CIAIAC

COMISIÓN DE
INVESTIGACIÓN
DE ACCIDENTES
E INCIDENTES DE
AVIACIÓN CIVIL

Report A-006/2016

Accident involving a Cessna 172 P, registration EC-LSY, in Las Muelas, Segura de la Sierra (Jaen, Spain) on 9 February 2016

GOBIERNO DE ESPAÑA
MINISTERIO DE FOMENTO

Report

A-006/2016

Accident involving a Cessna 172 P, registration EC-LSY, in Las Muelas, Segura de la Sierra (Jaen, Spain) on 9 February 2016

GOBIERNO DE ESPAÑA
MINISTERIO DE FOMENTO
SUBSECRETARÍA
COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

Edita: Centro de Publicaciones
Secretaría General Técnica
Ministerio de Fomento ©

NIPO: 161-16-320-6

Diseño, maquetación e impresión: Centro de Publicaciones

COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

Tel.: +34 91 597 89 63
Fax: +34 91 463 55 35

E-mail: ciaiac@fomento.es
http://www.ciaiac.es

C/ Fruela, 6
28011 Madrid (España)

Foreword

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident object of the investigation, and its probable causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.5 of Regulation (UE) nº 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1.4 and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

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

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

Table of contents

Abbreviations

° ' "	Sexagesimal degrees, minutes and seconds
°C	Degrees centigrade
ACC	Airport Coordination Center
ADF	Automatic Detection Finder
AEMET	Spain's National Weather Agency
AENA	Spain's airports operator
AESA	Spain's National Aviation Safety Agency
AIP	Aeronautical Information Publication
AIRMET	Airmen's meteorological information
AMA	Aviation Weather Self-Service
ATO	Approved Training Organization
CR	Class Rating
ERP	Emergency Response Plan
ETA	Estimated Arrival
FIR	Flight Information Region
FL	Flight level
FPL	Flight plan
ft	Feet
GAMET	General Aviation Meteorological information
GPS	Global Positioning System
H, hr	Hours
hPa	Hectopascals
HSI	Horizontal Situation Indicator
ICAO	International Civil Aviation Organization
Km	Kilometers
kph	Kilometers/hour
Kt	Knots
LEBE	ICAO identifier for the Beas del Segura aerodrome (Jaén, Spain)
LELM	ICAO identifier for the Almansa aerodrome (Albacete, Spain)
LEOT	ICAO identifier for the Ontur aerodrome (Albacete, Spain)
m	Meters
METAR	Metéorologique Aviation Régulaire
Min	Minutes
N	North
NM	Nautical miles
N/A	Not applicable
PPL(A)	Private Pilot License (Airplane)
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
s	Seconds
SEP (L)	Single Engine Piston (Land) rating
SIGMET	Significant meteorological information report
SPECI	Selected special weather report
SW	Southwest
TAF	Terminal Aerodrome forecast
VOR	VHF Omnidirectional Range
UTC	Coordinated Universal Time
W	West

Synopsis

Owner:	Nevada Aviación S.L.
Operator:	Private[1]
Aircraft:	Cessna 172 P, registration EC-LSY
Date and time of accident:	9 February 2016 at 19:00[2]
Site of accident:	Las Muelas, Segura de la Sierra (Jaen)
Persons onboard:	1, killed
Type of flight:	General Aviation - Private
Phase of flight:	En route
Date of approval:	27 April 2016

Summary of the accident

On Tuesday, 9 February 2016 at approximately 19:00, a Cessna 172 P aircraft, registration EC-LSY, crashed into a mountain in Las Muelas, inside the municipality of Segura de la Sierra (Jaen).

The aircraft had taken off at 16:00 from the Valencia airport en route to the Granada airport. During the flight, after a flight time of 2:13 hours, the pilot asked the Seville control center to divert to the Beas de Segura aerodrome, since the strong headwind would make it impossible for him to reach his destination before sundown. The Seville control center was in contact with the pilot until 19:00, at which time radio and radar contact were lost with the aircraft. At that time, the aircraft was on the correct heading for the Beas de Segura aerodrome and, according to the display on the controller's screen, was 11 NM away from the field, roughly equivalent to a 13-minute flight time.

At the Beas del Segura aerodrome there was a 15- to 20-kt wind from the southwest and little visibility, since it was practically nighttime.

At 19:15, the Seville control center received a 112 (emergency) call reporting that an eyewitness in the area had seen a small airplane crash in the mountains.

[1] The aircraft's operator was Gesplane Servicios Aéreos, S.L. On the day of the accident, the aircraft was piloted by a private pilot who had rented it from Gesplane Servicios Aéreos for the day.

[2] All times in this report are local. To obtain UTC, subtract 1 hour.

The airplane was located at 9:30 the next morning in Las Muelas, in the municipality of Segura de la Sierra (Jaen). The aircraft had crashed into the mountain side. The pilot was dead and the aircraft had been completely destroyed.

The investigation concluded that this accident was most likely the result of a controlled flight into terrain. The wreckage indicated that the aircraft had impacted the ground at a some pitch and bank angle and at a high speed.

Contributing to the accident were:

1. Improper route management by the pilot, who had already been flying for over 2 hours at a cruise speed that was well below the speed in the flight plan before deciding to deviate from his planned route.

2. The fact that sunset was near may have forced the pilot to incorrectly select the landing aerodrome by only considering the proximity of the aerodrome, without taking into account weather conditions in the area or the aerodrome's location in the mountains.

1. FACTUAL INFORMATION

1.1. History of the flight

On Tuesday, 9 February 2016, a Cessna 172 P, registration EC-LSY, was rented for a day by a private pilot from the authorized training organization and operator of the airplane, Gesplane Servicios Aéreos, S.L.

The pilot took off from the Granada airport at 8:14 and landed at the Valencia airport at 10:15. The pilot, after conducting some private business in Valencia, planned to return in the afternoon to the Granada airport, taking off from the Valencia airport at 16:00.

Two hours and 13 minutes into the flight to Granada, the pilot asked the Seville control center if he could divert to the Beas de Segura aerodrome since a strong headwind would make it impossible to reach his destination before sunset. The Seville control center was in contact with the pilot until 19:00, at which time radar and radio contact were lost with the aircraft. At that time, the pilot was on the correct heading for the Beas de Segura aerodrome and, according to the display on the controller's screen, was 11 NM away from the field, roughly equivalent to a 13-minute flight time.

At the Beas del Segura aerodrome there was a 15- to 20-kt wind from the southwest and little visibility, since it was practically nighttime.

At 19:15, the Seville control center received a 112 (emergency) call reporting that an eyewitness in the area had seen a small airplane crash in the mountains.

The airplane was located at 9:30 the next morning in Las Muelas, in the municipality of Segura de la Sierra (Jaen). The aircraft had crashed into the mountain side. The pilot was dead and the aircraft had been completely destroyed.

1.2. Injuries to persons

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

1.3. Damage to aircraft

The aircraft was completely destroyed.

1.4. Other damage

Several pine trees were damaged by the impact.

1.5. Personnel information

The pilot, a 47-year old Spanish national, had a private pilot license (PPL(A)) that had been issued by AESA on 20 November 2015. He also had a single-engine piston (land) (SEP(Land)) rating that was valid until 30 November 2017, and a NIGHT rating that allowed him to make nighttime visual flights.

He also had a Class-2 medical certificate that was valid until 11 September 2016.

On the day of the accident he had a total of 103:47 flight hours.

1.6. Aircraft information

The Cessna 172 P aircraft, with registration EC-LSY and serial number 172-74147, was manufactured in 1981 and registered in Spain's Aircraft Registry on 11 August 2015. The aircraft was equipped with a LYCOMING O-320-D2J engine.

