



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

Report A-004/2017

Accident involving a Socata
TB-20 Trinidad aircraft,
registration D-ECJP, in
Sierra de Tejeda,
Canillas del Aceituno (Málaga)
on 29 April 2017



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Notice

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
'	Minutes
"	Seconds
AEMET	National Weather Agency
AIP	Aeronautical information publication
AMA	Area minimum altitude
AMSL	Above mean sea level
APP	Approach control
ATC	Air traffic control
ATPL(A)	Airline transport pilot license (airplane)
CPL(A)	Commercial pilot license (airplane)
CFIT	Controlled flight into terrain
CTR	Control zone
DME	Distance measuring equipment
ELT	Emergency Locator Transmitter
FI	Flight instructor
FL	Flight level
ft	Feet
h	Hour
hPa	Hectopascal
IAS	Indicated airspeed
ICAO	International Civil Aviation Organization
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
FI(A)	Flight instructor (airplane)
IR	Instrument rating
kg	Kilograms
km	Kilometers
Kph	Kilometers per hour
kt	Knots
LBA	Germany's Federal Aviation Office
LEAM	ICAO code for the Almería airport
LEAX	ICAO code for the La Axarquía aerodrome
LEGR	ICAO code for the Granada airport
LEMG	ICAO code for the Málaga airport
LEMU	ICAO code for the Mutxamel aerodrome
LER	Restricted area
LFMP	ICAO code for the Perpignan/Llabanère airport (France)
m	Meters
m/s	Meters per second
mb	Millibars
min	Minutes
MKR	Marker beacon receiver
MLGL	Left main landing gear
MLGR	Right main landing gear

N	North
NDB	Non-directional beacon
PIC	Pilot in command
PPL(A)	Private pilot license (airplane)
QNH	Altimeter subscale setting to obtain elevation when on the ground
S	South
s	Seconds
SAR	Search and rescue
SEP	Single-engine piston rating
SERA	Standardised European Rules of the Air
SW	Southwest
TAF	Aerodrome forecast
TWR	Aerodrome control tower
ULM	Powered ultralight aircraft
UTC	Coordinated universal time
VFR	Visual flight rules
VMC	Visual meteorological conditions
W	West

Synopsis

Owner and operator:	Private
Aircraft:	Socata TB-20 Trinidad; registration D-ECJP
Date and time of accident:	29 April 2017 at 16:31 UTC ¹
Site of accident:	Canillas de Aceituno (Málaga). Spain
Persons on board:	Three, pilot and two passengers. All killed
Type of flight:	General Aviation – Other
Phase of flight:	On route – Cruise
Flight rules:	VFR
Date of approval:	25 September 2019

Summary of event

On 29 April 2017, a Socata TB-20 Trinidad aircraft, registration D-ECJP, took off from the aerodrome of Mutxamel (LEMU), in the province of Alicante, at 14:36 on route to the Federico García Lorca Granada-Jaén Airport (LEGR). The flight was planned under visual flight rules (VFR) and its flight path followed the coastline along the provinces of Alicante, Murcia, Almería, Granada and Málaga to the vicinity of the aerodrome of La Axarquía (LEAX), where it turned north (354°) to the S entrance point to the visual approach pattern for the LEGR airport. During this final segment, the aircraft impacted the side of a foothill in the Sierra de Tejeda. All three occupants were killed and the aircraft was destroyed.

The investigation shows that there were essentially two precursors to the accident: a loss of perception of the type of flight that was being conducted, despite having been identified as a VFR flight, and the communications between the aircraft and air traffic control, which may have been misinterpreted by the crew of the aircraft.

Finally, the report concludes that the accident was caused by the loss of visual references while conducting a VFR flight.

¹ All times in this report are in UTC. To obtain local time, add two hours to UTC.

1. FACTUAL INFORMATION

1.1. History of the flight

On 29 April 2017, a Socata TB-20 Trinidad aircraft, registration D-ECJP, took off from the aerodrome of Mutxamel (LEMU), in the province of Alicante, at 14:36 on route to the Federico García Lorca Granada-Jaén Airport (LEGR). The flight was planned under visual flight rules (VFR) and its flight path followed the coastline along the provinces of Alicante, Murcia, Almería, Granada and Málaga to the vicinity of the aerodrome of La Axarquía (LEAX), where it turned north (354°) to the S entrance point to the visual approach circuit for the LEGR airport. During this final segment, the aircraft impacted the side of a foothill in the Sierra de Tejeda. All three occupants were killed and the aircraft was destroyed.

Aircraft D-ECJP had taken off from Germany with seven other aircraft to go on an air tour of different locations. Inbound from the airport of Perpignan-Rivesaltes (LFMP), it entered Spanish airspace and flew to the aerodrome of Mutxamel, where its occupants, after a brief rest and refueling, took off for the airport of Granada. There were three individuals on board the aircraft, the pilot and two passengers, one of whom assisted with navigation and handled communications with air traffic control stations.

Due to the weather conditions in the southeast quadrant of the Iberian Peninsula, the group of aircraft flew along the coastline between LEMU and LEGR, as stated previously. The aircraft took off sequentially, as per each pilot's discretion and based on their own flight schedule. All of the airplanes took off within 45 minutes of each other, with D-ECJP being the first.

The blue line in Figure 1 shows the final part of the flight path. In the first part, until LEAM, the aircraft maintained an altitude of about 1000 ft.

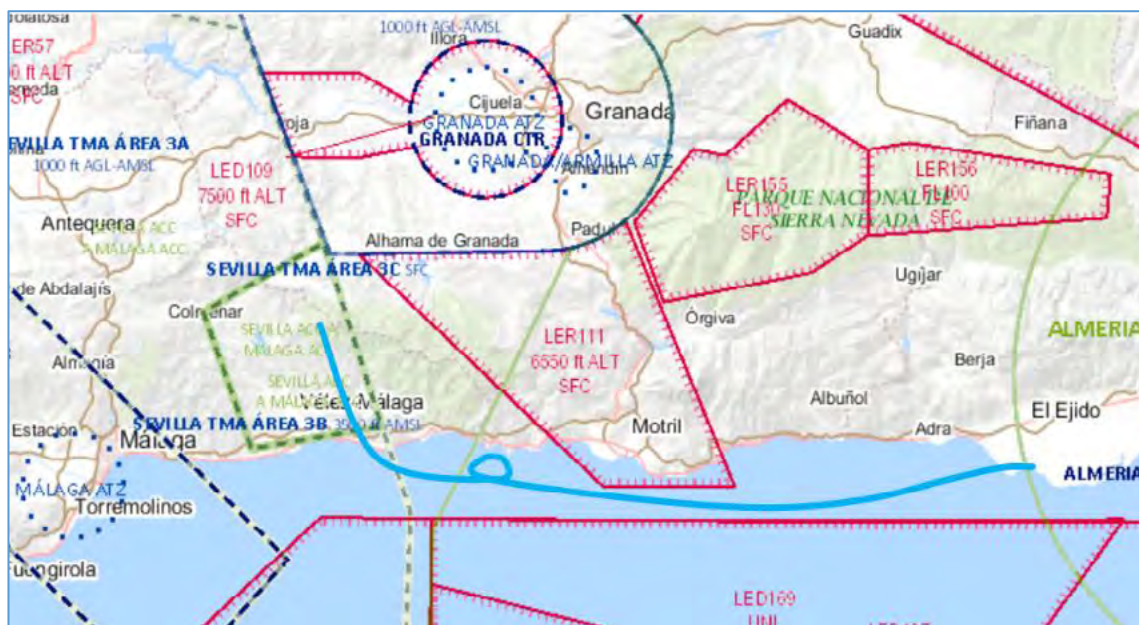


Figure 1: Flight path

At 15:41:15, the crew of the aircraft contacted the Almería control tower (LEAM TWR) to report their position. The controller authorized them to proceed from point S to SW in his control zone, reported the weather conditions at LEAM and informed them there was no activity in restricted area LER111.

