and helicopters.

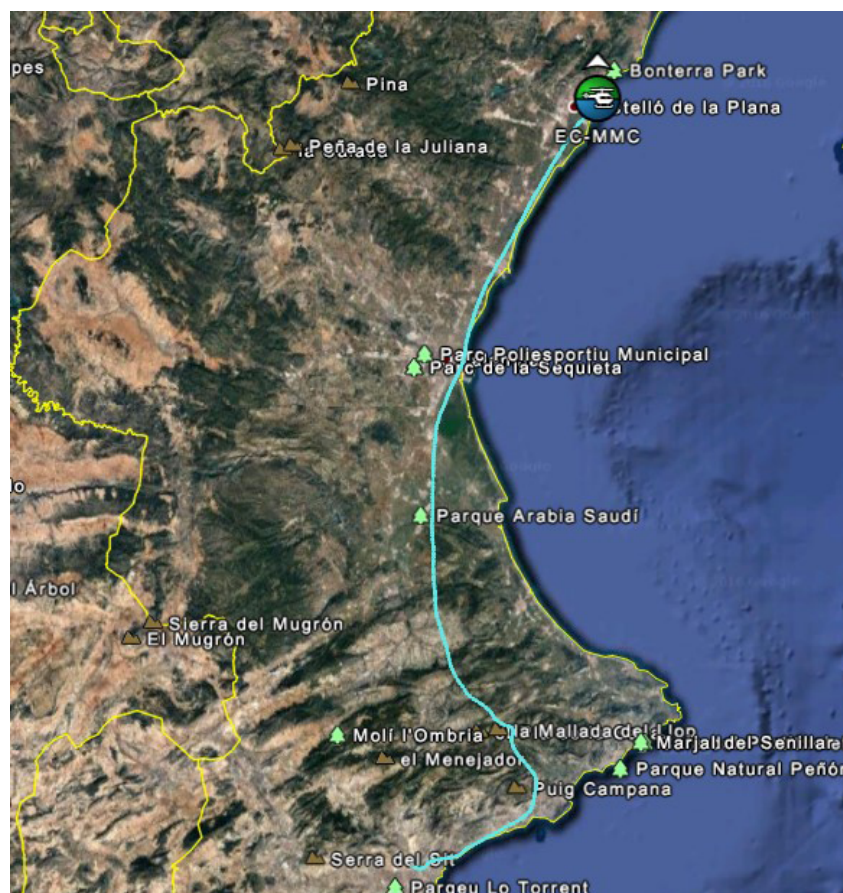


Figure 7. Track of aircraft EC-MMC

The track followed by aircraft EC-MMC shows that it directly joined the final segment of the pattern to land on runway 30, as instructed in the visual approach chart for the aerodrome.

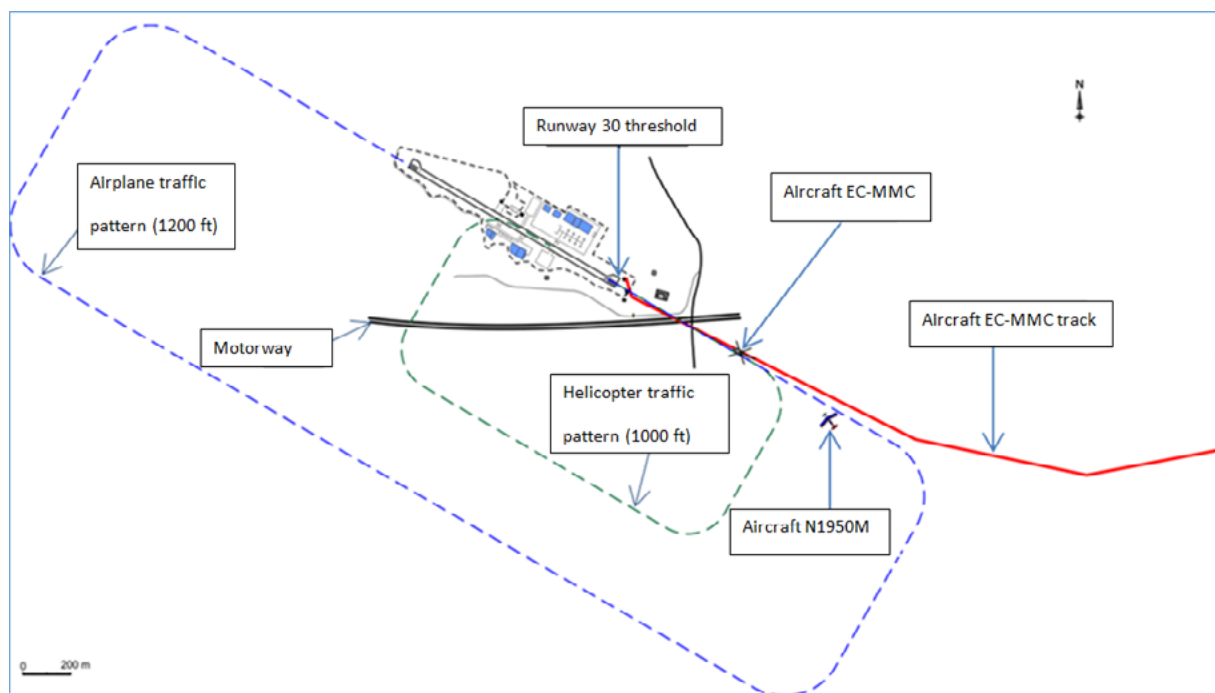


Figure 8. Relative positions of aircraft EC-MMC and N1950M

The close-up shown in Figure 9 provides the positions of both aircraft on final approach seconds before the collision. This sequence was obtained from the fleet tracking data provided.