The accident aircraft had a Certificate of Airworthiness that was issued in September 2015 by Spain's National Aviation Safety Agency (AESA). The Airworthiness Review Certificate had been issued by Aeronáutica Delgado, S.L., as the continuing airworthiness maintenance organization, on 25 September 2015. It was valid until 23 September 2016.

On the day of the accident, the aircraft had 10507:58 hours and the engine 6431:58 hours since construction. Since the last engine overhaul 126:22 hours had elapsed, and 28:57 since the last general inspection.

As for the most recent inspections of the aircraft:

- On 18 September 2015, the aircraft underwent 50-hr, 100-hr, 200-hr, and special item inspections with 10381:36 flight hours.

- On 19 November 2015, the aircraft underwent 50-hr and special item inspections with 10431:52 flight hours.

- On 21 January 2016, the aircraft underwent 50-hr, 100-hr and special item inspections with 10479:01 flight hours

There were no deferred items or open discrepancies on the day of the accident.

1.7. Meteorological information

1.7.1. Weather situation in the Spanish mainland. Low-level map

A powerful cold front was crossing the Iberian Peninsula from north to south, resulting in overcast skies throughout the peninsula and significant precipitation in its northern half. Behind the front the wind was from the northwest, moderate to strong on the surface and strong to very strong aloft (around 80 km/hr in the northern half of the peninsula). In the area between Valencia and Granada, winds aloft were weaker and the cumuliform clouds along the front had not yet reached the accident site. Embedded in the cloud front may have been cumulonimbus clouds.

All of these conditions are detailed in the 06 UTC, 12 UTC and 18 UTC low-level maps, which also forecast orographic or mountain waves[3] in the east of Spain, that is, the area where the flight was taking place.

[3] Wave motion in the atmosphere caused by air flowing over a mountain. The waves form above and downwind of the mountain or range.

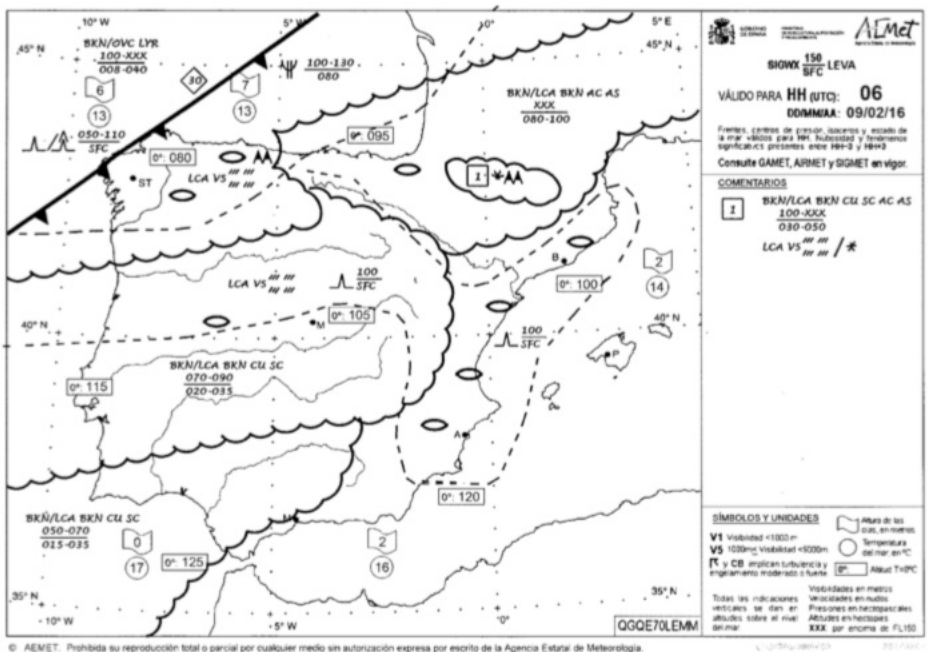

Figure 1. Low-level map for 07:00 local time

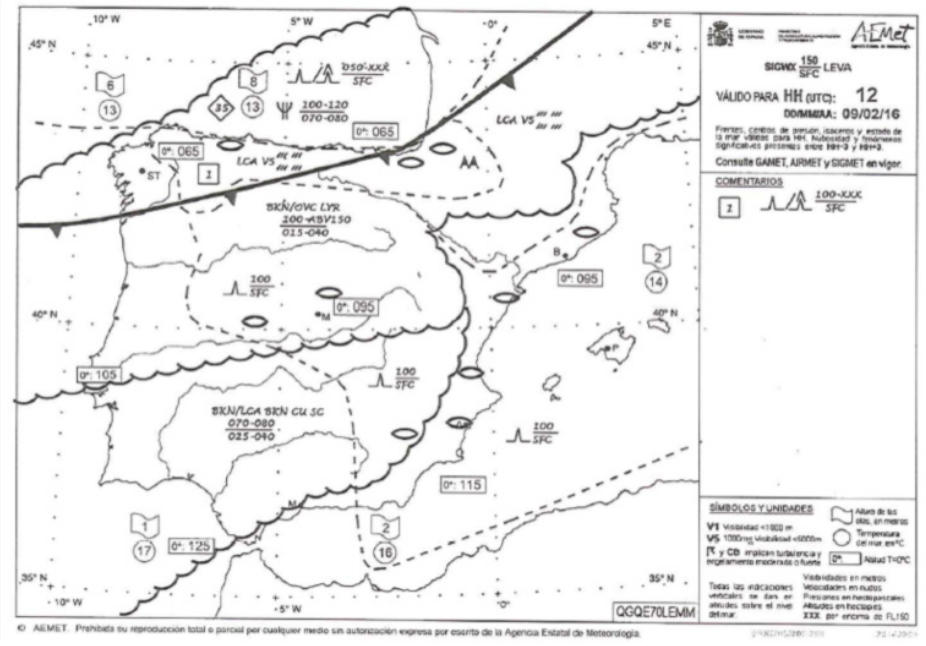

Figure 2. Low-level map for 13:00 local time

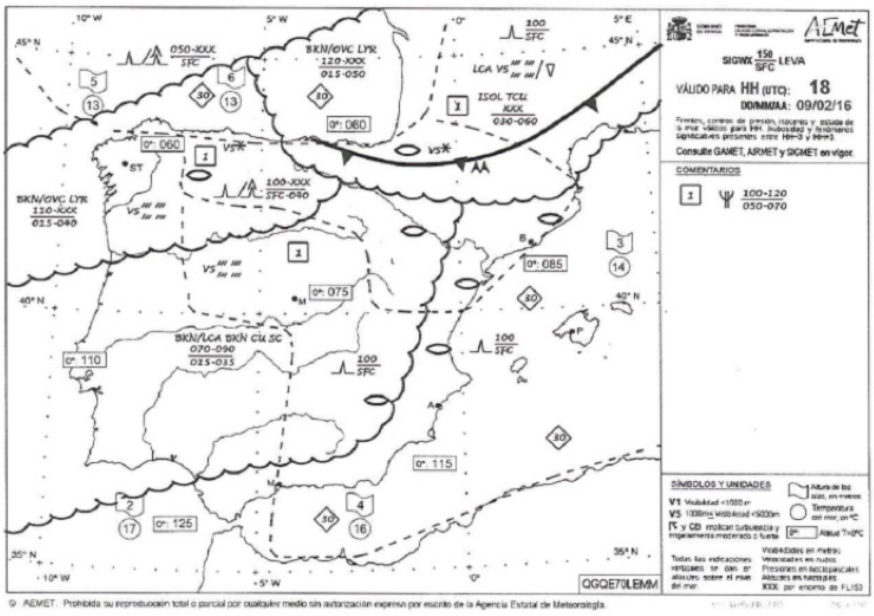

Figure 3. Low-level map for 19:00 local time

1.7.2. Weather situation over the peninsula. SIGMET

The SIGMET messages that were issued on the day of the accident, which are used to warn of dangerous phenomena en route, did not apply to the area in which the return flight took place.