At 16:18:45, the crew of the aircraft contacted Málaga approach (LEMG APP), resulting in the exchange indicated below:

TIME	STATION	CONTENT
16:18:45	DECJP	<i>Málaga approach DECJP buenas tardes</i>
16:18:50	LEMG APP	<i>Buenas tardes DECJP go ahead</i>
16:18:55	DECJP	<i>DECJP squaking 6303 we are VFR flight from LEMU to LEGR presently 5000' inbound PTM², request to cross airspace and 5000' via PTM, LEAX, S from LEGR inbound for LEGR</i>
16:19:27	LEMG APP	<i>DECJP we don't have traffic reported on the route to Granada and you may continue visual flight plan</i>
16:19:40	DECJP	<i>I don't understand. May we continue in 5000' direct PTM now?</i>
16:19:46	LEMG APP	<i>I say again Madam. You are VFR, no traffic reported on the area, climb to 5500' and you may continue own discretion on your route</i>
16:19:58	DECJP	<i>Ok, so, confirm we are climbing to 5500' direct PTM, then after LEAX then S point from LEGR</i>
16:20:15	LEMG APP	<i>Affirmative, affirmative</i>

² PTM: Point on the visual chart, located in Torre del Mar (Málaga)

16:20:16	DECJP	<i>Gracias</i>
16:20:17	LEMG APP	<i>De nada</i>
16:22:37	DECJP	<i>And DJP latest METAR report of Granada please</i>
16:22:42	LEMG APP	<i>Roger</i>
16:23:13	LEMG APP	<i>DECJP copy weather of LEGR, wind is 270-4 knots wind, sorry, the clouds FEW at 2000, SCT at 4000', BKN 7500 Temperature 18 DP 13 QNH 1013</i>
16:23:37	DECJP	<i>Copied sir, QNH 1013 but I didn't take the wind please say the wind again</i>
16:23:43	LEMG APP	<i>Wind is 270-4 knots</i>
16:23:47	DECJP	<i>270-4 knots thank you sir, so runway 27 in use?</i>
16:23:53	LEMG APP	<i>Yes, let me just check it with them, one minute.</i>
16:23:55	DECJP	<i>Thank you sir</i>
16:24:43	LEMG APP	<i>DJP runway in use in LEGR is 09</i>
16:24:48	DECJP	<i>Runway in use 09, thanks copied. Gracias JP</i>
16:26:12	DECJP	<i>DECJP is approaching PTM next LEAX</i>
16:26:18	LEMG APP	<i>Roger</i>
16:29:11	DECJP	<i>DECJP now inbound S</i>
16:29:14	LEMG APP	<i>Roger. Thank you</i>
There was no further radio contact with the aircraft after this last transmission		

The aircraft disappeared from radar at 16:31:46. The INCERFA, ALERFA and DETRESFA phases were activated at 17:02, 17:36 and 18:07, respectively. The Search and Rescue Service (SAR) located the aircraft wreckage at coordinates 36° 54' 9.75 N 004° 03' 58.40" W at an elevation of 1718 m (5636 ft) and confirmed the death of the occupants.

The remaining aircraft in the group reached their destination in LEGR, except for one, which landed in LEAX at 17:35 because the weather conditions did not allow the pilot to continue flying to Granada.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Other
Fatal	1	2	3	
Serious				
Minor				
None				
Total	1	2	3	

1.3. Damage to aircraft

The aircraft was destroyed by the frontal impact with a hillside in the Sierra de Tejeda.

1.4. Other damage

The terrain was rocky, covered with small, scattered shrubs. The debris field contaminated part of the terrain and some of the shrubs were burned.

1.5. Personnel information

1.5.1. Pilot

- Age: 64
- Nationality: German
- License: Private pilot license (PPL(A))
- Licensing authority: Federal Aviation Office (LBA)
- Initial license date: 21/02/2001
- Ratings:
 - SEP (land), valid until 31/03/2018
 - PIC, valid until 31/03/2019
 - IR, valid until 31/03/2018
- Language proficiency: English level 6
- Medical certificate: class 2, valid until 12/12/2017
- Total flight hours: 800³, approximately 8% of them in flight with aircraft classified as ULM
- Flight hours in the last 30 days: 9:27 (in D-ECJP) as the PIC
- Flight hours in the last 7 days: 7:18 (in D-ECJP) as the PIC
- Rated for night flying
- The pilot logbook shows flights with D-ECJP since 2013.

1.5.2. Flight information on the passenger on board

The person who was assisting the pilot with the communications also had a pilot license but did not have a valid medical certificate at the time due to an surgery.

Her license contained the following information:

- Age: 53
- Nationality: German
- License: Airline transport pilot license (ATPL(A))
- Licensing authority: Federal Aviation Office (LBA)
- Initial license date: 8/09/1999

³ Information provided by the LBA (Federal Aviation Office) on 2/11/2016.

- Ratings:
 - EMB170:
 - PIC, valid until 30/06/2017
 - IR, valid until 30/06/2017
 - SEP (land):
 - PIC, valid until 31/03/2018
 - IR, valid until 30/04/2017
 - FI(A), CPL, PPL, SE SP; night, valid until 31/05/2018
- Language proficiency: English level 6
- Total flight hours: approximately 10 000

1.5.3. Information on the air traffic controller

- Age: 63
- Nationality: Spanish
- Licensing authority: Spain's National Aviation Safety Agency
- Unit endorsements in LEMG:
 - APS valid until 21/11/2017
 - ADI/TWR/RAD valid until 21/11/2017
- Language proficiency:
 - English level 4, valid until 16/05/2019
- Medical certificate: Class 3, valid until 13/11/2017
- Time on duty in last 7 days: 10:24:40 hours
- Time on duty on 29/04/2017, prior to event: 00:30:13 hours

1.6. Aircraft information

The accident aircraft was a Socata TB-20. It was equipped with a single Lycoming IO-540-C4D5D engine, a dual-blade propeller and a tricycle landing gear and had a maximum takeoff weight of 1335 kg. This aircraft was manufactured in 1982 and had serial number 292. The airframe had 2575 hours and the engine had 3364:55 hours of operation.

It had an Airworthiness Review Certificate (reference MG. 0539) that was approved by the German Federal Aviation Office and was valid until 7 November 2017.

The last maintenance check of the aircraft, a 100-hr check, was conducted on 8 November 2016 with 2557:00 flight hours on the aircraft.

A review of the electronic equipment on the aircraft, dated 27/09/2016, certified that it was equipped with the following instruments:

- GARMIN GNS 430W unit with integrated communication and navigation equipment. Unit 2 had an inoperative ILS (instrument landing system) locator.
- One NDB (non-directional beacon).

- Marker beacon receiver (MKR).
- Mode-S transponder.
- One DME (distance measuring equipment) unit.
- One KING KFC 150 autopilot.
- Emergency locator transmitter.
- Installation required for flying in IMC (instrument meteorological conditions).

1.7. Meteorological information

1.7.1. Information from around the time of the accident

Spain's National Weather Agency analyzed the situation between 11:00 and 17:00. Clouds began rolling in at the aerodrome of departure (LEMU) at 11:00. The cloud base dropped from 3000-4000 ft at the start of this period to 2500 ft at the end. There were lower clouds in San Javier (Murcia), with bases at around 2000 ft. The situation in Almería was somewhat better. On the coasts of Granada and Málaga, there were very low clouds (bases at around 1000 ft) with intermittent showers, which reduced visibility. Toward the center of Granada the situation was a little better, since the cloud ceilings were higher and the visibility was better, though convective activity started in the vicinity at the end of this period. In Málaga there were significant downpours that lowered in intensity over the period in question.

It is very likely that clouds would have covered the mountaintops in the Sierra de Tejeda. Barring a few one-off values for the wind gusts at the storm fronts, no strong winds were recorded.

Despite all the information available, it is not easy to determine what the situation was at the accident site. At the station of Velez Málaga, 15 km away, there was no wind, the humidity was 90% and the temperature 16° C, and in Algarrobo, 14 km away, there was a 15-kt wind, the humidity was 90% and the temperature 16° C, with no rain.

AEMET summarizes the situation as complex, with abundant low clouds that, along with the mountainous terrain at the accident site, would likely have hampered visual flight.