Also shown is the point of impact and the final positions of the aircraft after the accident.

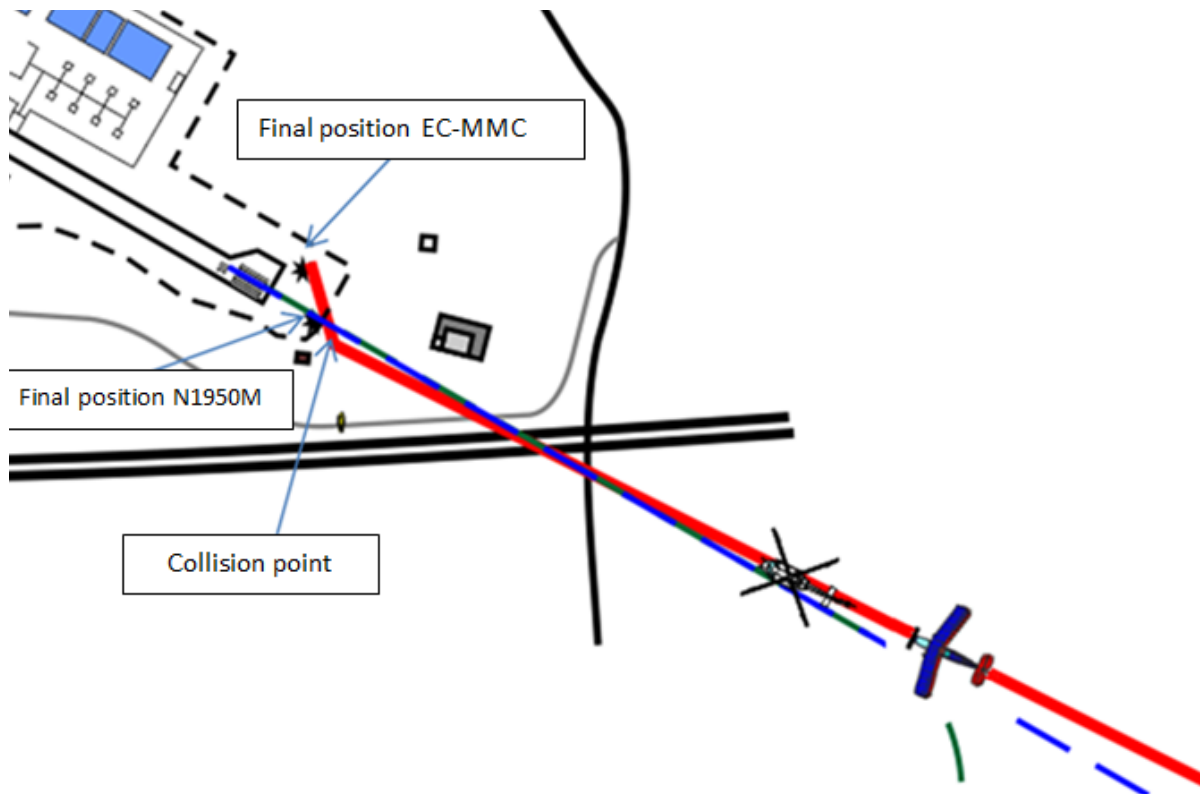


Figure 9. Aircraft on final approach to RWY30

In the moment of the collision, occurred approximately at 17:42 h, the height was 4 m, and groundspeed and course for the helicopter were 61 km/h and 294°.

After the collision, the change in the track of aircraft EC-MMC shows that the helicopter deviated from its path, ending up to the right of the runway 30 centerline after landing.

As for the Bücker, after the impact it ended up slightly left of the extended runway centerline.

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. Information provided by the eyewitness

According to information provided by the person who witnessed the accident, the Bücker had taken off at 17:10 and it was flying maneuvers to the left of runway 30 for about half an hour. At 17:42, it was maneuvering in the aerodrome pattern, specifically in the transition area between base and final for runway 30, after which the pilot executed a 180° turn to line up with the runway at an altitude of approximately 1500 to 2000 ft. The aircraft slipped while turning, causing it to lose altitude quickly, leveling out some 100 ft above aircraft EC-MMC. After this, it continued descending until it impacted the helicopter.

2.2. Meteorological information

The weather information provided indicates that the visibility conditions were not limiting to visual flight. The wind was moderate, and no significant weather phenomena were recorded.