1.7.3. Weather situation over the peninsula. GAMET

The GAMET message, which provides an area forecast and which was issued at 12 local time and applicable from 16 to 22 local time for the Madrid FIR, called for moderate mountain waves in the mountains in the northeast of the FIR/2[4]. This GAMET, therefore, affected the area in which the return flight took place.

```
ZCZC
FASP41 LEMM 091100
LECM GAMET VALID 091500/092100 LEVA-
LECM MADRID FIR/2 BLW FL150

SECN I

SFC WSPD:   SW 30 KT  ALBORAN
SFC VIS:    4000 M  RA LCA N OF LINE N3710 W00720 - N3650 W00150
            - N3830 W00130
SIG CLD:    BKN/LCA BKN CU SC 015-035/070-090 HFT AMSL N OF LINE
            N3710 W00720 - N3650 W00150 - N3830 W00130
TURB:       MOD SFC/100 HFT AMSL E OF LINE N39 W00350 - N36
            W00450
MTW:        MOD MT NE OF FIR/2
```

[4] South of the 39N parallel.

```
SECN II

PSYS:   18 COLD FRONT N4310 W00320 - N4240 00000 - N45 E005 MOV
           E NC
        18 H 1032 HPA S OF AZORES EXTD 1024 HPA SW PENINSULA
           IBERICA  STNR NC


WND/T:    GIBRALTAR      ALBACETE       BADAJOZ
       -------------- -------------- --------------
020HFT 270/025KT PS11 277/015KT PS13 262/024KT PS12
050HFT 301/028KT PS09 277/039KT PS05 289/028KT PS06
100HFT 302/033KT PS04 299/057KT MS01 297/043KT PS01
150HFT 297/035KT MS04 292/068KT MS08 295/061KT MS07
200HFT 300/041KT MS15 289/074KT MS16 296/072KT MS16


300HFT 310/045KT MS40 296/084KT MS40 301/074KT MS40


FZLVL:  125 HFT AMSL    090 HFT AMSL   110 HFT AMSL


MNM QNH:   0 HPA
NNNN
```

1.7.4. Weather situation at the Valencia airport

The METAR for the Valencia airport at 15:00, when the pilot took off, stated that the prevailing wind was from the W (260º), varying significantly between 240º and 300º, at a speed of 23 kts (about 45 kph), gusting to a maximum of 33 kt (about 66 kph). In other words, the wind was from west, gusting and occasionally strong.

METAR COR LEVC 091400Z 26023G33KT 240V300 9999 FEW030 SCT040 19/06 Q1015 WS R30 NOSIG=

There were no short TAFs for the Valencia airport, but there were long TAFs. The last TAF before takeoff is included. This TAF forecast wind from 270º at 15 knots. These conditions were subject to change, with the forecast calling for 28-kt wind, gusting to 45 kt at times for the duration of the forecast.

TAF AMD LEVC 091319Z 0913/1012 27015KT 9999 FEW030 TX20/0914Z TN13/1006Z TEMPO 0913/0924 27028G45KT TEMPO 1003/1012 27018G28KT=

1.7.5. Weather situation at the Granada airport

At the Granada airport, the wind direction was variable and very weak until 14:00, when it shifted to the W (270º) and increased suddenly to 20 kph, with gusts up to 30 kph. The 19:00 METAR and TAFOR are shown below:

METAR LEGR 091800Z 28010KT 9999 FEW012 SCT025 BKN035 12/08 Q1026=

TAF LEGR 091400Z 0915/1015 28006KT 9999 SCT035 TX15/0915Z TN05/1006Z PROB40 TEMPO 0921/1015 4000 DZ BKN014=

1.7.6. Weather situation in the vicinity of Beas de Segura (Jaén) at around 19:00

Spain's National Weather Agency (AEMET) does not have weather data for Beas de Segura, but it does have an automatic weather station in Cazorla, some 30 km to the south. In light of the data from this station, the most likely weather conditions at the accident site were:

- Wind from the south, 180º, at 8 kph and gusting to a maximum of around 24 kph.
- Good visibility on the surface.
- The day was very cloudy or overcast with low clouds.
- The temperature was around 12º C.
- The relative humidity was 78%.
- The pressure (QNH) was 1,020 hPa.
- There was no significant precipitation.

1.8. Aids to navigation

The moments from the aircraft's radar track of most significance to the accident analysis are shown below.

At 16:03:25, the aircraft, after taking off from the Valencia airport, was flying at an altitude of 8,400 ft at a ground speed of 50 knots.

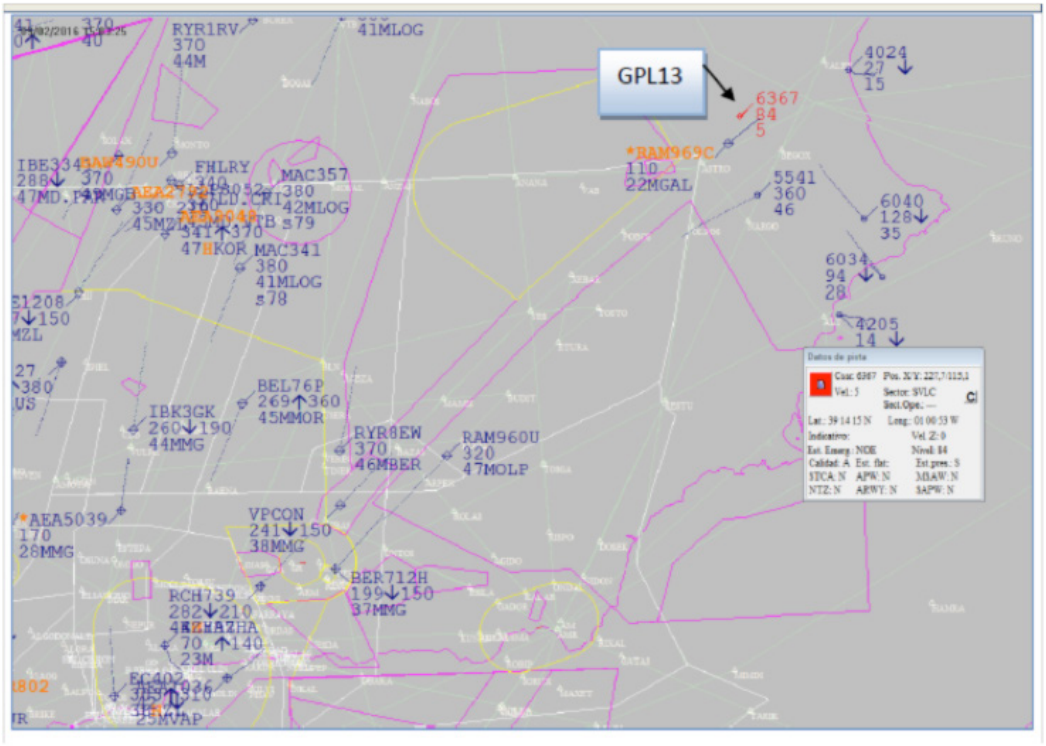

Figure 4. Aircraft's position at 16:03:25

At 18:09:25, the aircraft was at flight level 52 with a ground speed of 60 knots.