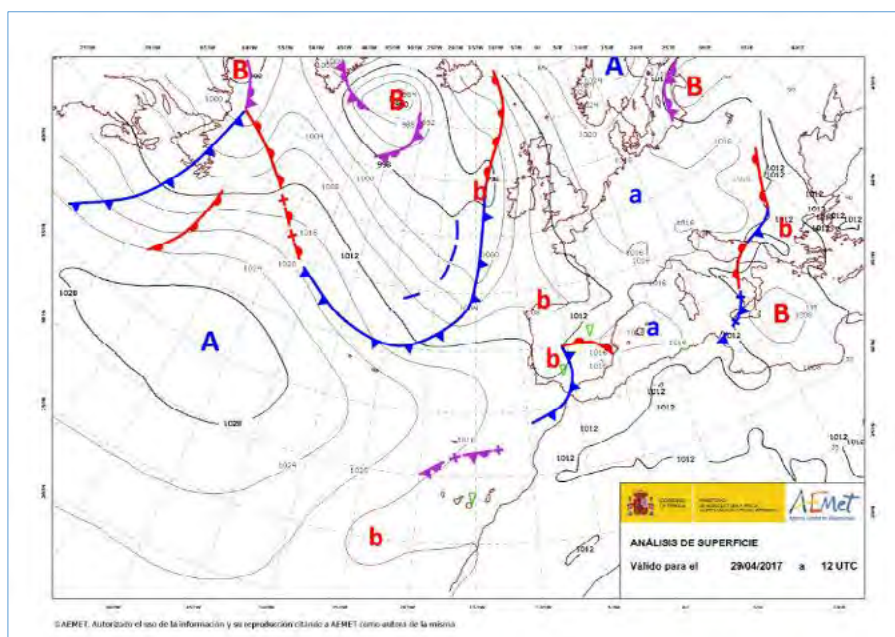


Figure 2: Situation at 12:00 UTC

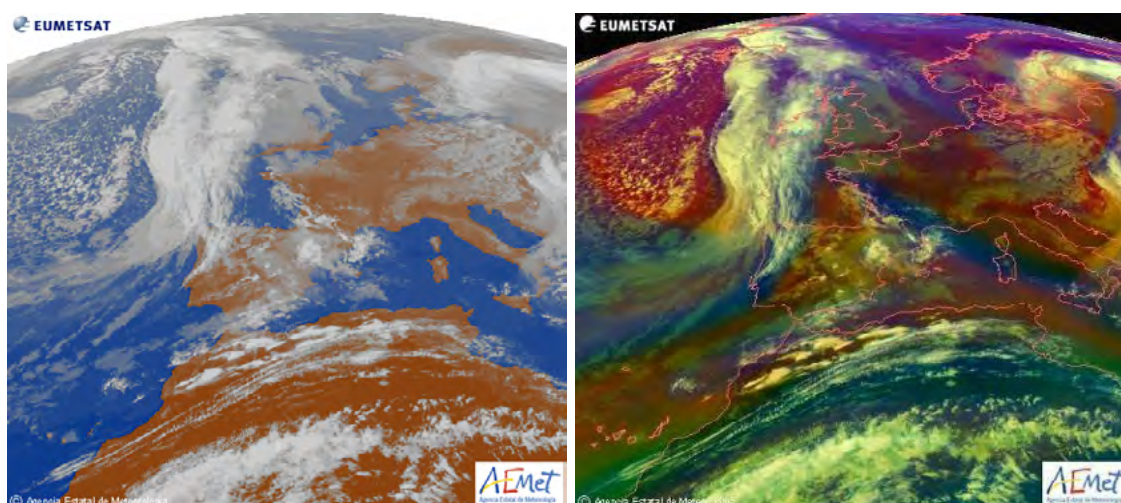


Figure 3: Satellite infrared and air mass images from 16:00 UTC

The 16:30 METAR reports for the closest airports to the crash site, Málaga and Granada, 46 and 41 km away, respectively, were as follows:

- LEMG 291630Z 10005KT 080V140 4500 BR BKN005 OVC011 14/14 Q1014 NOSIG=
 Wind direction 100°, speed: 5 kt (9 kph) (3 m/s).
 Variable wind direction between 080 to 140°.
 Horizontal visibility: 4500 m.
 Haze.

Clouds: broken (5-7 octas) at 500 ft and overcast (8 octas) at 1100 ft.
Temperature: 14°C. Dew point: 14°C. Relative humidity: 100 %.
QNH: 1014 hPa.
No significant changes expected.

- LEGR 291630Z 27004KT 200V340 9999 FEW025 SCT045 BKN075 18/12 Q1013=
Wind direction 270°, speed: 4 knots (7 kph) (2 m/s).
Variable wind direction between 200 and 340°.
Horizontal visibility: 10 km or more.
Clouds: Few (1-2 octas) at 2500 ft, scattered (3-4 octas) at 4500 ft and
broken (5-7 octas) at 7500 ft.
Temperature: 18°C. Dew point 12°C. Relative humidity 67.99 %.
QNH: 1013 hPa.
No significant changes expected.

The aerodrome of La Axarquía (LEAX), 13 km away from the accident site and close to the aircraft's flight path, measured the following values at its weather station:

Time (UTC)	Wind speed (kt)	Wind gusts (kt)	Humidity (%)	Temperature (°C)	Pressure (mb)	Dew point (°C)	QNH
16:10:00	0	0	91	14.7	1010.04	13.3	1014.50
16:20:00	0	0	91	14.7	1010.11	13.3	1014.57
16:30:00	0	0	91	14.7	1010.14	13.2	1014.61
16:40:00	0	0	91	14.7	1010.04	13.3	1014.50
16:50:00	0	0	91	14.7	1009.97	13.3	1014.44

Observations made at the same aerodrome at times before those shown in the table also indicated that the sky was overcast, with the cloud base at 1000 ft.

1.7.2. Weather reports from different airports

The weather reports at the Málaga and Granada airports between 13:30 and 15:30 were as follows:

LEMG 291330Z 09008KT 060V130 3000 BR -RA FEW005 BKN009 OVC013 15/14 Q1014 NOSIG=
LEMG 291400Z 09007KT 3000 BR -RA SCT006 BKN011 OVC017 14/14 Q1014 NOSIG=
SPECI LEMG 291406Z 10008KT 070V140 2500 BR RA BKN006 OVC014 14/14 Q1015 NOSIG=
SPECI LEMG 291421Z 10009KT 080V140 3500 BR -RA BKN006 BKN011 OVC016 14/13 Q1014 NOSIG=
LEMG 291430Z 10008KT 080V140 3500 BR -RA BKN005 BKN009 OVC014 14/14 Q1014 NOSIG=
SPECI LEMG 291452Z 10007KT 2500 BR RA BKN005 BKN009 OVC014 14/14 Q1014

NOSIG=

LEGR 291330Z 23009KT 200V260 9999 FEW025 BKN050 17/11 Q1013=
 LEGR 291400Z 27008KT 250V320 9999 -RA FEW025 SCT050 BKN070 16/12 Q1013=
 LEGR 291430Z 29005KT 260V320 9999 FEW020 BKN045 16/12 Q1013=
 LEGR 291500Z 32005KT 270V350 9999 FEW020 BKN042 16/13 Q1013=
 LEGR 291530Z 31003KT 260V010 9999 FEW020 BKN042 17/12 Q1013=

1.7.3. Weather forecast for the flight

On 29 April 2017, the National Weather Agency issued the SIGWX significant weather charts⁴ shown in Figures 4 and 5 for 12:00 and 18:00 UTC, which contained the forecasts for the area through which the aircraft flew.

The 12:00 significant weather chart shows a layer of clouds in Alicante with a base between 2500 and 5000 ft. This layer should not have affected the flight since, after taking off from LEMU, the aircraft remained at 1000 ft AGL, flying along the coastline.

From Almería, another band of clouds formed to the west, this one with a base between 3000 and 5000 ft, with the cloud tops above flight level 150. Isolated cumulonimbus and towering cumulus clouds were forecast, interspersed among other cloud layers. To the north of Almería, the forecast called for mountain obscuration, with visibility between 1000 and 5000 m, and snow.

The freezing level was at 9500 ft.