However, since the accident occurred 8 min before sunset, which for that date and location took place at 17:50, and considering the orientation of the runway, the visibility at that time would have been reduced when landing on runway 30 due to the low position of the sun.

2.3. Questions involving the aircraft

According to the statements of both the eyewitnesses and the crew of aircraft EC-MMC, and based on the analysis of the aircraft, the investigation ruled out problems of a technical nature in causing the accident. The engine on the Bücker provided power until the moment of impact and the fractures observed occurred during the collision or as a result of the impact with the ground. Scattered debris was also found in the plot next to the aerodrome, along the runway extension, which detached when the aircraft first made contact.

Also, as stated by the eyewitness who landed moments before the Bücker took off, after landing he monitored the radio for several minutes without hearing any communications from the pilot of the Bücker, watching as said pilot started flying acrobatic maneuvers in the area of the aerodrome pattern. Similarly, the crew of aircraft EC-MMC, after making the required reports during their approach, stated that they did not hear any communications on the aerodrome frequency.

The eyewitness who approached the Bücker after the accident and looked into the cockpit saw the radio turned on and tuned to the aerodrome frequency. According to the information gathered, the radio in the aircraft worked perfectly and the pilot made radio reports in English, though since the cockpit was open, there was the drawback of the loud engine noise hampering communications. The condition of the radio panel after the impact made it impossible to determine the volume set by the pilot and whether this factor could have made it difficult to hear the reports made by the helicopter crew during their approach.

Since no reports were heard from the pilot, the possibility also exists that he did not make the relevant reports involving his intentions. This may have been influenced by the fact that it was close to sunset, which could have led the pilot to think there would be no other aircraft operating in the vicinity of the aerodrome.

Another factor to consider is the reduced frontal and downward visibility from the cockpit of the Bücker. On this aircraft type, the pilot will usually slip the airplane, moving the nose of the airplane at an angle in order to gain visibility toward the front and thus be able to see the runway before landing.

2.4. Collision

The information provided indicates that the Bücker slipped and started to lose altitude at about 2000 ft. After the slip maneuver was completed and stabilized, and while continuing the descent at a much slower rate, the helicopter had flown below and ahead of the Bücker, undetected by its pilot due to the reduced visibility from his position. The Bücker impacted the helicopter's tail assembly a few seconds later. According to the statements from the helicopter's occupants, it was not a violent impact. In this regard, it should be noted that both aircraft were stabilized on final, meaning the relative speed between them would not have been high.

Also worth considering are other factors that could have contributed to the accident, like the fact that, according to eyewitnesses, the Bücker did not fly the aerodrome pattern when maneuvering to land. Also, although the weather was favorable, the sun's position that close to sunset was such that the visibility would have been reduced in the area. This factor would have made it difficult for both crews to see the other before initiating their final approaches.

3. CONCLUSIONS

3.1. Findings

- The documentation for both aircraft was valid at the time of the accident.
- The documentation for the pilots was also valid.
- The aerodrome of Mutxamel does not have an air traffic control service.
- Aircraft EC-MMC had taken part in firefighting duties in Castellón over the course of the day.
- The pilot of the Bücker took off at 17:10, and according to eyewitness statements, was flying acrobatic maneuvers to the left of runway 30.
- During the return to LEMU, aircraft EC-MMC reported its location on the aerodrome frequency, and did so again upon commencing the final leg of the approach without hearing any other reports on the frequency.
- The pilot of the Bücker was flying maneuvers in the aerodrome pattern, after which he turned left and slipped to position his aircraft for the final leg. After this he continued descending until he impacted the helicopter.
- Weather conditions were not limiting for visual flight.
- The accident occurred 8 min before sunset, which caused the visibility to be reduced due to the position of the sun.
- According to the eyewitnesses, the Bücker was thrown clear from EC-MMC after striking its main and tail rotors, which also caused it to lose the two right wings, after which it impacted the ground upside down.
- The pilot of aircraft EC-MMC made an emergency landing in the strip of land next to the runway 30 threshold.
- Two of the occupants of aircraft EC-MMC sustained minor injuries. The pilot of the Bücker was taken to a hospital, where he later died as a result of his injuries.

3.2. Causes

The most likely cause of the accident was the failure of the pilot of the Bücker to detect the helicopter while on final approach to runway 30 at the Mutxamel aerodrome. The biplane was further back and in a higher position in the approach

to land on the same runway.

The following factors contributed to the accident:

- the non-use of communications by the pilot of the Bücker;
- the failure by the pilot of the Bücker to fly the aerodrome pattern and flying acrobatic maneuvers in the pattern.

4. SAFETY RECOMMENDATIONS

Having being indicated by the Spanish Air Safety Agency the aerodrome of Mutxamel is under the responsibility of the Department of Transport of the Community of Valencia, the following recommendation is issued:

REC 36/18: It is recommended to the Department of Transport of the Community of Valencia to contact the owner/manager of the aerodrome in order to assess, and if necessary, to modify the services provided in it, as a consequence of the increase in activity.