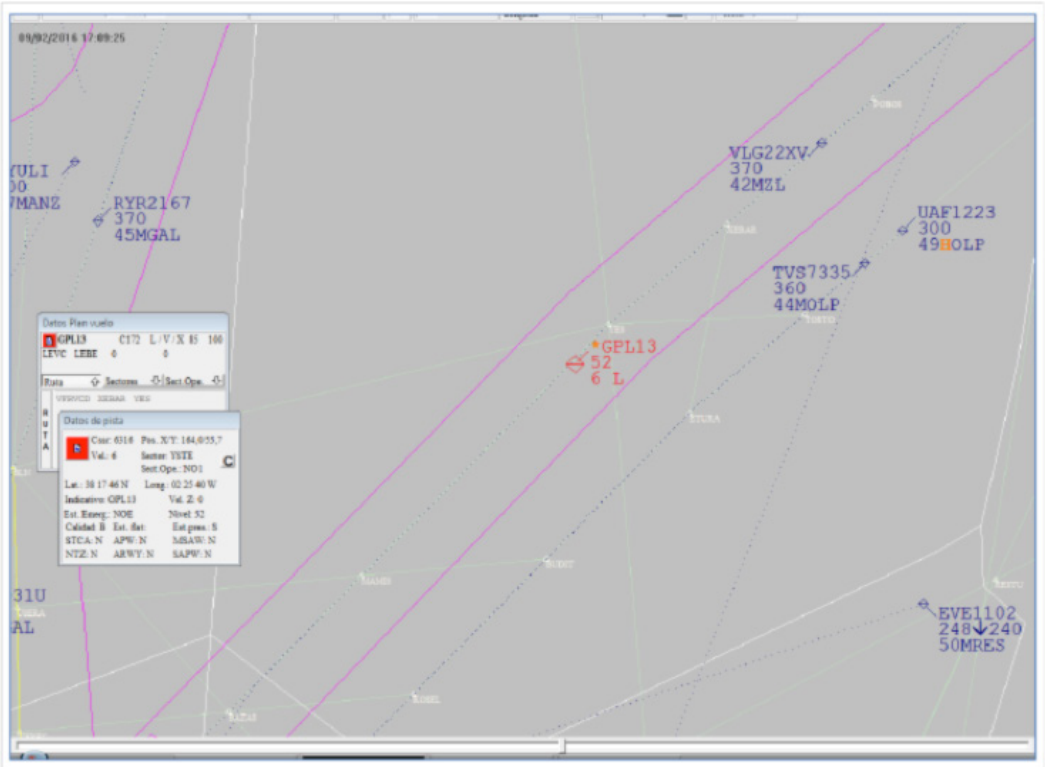

Figure 5. Aircraft's position at 18:09:25

At 18:10:34, its ground speed was 0 knots.

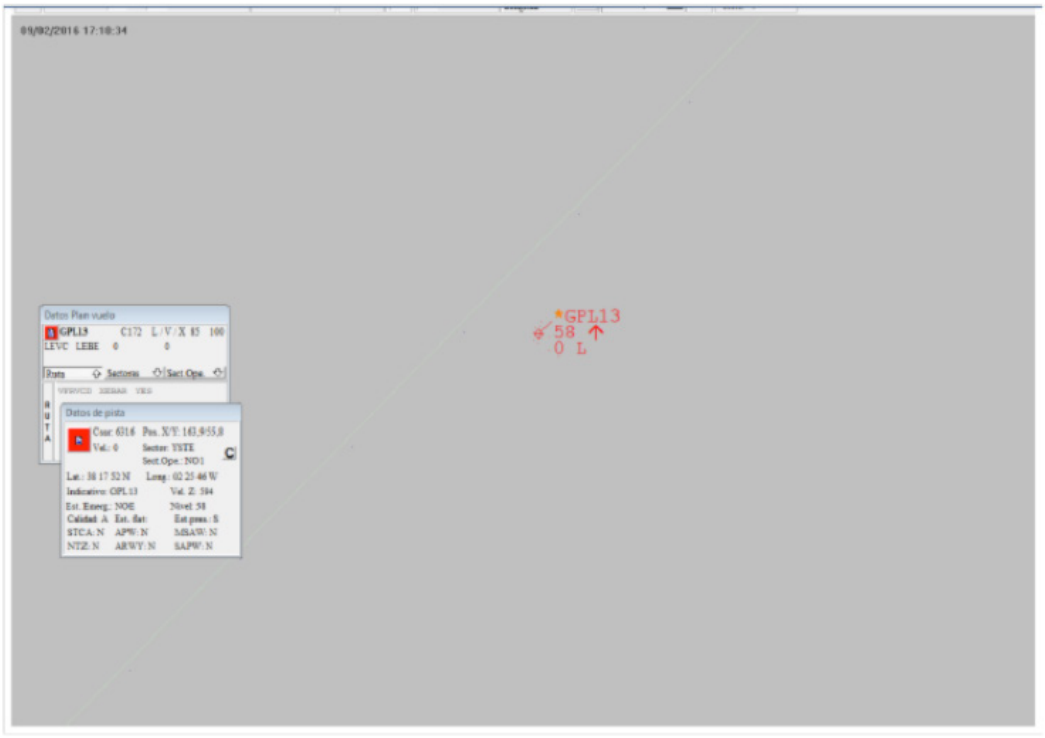

Figure 6. Aircraft's position at 18:10:34

At 18:13:39, the aircraft's speed was 10 knots.

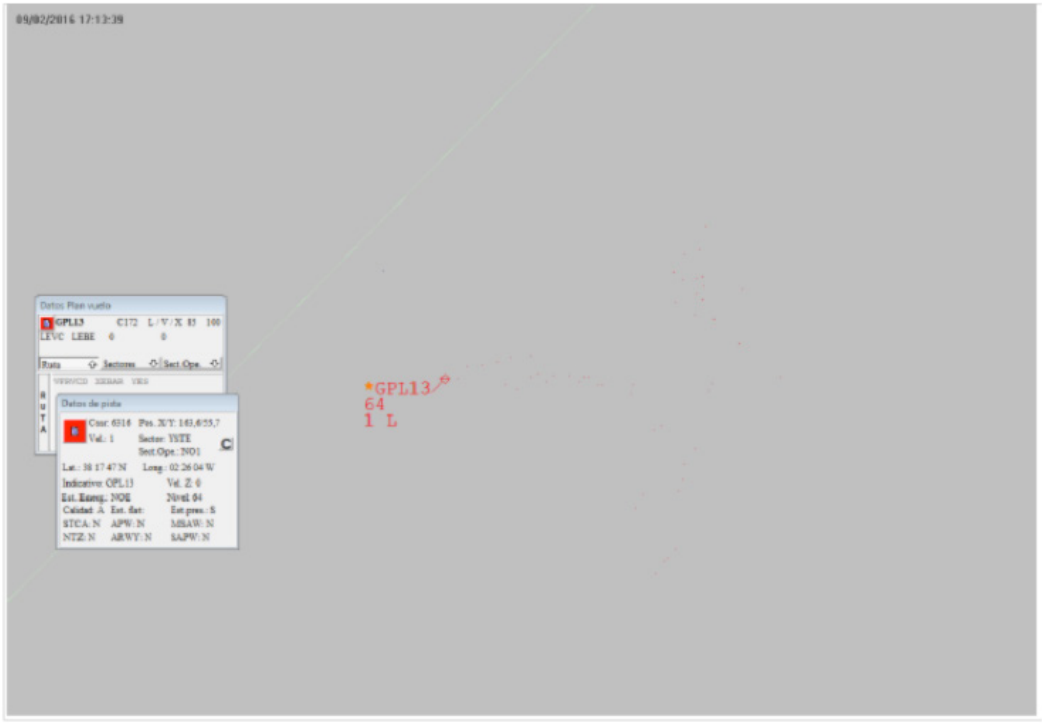

Figure 7. Aircraft's position at 18:13:39

At 18:27:19, the aircraft's speed was still 10 knots.