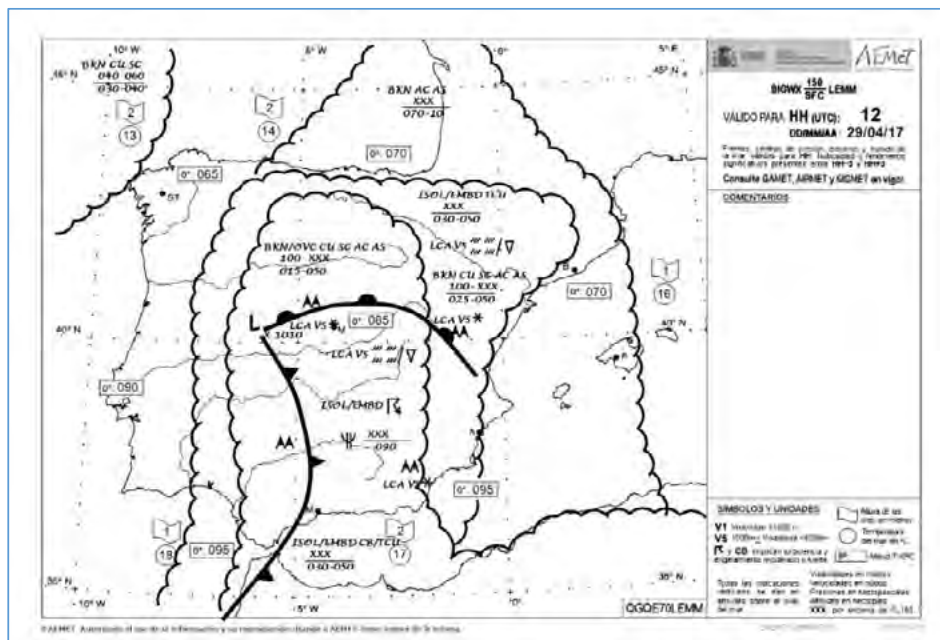


Figure 4: 12:00 significant weather chart

⁴ Significant weather charts, SIGWX, are designed to cover Spanish territory up through FL150. They are issued every six hours and contain the forecast weather conditions from 3 hours before until 3 hours after the valid time shown on the map, except for fronts, pressure centers, altitude of the 0 °C isotherm and sea state, the valid times for which will be indicated on the map.

The 18:00 UTC significant weather chart showed that a cloud layer with a base at 2500 to 5000 ft remained over the Alicante area, which would not have affected the initial part of the flight. In the vicinity of LEGR, the cloud base would have been between 2000 and 5000 ft, with cloud tops above flight level 150. Isolated cumulonimbus and towering cumulus clouds were forecast, interspersed among other cloud layers.

To the north of Almería, there was mountain obscuration and no visibility figure is given. The freezing level remained at 9500 ft.

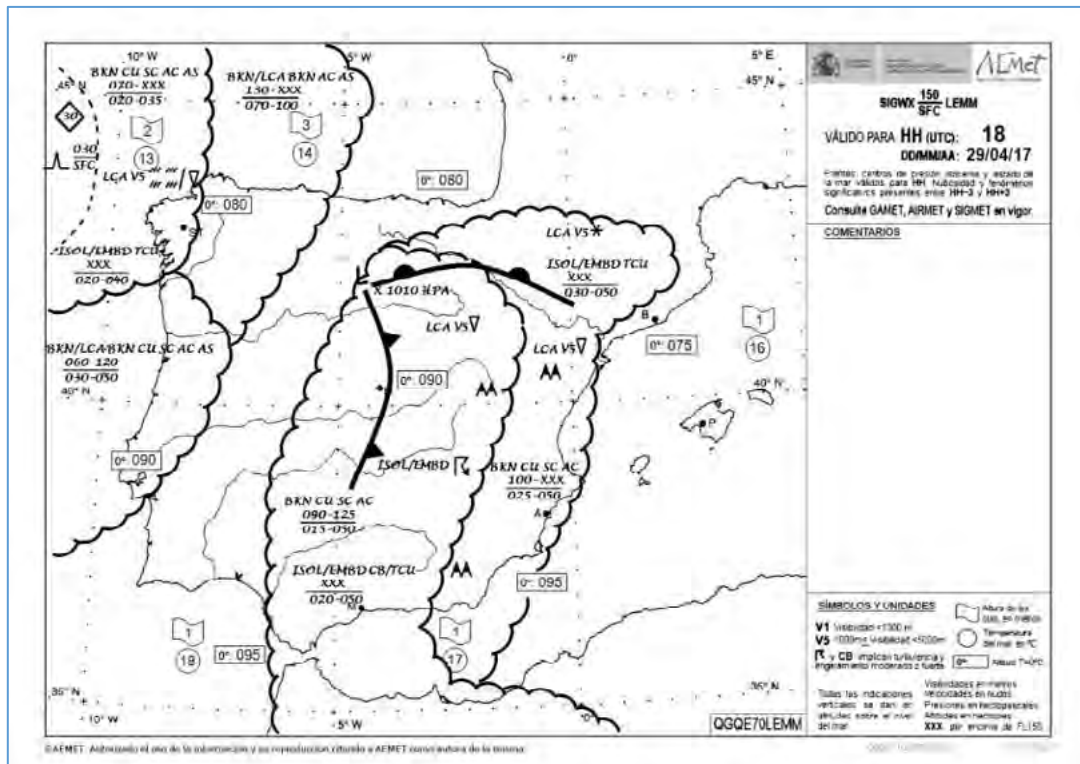


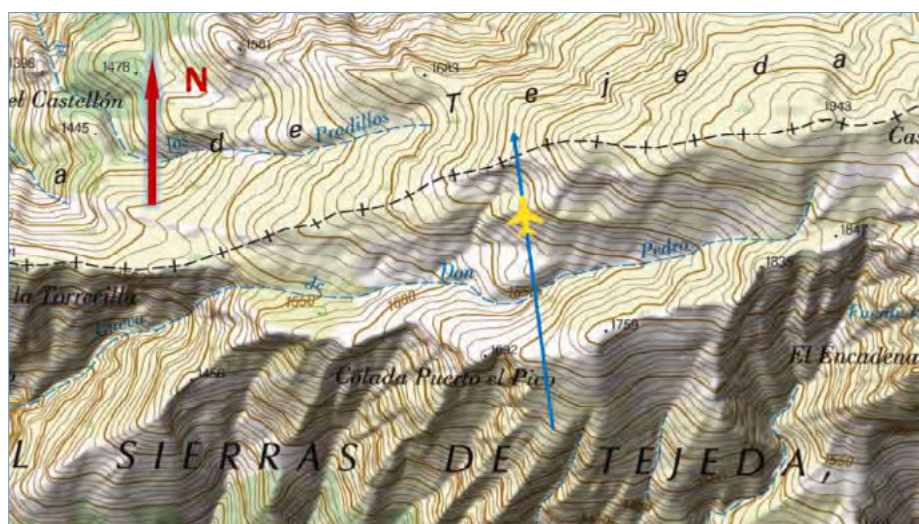
Figure 5: 18:00 UTC significant weather chart

1.8. Aids to navigation

The flight was being conducted under visual flight rules.

1.9. Communications

The communications shown in section 1.1 are limited to those recorded between the crew of the aircraft and LEMG APP. Provided below are other air communications that D-ECJP and the group of aircraft held with other air traffic control units contacted after flying over LEAM, the contents of which involved traffic information for LER111.



The aircraft wreckage was found scattered on a slope with a 28° gradient at an elevation of 1718 m (5636 ft), rising in the direction of flight. The first impact point contained debris from the propeller and, fanning out, other aircraft parts, with the engine, at 23 m, being the furthest away. Spreading out from this first point was an area affected by the fire caused by the fuel contained in the tanks. Figure 7.

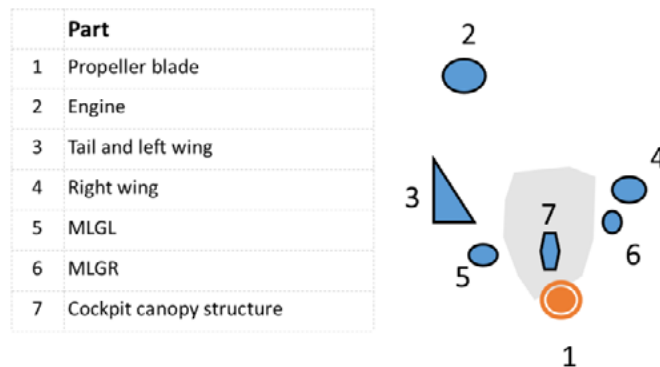


Figure 7: Positions of the main wreckage

A shrub located some 5 m before the impact point exhibited recent signs along its top of having been horizontally sheared.

The aircraft's documentation was among the wreckage recovered, including the aircraft logbook, certificate of airworthiness and the weight and balance sheet from the pilot's logbook. Also found were the flight logbook, technical documents on navigation devices, visual flight charts for the areas flown over and handwritten notes on waypoints, flight information and radio frequencies for the air control stations along its flight path.

1.13. Medical and pathological information

No medical aspects of relevance to the investigation were found.

1.14. Fire

The fire that broke out was extinguished when all the fuel in the tanks burned. The area affected was limited to that where the fuel spilled after the tanks broke.

1.15. Survival aspects

The energy of the impact with the ground caused injuries that were incompatible with life. The occupants' safety harnesses that were found were fastened and had detached from the airframe.

⁶ MLGL and MLGR: Left and right main landing gear.

1.16. Tests and research

1.16.1. Reconstruction of the aircraft's flight path

The aircraft had begun its journey the previous day when it flew from the aerodrome of Landshut (Germany) to the aerodrome of Perpignan-Rivesaltes (France). On the next day, it took off en route to Mutxamel and, after a short break, continued to the Granada Airport.

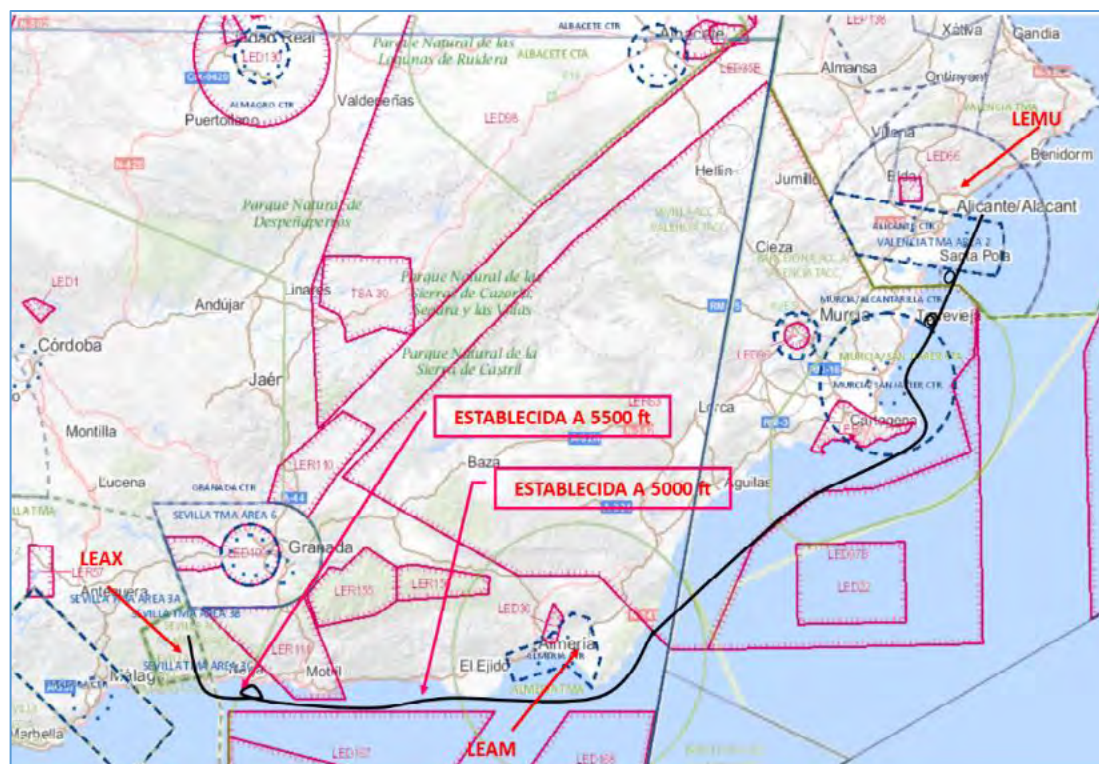


Figure 8: Reconstruction of the aircraft's flight path

Figure 8 shows the flight of aircraft D-ECJP from LEMU to the accident site based on radar information. The figure shows that the aircraft flew along the coastline, avoiding restricted areas LER111, LER155 and LER156.

At 16:02:50, seconds before reaching an altitude of 5000 ft, the crew of the aircraft had received confirmation that LER111 was not active. In light of this, the alternatives for continuing the flight were either to cross LER111 or go around it, which was the option selected.

The most significant radar data for the remaining aircraft in the group are provided below:

AIRCRAFT	DEPT AIRPORT/TIME	ARRIVAL AIRPORT/TIME	FLIGHT ALTITUDE (ft)	APPROACH TO GRANADA
D-ECJP	LEMU 14:36	---	5500	Did not enter any LER.
D-EPCD	LEMU 14:36	LEGR 16:18	9000	Entered LER111 at 9000 ft and the LEGR CTR from the south of the field.
D-EIPK	LEVC 14:47	LEGR 18:13	9000	Entered LER111 at 9000 ft and reached LEGR via point S on the visual approach pattern.
D-ESDJ	LEMU 14:51	LEGR 16:50	7700	Entered LER111 at 7700 ft. Entered the LEGR CTR from the south of the field.
D-EVAR	LEMU 14:57	LEGR 17:02	11 800	Entered LER155 at 8000 ft climbing to 11 800 ft. Flew over Arandilla, entered the LEGR CTR from the east and flew to the south of the runway.
D-EJLW	LEMU 15:02	LEGR 16:43	8700	Entered LER111 at 8700 ft and entered the LEGR CTR from the south of the field.
D-EKFT	LEMU 15:18	LEGR 17:31	7000	Did not enter any LER and entered LEGR via point S on the visual approach pattern.
D-EPGC	LEMU 15:20	LEAX 17:35	1000	Did not enter any LER.

1.16.2. Physical characteristics of the area flown over

The aircraft was flying over the Sierra de Tejada, inside the Sierras de Tejada, Almirajara and Alhama Natural Park. These ranges run from northwest to southeast and reach the sea. The foothills of these mountains provide a natural barrier between the provinces of Málaga and Granada.

Figure 9 shows the geographic location of the aircraft's final flight path, level at an altitude of 5500 ft. The terrain slopes up constantly up to the elevation where the wreckage was found. The highest foothills in the Sierra de Tejada closest to the site are to the right of the flight path, with a maximum elevation of 2069 m (6775 ft), and continuing to the southeast with elevations of 1824 m (5984 ft) and 1832 m (6010 ft) practically to the sea.



Figure 9: Location of crash site and terrain profile

1.16.3. Statement from the LEMG APP controller

A statement was taken from the controller who was in contact with the accident aircraft. Regarding the day of the accident, the controller said that he was fit to be on the frequency and he explicitly stated that he did not feel any type of condition that would have caused him to be overworked or fatigued.

He had a very general knowledge of the area of La Axarquia, and no specific knowledge of the area where the aircraft crashed. As for the weather conditions, he stated that they must not have been good.

He stated that the communications, held in English, were clear, understandable and professional.

When asked what he wanted to convey when he said “climbing 5500 ft”, he noted that it was a routine measure to separate VFR and IFR flights. He also believes that he expressed himself correctly, as with all VFR flights that routinely fly through the area, and that it should not have given rise to a misunderstanding.

As for the phraseology used with VFR flights, he noted that the visual flight rules are the same in every country, and they prevail over any information received by the aircraft. He also thought it inexplicable that the pilot did not report flying into clouds so that he could have received help from the controller, especially when the communications indicate that the pilot had aeronautical information on the location.

1.16.4. Statement from a member of the flight group. Flight planning

This individual had a flight license and was in charge of supporting the group’s logistical tasks and held the daily briefing for the group.

On this occasion, this person was aiding the pilot in command of one of the aircraft and confirmed that the crew of aircraft D-ECJP acted in the same way, since there were two pilots on board. As concerns the flight planning, each crew acted individually based on their own experience level.

Seconds before aircraft D-ECJP took off, this member was in contact with its occupants and later, during the flight, was discussing restricted area LER111 and whether it was active or not. As for the flight, it was conducted in VMC conditions and it flew over LER111. They reported no weather-related problems.

When asked about how they obtained weather information, he replied that the METARs, TAFs, significant information, etc., was checked with commercial providers and official entities like the DWD (German Weather Office).

1.16.5. AIP Spain

The Aeronautical Information Publication (AIP), in section ENR_5_1 on navigational warnings, offers the following information on prohibited, restricted⁷ and hazardous areas and temporarily segregated airspaces:

⁷ Restricted area (R): airspace of specific dimensions defined over the jurisdictional land or water of Spain in which aircraft flights are restricted based on specific conditions, except for Spanish state aircraft when required to carry out their mission or for emergency reasons.

No aircraft may fly in a restricted area (R) without observing the restrictions in place without permission from the competent authority.

Note: Inland waters associated with these areas, and only when specified, territorial waters, shall be regarded as prohibited or restricted.

AREA	VERTICAL LIMITS	ACTIVITY
LER111	SFC/6550 FT	Military training area, school helicopters. Permanent, subject to actual activity of helicopter school. To enter the area, contact Granada APP or the Granada/Armillá TWR.
LER155	SFC/FL130	National Park. No overflights except for state aircraft and park preservation flights authorized by the National Parks Autonomous Organization.
LER156	SFC/FL100	National Park. No overflights except for state aircraft and park preservation flights authorized by the National Parks Autonomous Organization.