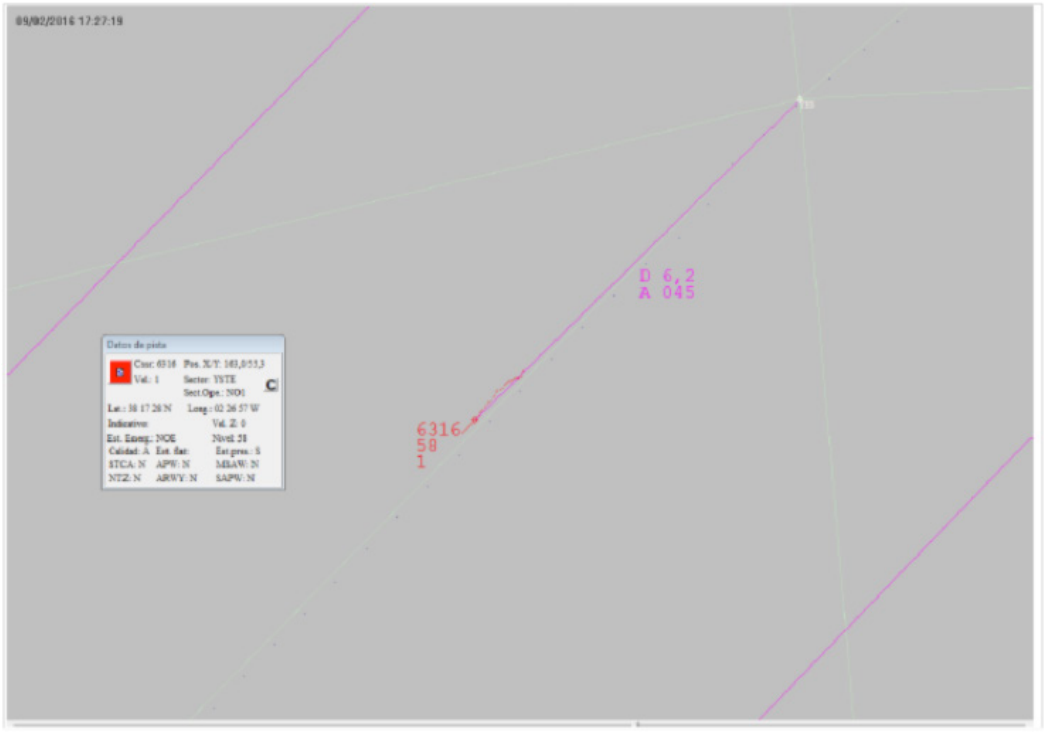

Figure 8. Aircraft's position at 18:27:19

At 18:36:01, the aircraft's ground speed was still 10 knots.

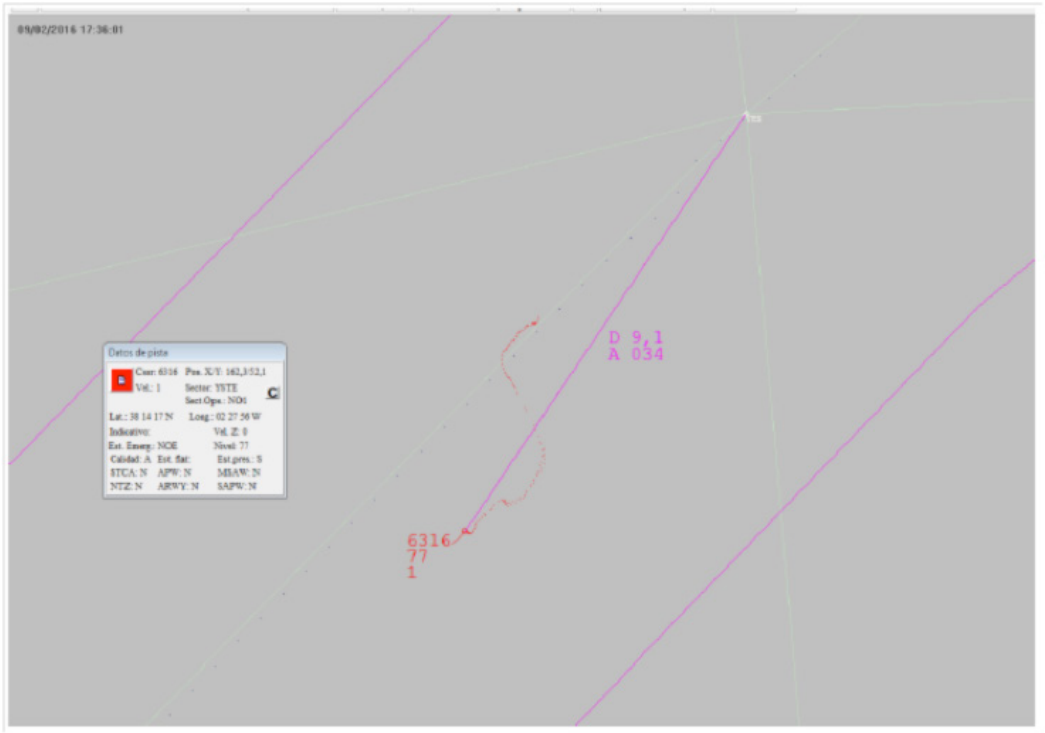

Figure 9. Aircraft's position at 18:36:01

By 18:42:19, the aircraft's speed had started to increase and was on the order of 20 knots.

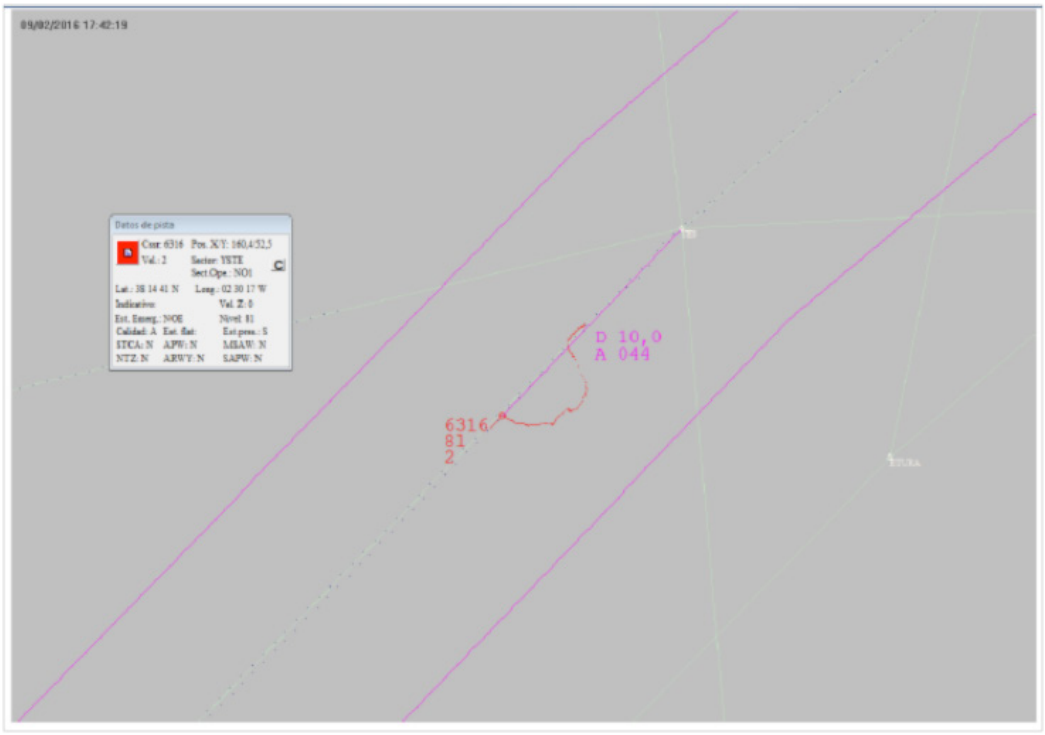

Figure 10. Aircraft's position at 18:42:19

At 18:52:34, the aircraft's speed was continuing to increase, this time to 40 knots.