1.17. Organizational and management information

Not applicable.

1.18. Additional information

Based on the Spanish and European regulations that lay out the rules of the air and common operating provisions for air navigation services and procedures (Rules of the Air and the SERA (Standardised European Rules of the Air) Regulations), the airspace through which the aircraft was flying was categorized as Class D (SERA.6001 and 5025b), to which the following flight services and requirements apply:

IFR and VFR flights are allowed and all flights are subject to the air traffic control service.

IFR flights are separated from IFR flights and receive traffic information on VFR flights and anti-collision guidance if requested.

VFR flights receive traffic information on all other flights and anti-collision guidance if requested.

Continuous ground-air voice communications are required for all flights and a 250-knot IAS limitation is imposed on all aircraft below 3050 m (10 000 ft) AMSL, except when approved by the competent authority for aircraft types that, for technical or safety reasons, cannot maintain that speed. All flights shall be subject to ATC clearance⁸.

⁸ ATC: Air traffic control

The same regulation, in reference to the visual flight rules (SERA.5001), indicates that the minimum visual meteorological conditions in which flights are possible are as follows:

Altitude band	Airspace class	Flight visibility	Distance from cloud
At and above 3 050 m (10 000 ft) AMSL	A*** B C D E F G	8 km	1 500 m horizontally 300 m (1 000 ft) vertically
Below 3 050 m (10 000 ft) AMSL and above 900 m (3 000 ft) AMSL, or above 300 m (1 000 ft) above terrain, whichever is the higher	A***B C D E F G	5 km	1 500 m horizontally 300 m (1 000 ft) vertically
At and below 900 m (3 000 ft) AMSL, or 300 m (1 000 ft) above terrain, whichever is the higher	A***B C D E	5 km	1 500 m horizontally 300 m (1 000 ft) vertically
	F G	5 km**	Clear of cloud and with the surface in sight

* When the height of the transition altitude is lower than 3 050 m (10 000 ft) AMSL, FL 100 shall be used in lieu of 10 000 ft.

** When so prescribed by the competent authority:

a) flight visibilities reduced to not less than 1 500 m may be permitted for flights operating:

- 1) at speeds of 140 kts IAS or less to give adequate opportunity to observe other traffic or any obstacles in time to avoid collision; or
- 2) in circumstances in which the probability of encounters with other traffic would normally be low, e.g. in areas of low volume traffic and for aerial work at low levels.

b) helicopters may be permitted to operate in less than 1 500 m but not less than 800 m flight visibility, if manoeuvred at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.

*** The VMC minima in Class A airspace are included for guidance to pilots and do not imply acceptance of VFR flights in Class A airspace.

Figure 10: VMC minimums for visibility and distance to clouds

Finally, as concerns the cruise level applicable to VFR flights, SERA.5005(g) states that air traffic control clearances may specifically assign a suitable level in level cruising flight when operating above 900 m (3000 ft) over ground or water.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. General

The investigation reconstructed the aircraft's flight path from the aerodrome of Mutxamel (LEMU) to the accident site. After taking off, it headed for the sea in the vicinity of Alicante. There, it started navigating south at an altitude of 800 ft along the coastline until it crossed the LEAM CTR. Then, it began climbing to 5000 ft on a westerly course.

In this situation, it contacted the LEMG APP controller to report the route it would be flying. After receiving instructions, the aircraft climbed to 5500 ft and continued to the town of Velez-Málaga, where it changed course to 354°, toward point S on the visual approach chart for the Granada airport. During this last segment, the aircraft remained level at an altitude of 5500 ft.

The aircraft eventually impacted the foothills of the Sierra de Tejeda at an elevation of 1718 m (5636 ft).

The evidence identified in the investigation matches the definition of a CFIT (controlled flight into terrain), referring to a flight in which an airworthy aircraft under the complete control of the pilot is inadvertently flown into the terrain, water or an obstacle.

The analysis considers aspects such as:

- Flight planning and weather.
- Communications between the pilot and air traffic control.
- Inadvertent entry into IMC conditions during a VFR flight.

2.2. General aspects of the flight path of the group of aircraft and the terrain.

Based on the radar track of each aircraft in the group, they all flew near the coastline until they reached the LEAM CTR, after which each aircraft flew different headings and altitudes. Four flew over restricted area LER111 above its upper limit of 6550 ft, one improperly entered LER155 (Sierra Nevada National Park) at 11 800 ft and the other three went around LER111 to the west.

It was also confirmed that the aircraft that landed at LEGR flew above 7000 ft in the last segment of the flight, while the two that did not reach LEGR flew below that altitude.

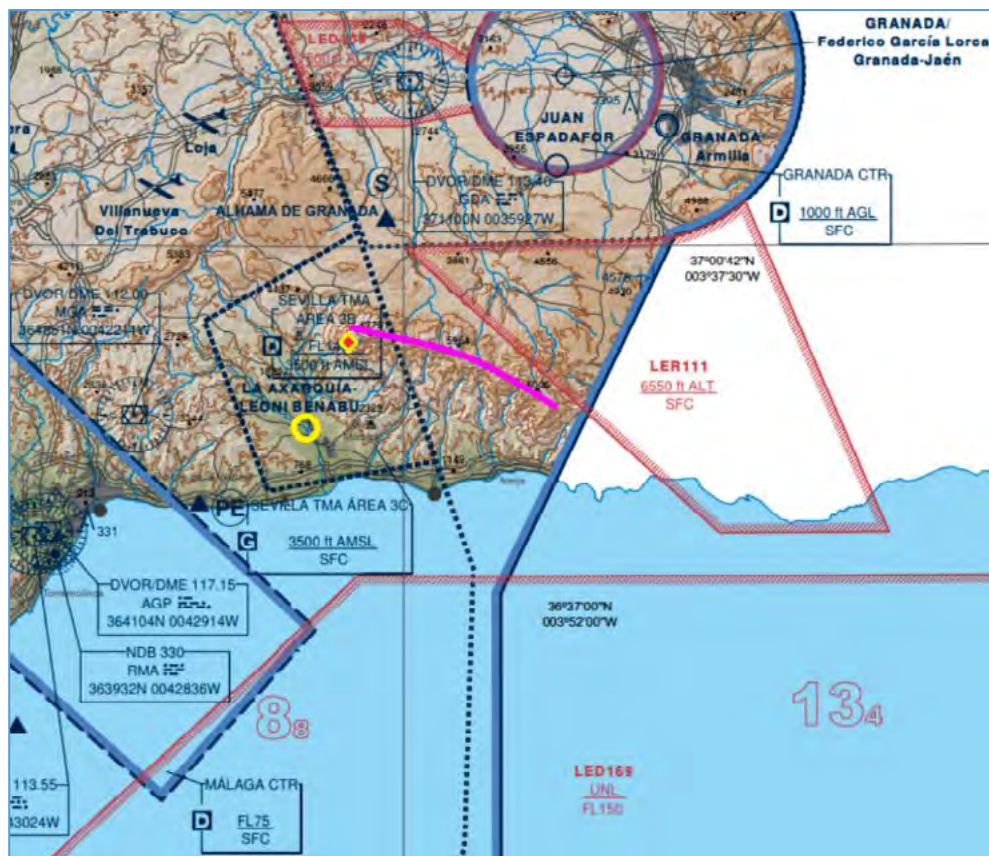


Figure 11: Visual chart of the area

Figure 11 shows, using the visual chart published in the AIP Spain for the area, the position of LEAX (yellow circle), where one of the aircraft landed; the accident site (yellow diamond); the foothills at an elevation of 6775 ft (purple line); and point S (Alhama de Granada) on the LEGR visual approach chart.

2.3. Aspects involving the aircraft's pilot

The record of the pilot in command showed that he flew routinely and that he normally used the accident aircraft. He also alternated his activity with flights in ULM aircraft. He also had IFR and night ratings. In light of this information, the pilot is deemed to have been qualified for the flight.

His flight activity on the day before the event was calculated to have been approximately 4:45 hours, and around 2:30 hours on 29 April, plus the time elapsed since the last takeoff, 1:55 hours.

2.4. Flight planning and weather

The evidence indicated that the pilot had information to make the flight from LEMU to LEGR; however, the specific meteorological information available to him when planning the flight could not be identified. It was, most likely, information provided online by commercial weather forecasting companies, instead of the information published by the national weather service as required by ICAO Annex 3, in this case Spain's National Weather Agency (AEMET).

During the period of time when the pilot could have planned for the weather conditions he might encounter on the flight, the AEMET data indicated the presence of a storm in the area with dual fronts, warm and cold, with abundant clouds with bases at around 1000 ft, rain and low visibility in the area between Málaga and Granada, made more complicated by the terrain. Therefore, this situation justified flying along the coastline. The information for LEAX confirmed this situation, as did the information for the LEAM, LEMG and LEGR airports, despite their distance.

The weather situation improved while the aircraft were in the air, though it still posed problems for visual flight. Specifically, in the 15 km that separate the coast from the accident site, this situation was made evident in light of how the two aircraft that flew around LER111 managed their flights, which allowed them to land. The aircraft that landed at LEGR at 17:31 flew over the area after climbing above 7000 ft, and the one that landed at LEAX at 17:35 had to land as a precaution after flying at 1000 ft above sea level.

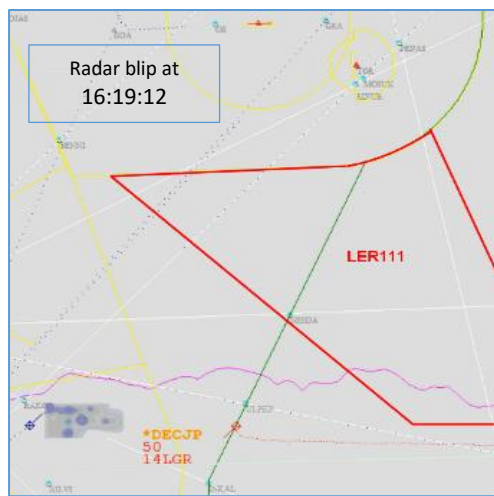
Therefore, in light of the above and considering the improving weather situation over time, the influence of the proximity of the mountain chain to the sea and the fact that the accident occurred almost one hour earlier, this Commission is of the opinion that when D-ECJP crossed the same area, the flying conditions were not suitable for visual flight in the location where the aircraft was found.

Each signatory State accepts the responsibility to provide aviation weather services pursuant to ICAO Annex 3. The information provided is checked against an organized quality system. In general aviation, there is a tendency to obtain flight weather data from private providers, especially when a flight is carried out in a country outside the pilot's primary place of residence. When planning the flight, the accident pilot had or could have had access to the 12:00 UTC significant weather chart (see Section 1.7.3), which forecasted conditions that reflected the reality of the atmospheric phenomena encountered by the aircraft in the accident area.

2.5. Analysis of the communications between the pilot and air traffic control

This section analyzes each individual communication between the crew of the aircraft and LEMG APP in an effort to detail the primary aspects of its content.

Before contacting LEMG APP, the aircraft was flying west along the coast of Andalusia on route to reaching point S on the visual approach pattern for LEGR. In order to plan the final segment of the route, the crew requested information from LEAM TWR involving activity in LER111. The tower replied that the LER was not active. Later, the Seville on route control sector repeated this information to the crew, and upon reaching the LEMG APP airspace, the communications analyzed below took place:

16:18:55	DECJP	<i>DECJP squaking 6303 we are VFR flight from LEMU to LEGR presently 5000' inbound PTM⁹, request to cross airspace and 5000' via PTM, LEAX, S from LEGR inbound for LEGR</i>
At 16:18:55 , the crew of the aircraft contacted LEMG APP and after identifying itself as a VFR flight on route to point PTM at 5000 ft, they requested to cross the airspace at 5000 ft via PTM, LEAX, point S for LEGR and LEGR.		
Remarks:		
<ul style="list-style-type: none"> The phraseology used and the data provided by the crew of the aircraft in their report conform to the communication standards for VFR¹⁰. The crew are aware that VFR rules apply. The crew know the points they are flying, indicating they have available to them a navigation chart (identified in the wreckage). The crew anticipate entering class-D airspace and contact ATC to request crossing the airspace. The aircraft started a right turn during the transmission, as shown by the radar track, in order to stay at an altitude of 5000 ft. 		 <p>The radar track shows the aircraft's path from LEMU to LEGR. A radar blip is marked at 16:19:12. A red line indicates the LER111 boundary. The aircraft's path is shown as a series of connected points, with a right turn indicated by the change in direction. The altitude is shown as 5000 ft.</p>

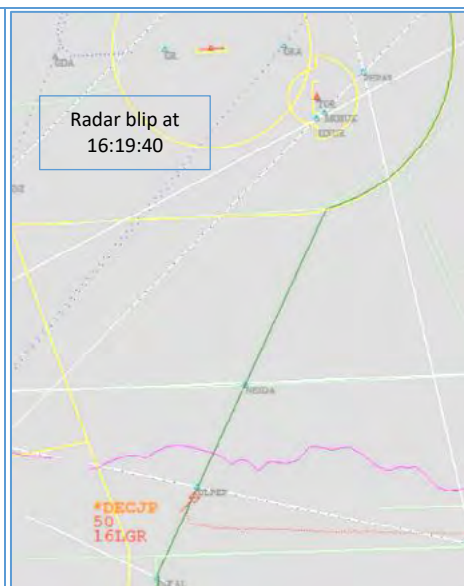
⁹ PTM: Point on the visual chart located in Torre del Mar (Málaga)

¹⁰ There are reference documents from ICAO, EUROCONTROL and civil aviation authorities on the structure of communications between pilots and controllers during VFR flights. See "A Guide to Phraseology for General Aviation Pilots in Europe".

16:19:27	LEMG APP	<i>DECJP we don't have traffic reported on the route to Granada and you may continue visual flight plan</i>
At 16:19:27 , the controller reported that "we don't have traffic reported on the route to Granada" and that D-ECJP could continue its visual flight plan.		
Remarks:		
<ul style="list-style-type: none"> The controller reports there is no conflict with other aircraft on the route. The controller clears D-ECJP to continue its flight plan. 		

16:19:40	DECJP	<i>I don't understand. May we continue in 5000' direct PTM now?</i>
At 16:19:40 , the crew of the aircraft requests clarification since they "don't understand", and asks about the possibility of continuing at 5000 ft direct to point PTM.		
Remarks:		

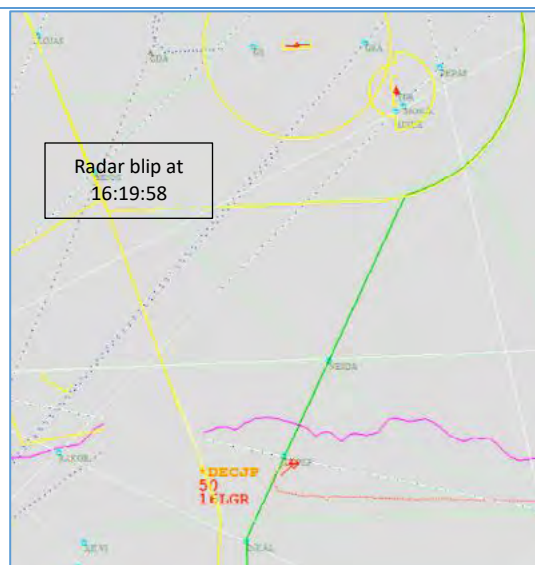
- Since the controller makes no reference to the altitude, the crew seek clarification by trying to determine if they can continue to point PTM, the first point listed on the route, at 5000 ft.
- The crew of the aircraft are uncertain about their current altitude and the altitude they should be at in order to cross the airspace.
- The aircraft continues turning right while holding at 5000 ft during the conversation.



16:19:46	LEMG APP	<i>I say again Madam. You are VFR. No traffic reported on the area, climb to 5500,' and you may continue own discretion on your route</i>
At 16:19:46 , the controller repeats that the aircraft is a VFR flight, that no traffic was reported in the area, to climb to 5500 ft and continue on its route at its own discretion.		
Remarks:		
<ul style="list-style-type: none"> The controller repeats the information given at 16:19:27 and instructs it to climb to 5500 ft and continue on its route at its discretion. By using the term "own discretion", the controller is trying to reinforce the content of the previous communication, namely, that because it is a VFR flight, it has to observe visual flight rules and that the route to take is at the discretion of the crew. The instruction is given to climb to 5500 ft. The continuation of the flight is, in any case, at the discretion of the aircraft's crew. 		