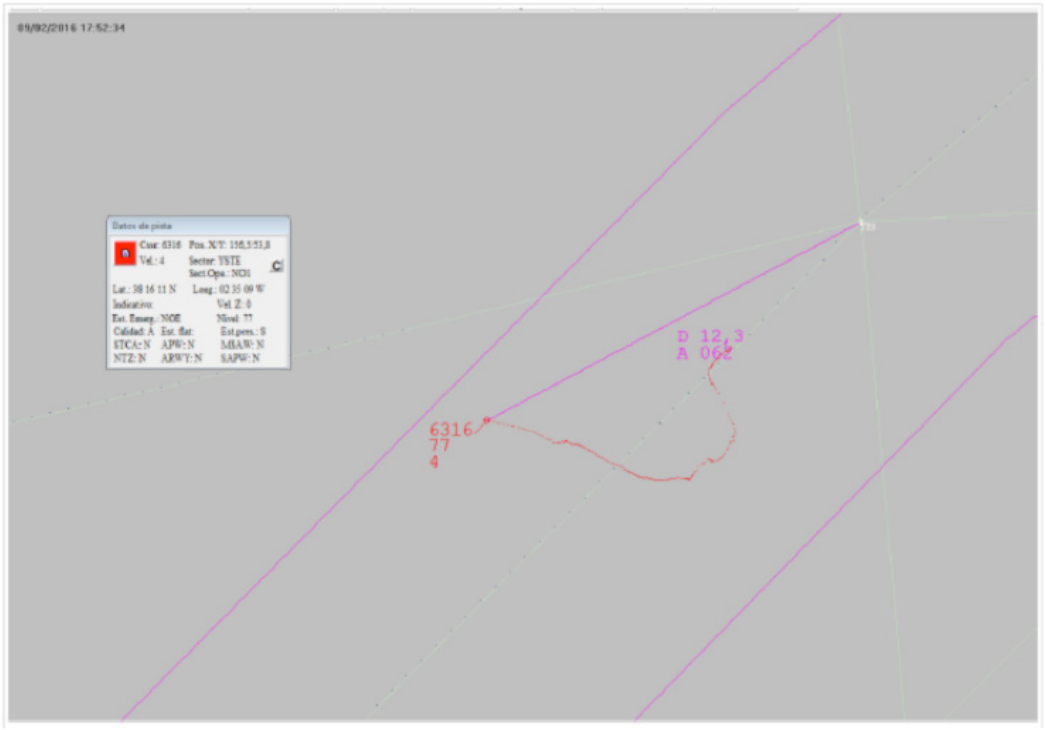

Figure 11. Aircraft's position at 18:52:34

By 18:57:33, the aircraft's speed was 50 knots.

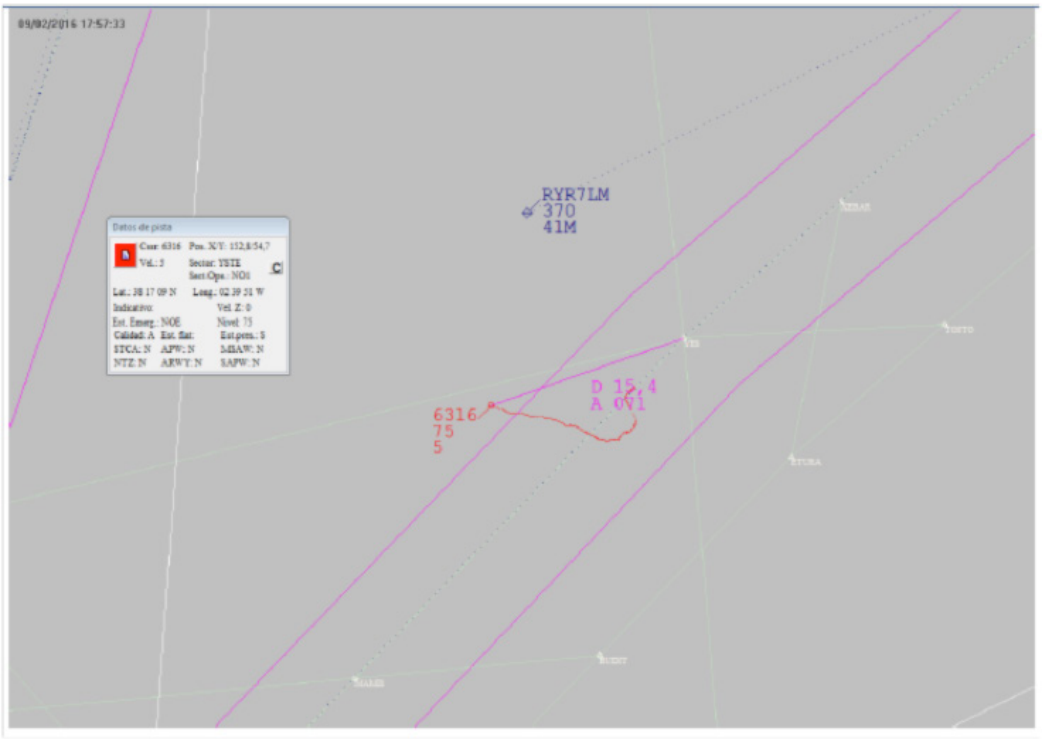

Figure 12. Aircraft's position at 18:57:33

At 19:00:28, with the aircraft flying at flight level 69, descending and a speed of 50 knots, the radar track was lost.

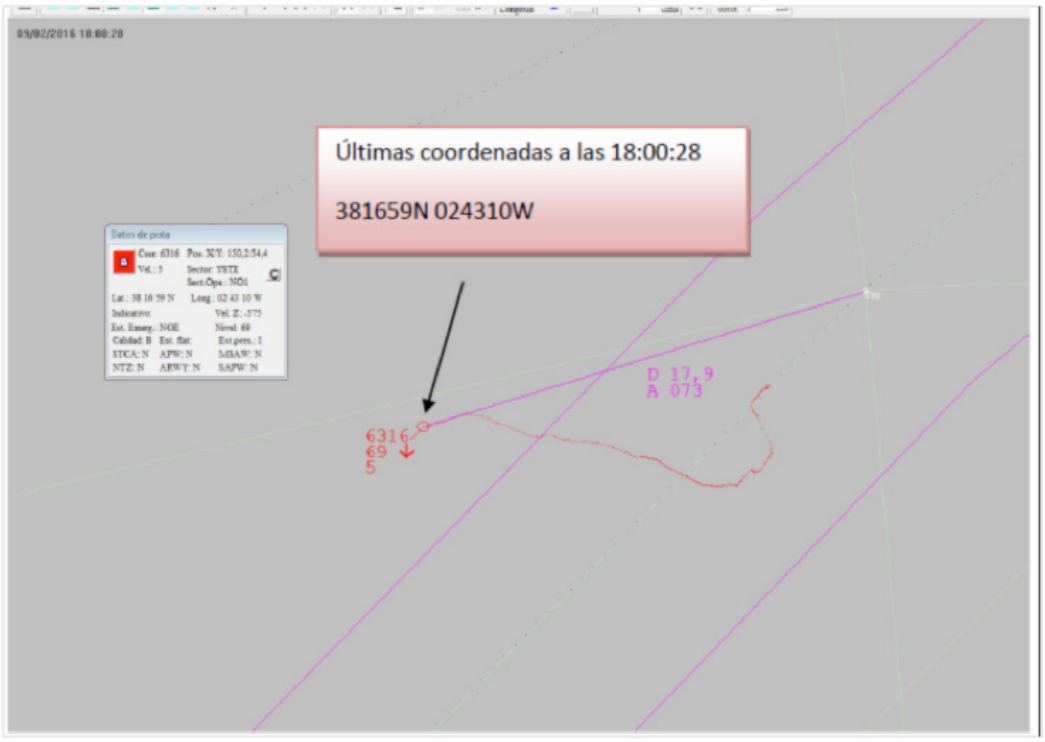

Figure 13. Aircraft's position at 19:00:28

The radar flight profile from 16:48:19 until 18:58:34 is also included.