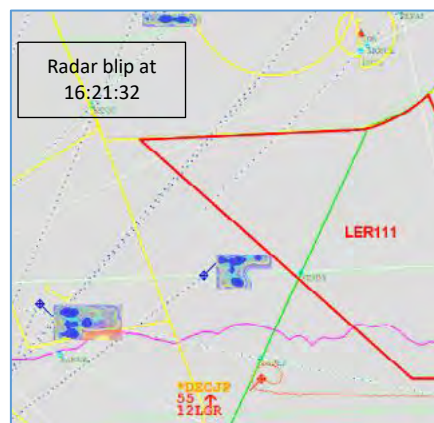
16:19:58	DECJP	<i>Ok, so, confirm we are climbing to 5500' direct PTM, then after LEAX then S point from LEGR</i>
At 16:19:58 , the crew confirm they are climbing to 5500 ft direct to PTM, then LEAX and then point S of LEGR.		
Remarks:		

- The use of the term “confirm” in its communication means that the crew are confirming the climb to 5500 ft and the route to LEGR point S.
- The confirmation is used to verify that the correct altitude is 5500 ft, since the altitude is the only change made during the messages exchanged.



16:20:15	LEMG APP	<i>Affirmative, affirmative</i>
At 16:20:15 , the controller replied “Affirmative, affirmative”, possibly due to the immediate communication it was maintaining with an IFR flight.		
Remarks:		
<ul style="list-style-type: none"> • It is not an acknowledgment by the controller, but rather a confirmation of the pilot’s message. • The “Affirmative, affirmative” reply received from the controller could have reinforced the crew’s mistaken belief that it was safe to cross all the waypoints at 5500 ft. • Under no circumstances would the controller’s reply release the crew from their responsibility to maintain separation from the terrain. 		

At **16:21:32**, the crew reached 5500 ft while still turning.



At **16:29:11**, the crew of the aircraft reported being on heading to LEGR point S.

At **16:31:54**, the aircraft's radar blip disappears.

Remarks:

- 2 min 43 s elapsed from the time the crew reported heading to LEGR point S, during which the aircraft maintained course and altitude at 5500 ft. No other communications were made.
- The terrain clearance when the aircraft turned to head toward point S was in excess of 2600 ft, but it decreased as it approached the Sierra de Tejeda, where the elevation reaches 6775 ft.

Based on the above information and by way of summary, the accident sequence is interpreted as follows:

- Before entering LEMG airspace, the crew of the aircraft contact APP.
- The crew identify themselves as a VFR flight and report their intention to cross the airspace at an altitude of 5000 ft on route to PTM, LEAX and point S on the visual approach to LEGR.
- While in contact with LEMG APP, the crew stop their advance and initiate a 360° turn to the right.
- LEMG reports no traffic in the area and allows the crew to continue their flight plan.
- The crew seem hesitant and ask the controller about the possibility of continuing at 5000 ft direct to point PTM.

- The controller reiterates the content of the previous communication and reinforces the crew's management of the flight by using the term "at your discretion".
- The controller adds to the previous communication with an instruction to climb to 5500 ft without giving a reason.
- The crew of the aircraft again confirm the altitude and route and request confirmation that they correctly interpreted the information.
- The controller's answer of "Affirmative" confirms the pilot's previous message.
- This reply could have reinforced the crew's mistaken belief that it was safe to fly at 5500 ft through all the waypoints.
- The interpretation of the communications and the ensuing uncertainty of the crew could be the result of the unexpected format and content, which differed from those of the crew's country of origin.
- The aircraft continued on its route and entered the class-D airspace following the controller's "Affirmative" response.

Based on the above, it is likely that the crew mistakenly thought that it was safe to fly at an altitude of 5500 ft through all the waypoints.

As concerns the proper interpretation of the spoken communications, the interlocutors were sufficiently qualified to ascertain and discern the content of the information.

The controller, in keeping with his duties, provided traffic information to the VFR flight as required by Spain's Air Traffic Regulation.

As concerns the crew of the aircraft, there are indications they deviated from visual flight rules and entered into adverse visibility conditions without taking any corrective actions. This action is deemed to have been driven by the crew's belief that an altitude of 5500 ft was sufficient to reach point S on the LEGR approach.

2.6. Aspects involving the approach controller

The data show that the controller had considerable control experience in Sectors 3A, 3B and 3C of the Seville TMA as a controller and supervisor. It is normal for visual and instrument traffic to be intertwined in the coastal area, so the scenario involved in this event may be regarded as a natural situation for a controller on duty at LEMG APP.

2.7. Aircraft's entry into IMC conditions during a VFR flight

The flight was operating under visual rules, meaning the pilot had to stay in visual contact with the terrain and remain in visual meteorological conditions¹¹. The evidence found points to the presence of clouds at the time of the accident in the area between LEAX and the Sierra de Tejada (section 2.4). The characteristics of the impact with the ground, the debris field and the lack of tracks to indicate the execution of evasive maneuvers demonstrate that the accident occurred when the aircraft entered zero-visibility conditions and inadvertently impacted the terrain.

The series of events that resulted in the accident is related to the following circumstances:

- a. Incomplete flight planning. There was a published weather forecast that warned of the possibility of encountering adverse phenomena along the route, made more hazardous by the mountainous features along the final segment.
- b. Insufficient knowledge of the mountainous obstacles along the route to LEGR point S.
- c. Carelessness in preventing and recognizing the drop in visibility.
- d. Inattention to visual flight rules, failure to maintain references on the ground, and the visual meteorological conditions in the final phase of the flight.

In light of the pilot's experience and qualifications, the lack of communications with control to report the degraded weather conditions or to request changing the VFR flight plan into a special VFR plan is considered significant.

¹¹ Inside class-D airspace, the pilot must maintain a visibility of 5 km and remain 1500 m away from clouds horizontally and 300 m (1000 ft) vertically.

3. CONCLUSIONS

An analysis of the evidence found in this event shows that the main factor involved in the accident was the failure to abide by visual flight rules, specifically by entering instrument meteorological conditions.

There are other factors that, while not being the ultimate cause, could be deemed to have contributed to the accident.

3.1. Findings

A. Aspects involving the weather situation:

- a. A storm with a dual front affected the southeastern part of the Iberian Peninsula for the duration of the flight.
- b. The weather forecast for the accident area published by AEMET called for clouds with a base at 1000 ft, rain and low visibility.
- c. The weather situation improved slightly as the flight progressed.
- d. At the time of the accident, the clouds and topography in the accident area hampered visual flight, particularly in the high foothills.
- e. Just one hour after the aircraft disappeared from radar, two other aircraft flew the same route.
- f. One of the aircraft in the group had to land as a precaution at the aerodrome of La Axarquía due to adverse weather conditions.
- g. Another area flew over the area at 7000 ft and reached its destination.

B. Operational aspects of the flight:

- a. The pilot was qualified for the flight in question.
- b. Aircraft D-ECJP had a valid certificate of airworthiness.
- c. On the day of the event, the aircraft and its occupants entered Spanish airspace inbound from the airport of Perpignan-Rivesaltes (France) and landed at the aerodrome of Mutxamel.
- d. The pilot filed a VFR flight plan.
- e. It is not known what weather information was available to the pilot when planning the flight.
- f. Radio communications were handled by another pilot who was on board.
- g. The pilot knew that restricted area LER111 was not active.
- h. The waypoints along the aircraft's route were selected by the pilot.
- i. Visual charts for navigating the route being flown by the aircraft were found in the wreckage.
- j. After flying through the LEAM CTR, the aircraft climbed from 1000 to 5000 ft.
- k. The aircraft held its position and reported its intentions to LEMG APP before entering the class-D airspace.
- l. At no point did the aircraft leave 5500 ft after entering the class-D airspace.

- m. The aircraft entered instrument meteorological conditions.
- n. The crew did not make any reports involving adverse weather conditions prior to the accident.
- o. The aircraft inadvertently impacted a hillside in the Sierra de Tejeda while on straight and level flight.

C. Aspects involving the radio communications:

- a. The controller had a valid license and unit endorsement, as required for the control duties he was performing.
- b. There was a lack of precision when changing the aircraft's flight altitude.

3.2. Causes/Contributing factors

The accident was caused by the loss of visual references while the aircraft was conducting a VFR flight.

The facts show that the aircraft's pilot was aware that he was conducting a VFR flight and of the rules that govern such flights; however, there were factors during the final segment of the flight that, to varying degrees, altered his perception of his surroundings. These contributing factors were:

For the crew of the aircraft:

- Insufficient flight planning by the pilot in terms of the contour of the route selected.
- Assuming that the 5500-ft value provided obstacle clearance and ignoring the applicable flight rules.

4. SAFETY RECOMMENDATIONS

None.

5. APPENDICES

None.