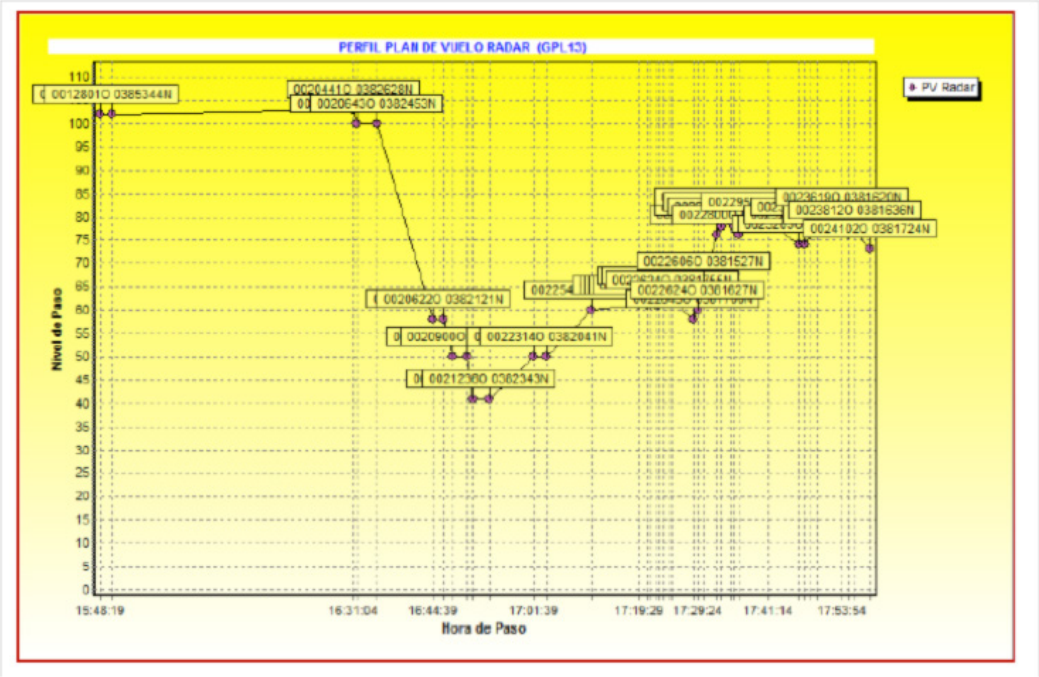

Figure 14. Radar profile of the flight from 16:48:19 until 18:58:34

The figure below shows the radar flight profile for the last two minutes, from 18:58:05 until 19:00:30, at which point the aircraft disappeared from radar.

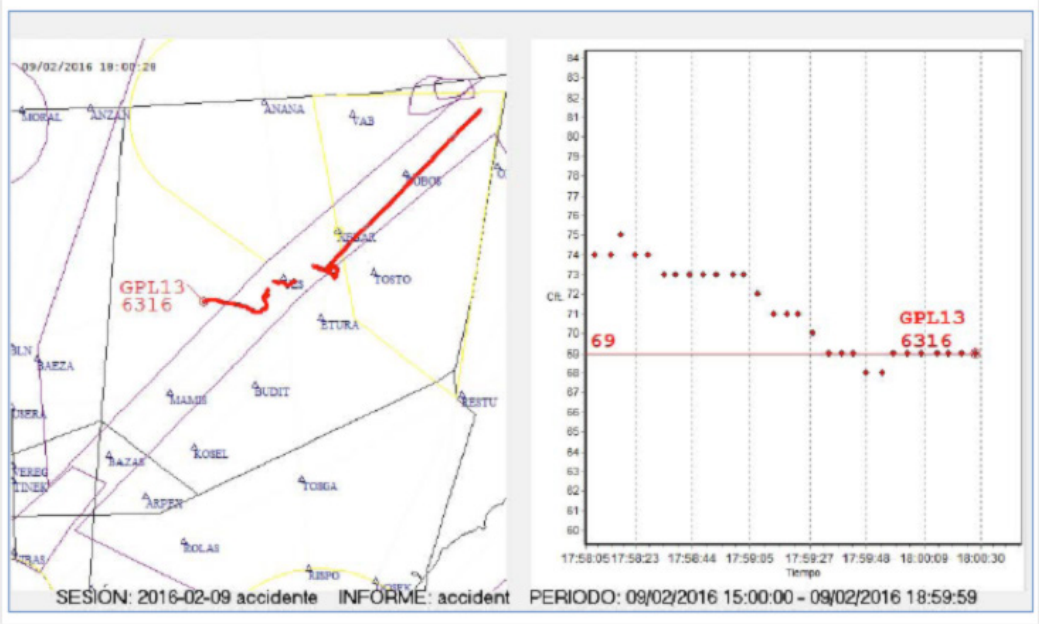

Figure 15. Final minutes of the radar flight profile

1.9. Communications

The communications between the pilot and the Seville control center that are of most relevance to the analysis of the accident are included here.

At 18:13:33, the pilot contacted the Seville control center to report that he was having a lot of problems with the wind, that he was running low on fuel and that he would proceed, if cleared by ATC, to Beas de Segura instead of Granada.

At 18:29:32, the pilot again contacted the Seville control center to ask for the heading to the Beas de Segura aerodrome, as he was disoriented. At 18:31:16, the controller informed the pilot that the aerodrome was on heading 2-7-0, 23 miles away from his position, and asked about his fuel situation. The pilot replied that he had enough to reach Beas de Segura if he did not get lost or disoriented.

The controllers at the Seville control center noticed that the pilot had a headwind of approximately 40 knots that was hampering his progress. As a result, at 18:34:14, the controller contacted the pilot to inform him that he had checked the METAR for the Albacete Airport and that the wind, which was from 270º, was at 25 knots and gusting up to 40 knots.

At 18:37:04, the pilot contacted the controller to have him confirm his heading. The controller indicated that the correct heading was 2-7-5, and asked the pilot what his indicated airspeed was. The pilot replied 80 knots, and the controller told him that according to his display, his ground speed was 10 knots meaning that with such a strong headwind and the resulting ground speed, it would take him about 75 minutes to reach the airport. The pilot informed him that he had enough fuel.

Later, at 18:41:19, the controller asked the pilot if he was familiar with the Beas de Segura aerodrome. The pilot replied it was his first time going to this aerodrome. The controller told him to be careful because it was between the mountains, it was very windy and there could be mountain waves.

At 18:50:34, the controller asked the pilot if he had a GPS unit onboard showing the airport. The pilot replied that he had GPS onboard, but that he trusted the controller's instructions and the compass more than the GPS. The controller then told him that due to the strong headwind, his ground speed was 20 knots and with the aerodrome 18 miles away, it would take him 36 minutes to reach it. He further told him that the owners of the aerodrome were going to turn their car lights on so that he would be able to see the runway in case the sun was setting as he reached the aerodrome.

At 18:53:23, the controller told the pilot that the aerodrome was 16 miles away, and that his ETA was 23 minutes. He also confirmed that there would be a car at the runway threshold with its lights on. He informed him that the runway was 2-7, and that the wind was from the SW at 15 to 20 knots.

At 18:57:33, the controller called the pilot to inform him that the heading was 2-6-5, and then at 18:58:41, instructed him to turn 10 degrees left to heading 2-5-5. The controller informed him that he was 11 miles away from the airport and that his ETA was 13 minutes.

At 19:00:48, the controller informed the pilot that he had lost the aircraft from radar, and asked him to report any change in course and altitude. At 19:01:04, the pilot replied that he would keep the controller informed. This was his last communication with the controller.

1.10. Aerodrome information

The aircraft had taken off from the Valencia airport en route to the Granada airport. Due to the strong wind, the pilot decided to divert to the Beas de Segura aerodrome.

This aerodrome, with ICAO identifier LEBE and better known as "El Cornicabral", is 7 km away from the town of Beas de Segura. It is at coordinates 38º 16' 12.5" N, 002º 56' 53.1" W, at an elevation of 1780 ft (587 m).

It has two 15-m wide asphalt runways with a 7.5-m safety margin on either side. Runway 09-27 is 1,500 m long, and runway 16-34 is 600 m long. The prevailing wind at the aerodrome is from the SW.

Figure 16. Satellite image of the Beas del Segura Aerodrome

1.11. Flight recorders

Not applicable.

1.12. Wreckage and impact information

The aircraft was completely destroyed.

The initial impact with the ground was with the tip or outer edge of the right wing. Further ahead and to the left, the fuselage impacted a pine tree at an altitude of 1 m above the ground. The tree was cut at an angle of 45 to 60º, with the top of the tree breaking and falling backwards. On the ground next to the tree trunk was a mark left by the impact from the nose wheel. The following components were found next to the tree: right wing tip, aileron axis, right wing leading edge and part of the fuselage. Wrapped around the tree was the strut from the right wing.

Figure 17. Initial debris field

After the pine tree and left of the main mark were parts from the left door and its lock, and the wheel and fork from the nose wheel leg.

In two, 2-m tall pine trees there were two marks that had probably been made by fuselage components following the initial impact. Scattered next to these two trees were various engine parts: the cowling, the alternator and its stator and part of the left aileron. Forward of this debris was the propeller, and a couple of steps back was the right wing, whose fuel tank had burst. The control cables had broken under tension.

At the top of a mountain, to the left of the two pine trees mentioned earlier, was the left seat, part of the left window and a section from the part of the fuselage that has a step to climb into the airplane.

Figure 18. Second debris field

At the other side of the mountain, next to a pine tree, was the main airplane wreckage: tail section, left wing, a part of the fuselage that included the left main landing gear leg, the exhaust manifold, which was heavily damaged, and the emergency transmitter. The right fuselage door was hanging from the branches of a pine tree.

The wire on the transmitter was properly connected to the antenna, but the impact did not trigger the transmitter. The expiration date on the transmitter battery was August 2017.

Figure 19. Main wreckage

At the time of the accident, the altimeter reading was approximately 5100 ft.

The pilot was carrying a USB dock for the tablet he was using to navigate, which was connected to the instrument panel.

The mixture was set to rich, the throttle lever was fully open and the pilot was wearing his safety harness. Although there was no fuel remaining since the fuel tanks had burst, the nature of the damage and the fuel left in some of the fuel lines confirmed that the aircraft had fuel at the time of the accident.

The engine and the right seat were to the right of the main wreckage. The right seat had come to a stop halfway down the hill, but the engine had rolled all the way to the bottom. The right main gear wheel was also to the right of the main wreckage.

The body of the pilot was found to the left of the main wreckage, and further left still was the airplane's battery.

1.13. Medical and pathological information

The autopsy results revealed no signs that the pilot's performance was affected by any physiological factors or impairments.

1.14. Fire

There were no signs that a fire had broken out in the area where the wreckage was found.

1.15. Survival aspects

Due to the nature of the accident, the sole occupant of the aircraft perished due to multiple trauma injuries. The autopsy determined that the time of death was between 18:00 and 20:00 on 9 February.

1.16. Tests and research

1.16.1. Statement from the training manager at Gesplane Servicios Aéreos S.L.

The training manager at Gesplane Servicios Aéreos provided a timeline for the events.

At 18:43 he received the first call from the Airport Coordination Center (ACC) at the Granada airport to inform him that, based on the flight plan filed at the Valencia airport, the airplane was overdue based on its ETA and they had no information on its whereabouts. They had also been unable to contact the pilot at the mobile number provided in the flight plan. The training manager then tried to contact the pilot, but was also unsuccessful.

At 18:47, he received a second call from the Granada airport ACC to report that the Seville Control Center was in radio contact with the pilot, who was encountering problems with the weather and diverting to the Beas de Segura aerodrome.

At 19:00, he called the manager of Gesplane Servicios Aéreos to report this information and to activate the company's Emergency Response Plan.

At 19:24, he received a third call from the Granada airport ACC, informing him that ground resources had been deployed at the Beas de Segura aerodrome to light up the runway, and that there may have been a hard landing, without specifying whether it was at the aerodrome or off-field.

After finding out that the airplane had not landed at the Beas de Segura aerodrome and that the Civil Guard had been alerted and was commencing its search for the airplane, he and the manager of Gesplane Servicios Aéreos went to Beas de Segura to provide any assistance necessary. When they reached Beas de Segura, they were told that the airplane was considered missing and that search and rescue operations had been postponed until the next day due to weather.

The next day, 10 February, they went to the Civil Guard station at 08:00 to inquire about the search for the airplane. They were told that the search operation was underway, based on the last known position of the airplane, in the area of La Puerta de Segura. At 09:30, they were informed that the airplane had been located and that the pilot was dead.

1.16.2. Statement from the manager of Gesplane Servicios Aéreos S.L.

On 11 February, the manager traveled to the accident site to aid CIAIAC personnel in their field investigation.

He stated that the pilot had been trained at his school and that it was normal, once pilots received their licenses, for the school to rent them airplanes for a day for their personal travel needs.

1.17. Organizational and management information

The owner of the accident aircraft was Nevada Aviación S.L., and it was leased to Gesplane Servicios Aéreos, S.L., which is an Approved Training Organization since 8 July 2013 by Spain's National Aviation Safety Agency (AESA). Gesplane Servicios Aéreos has its main base at the Granada Airport and is approved for the following courses:

Code	Course	Since
CR(A)	Class Rating	14/08/2006
PPL(A)	Private Pilot License (Airplane)	14/08/2006

And for the following activity:

Code	Aircraft	Since	Remarks
SEPL	Single Engine Piston Land	08/07/2013	+REN

1.18. Additional information

1.18.1. Meteorological information available when planning the flight

Although investigators were unable to determine what weather information the pilot used when preparing the flight, Gesplane Servicios Aéreos was asked about the information that was available. Gesplane stated that pilots have several resources for obtaining weather information prior to a flight:

1. AENA operations offices[5].
2. AEMET's Aviation Weather Self-Service (AMA), and
3. Other websites with weather information

Specifically, the AMA offers access to updated area and aerodrome reports and forecasts that inform aviation users of the current and forecast conditions for a flight. In particular:

- METAR, SPECI and TAF reports for aerodromes all over the world available in AEMET's database, for requested aerodromes and SIGMETs (including volcanic ash and tropical cyclone reports) for FIRs all over the world upon request.

[5] Since November 2015, ENAIRE has made it possible for registered users to create a flight plan and check bulletins on its website using the ICARO system, which does not require pilots to travel to the operations office.

- GAMET and AIRMET reports, wind and temperature maps for various levels, and significant en-route weather maps for the Iberian Peninsula, the Balearic and Canary Islands, and Melilla, created by AEMET.

- Weather warnings for Spanish aerodromes.

- Images from satellites, radar and from Spain's lightning detection network.

- Routes previously generated and saved for flight planning.

- Various maps with forecasts for weather variables of interest to aviation: precipitation, cloud cover, QNH and forecast surface maps.

1.18.2. Alternate aerodromes on the Valencia-Granada route

Shown below are the aerodrome and heliport chart, and the restricted aerodrome chart published in the AIP (Aeronautical Information Publication). The route between Granada and Valencia is shown in red for easy identification of alternate aerodromes:

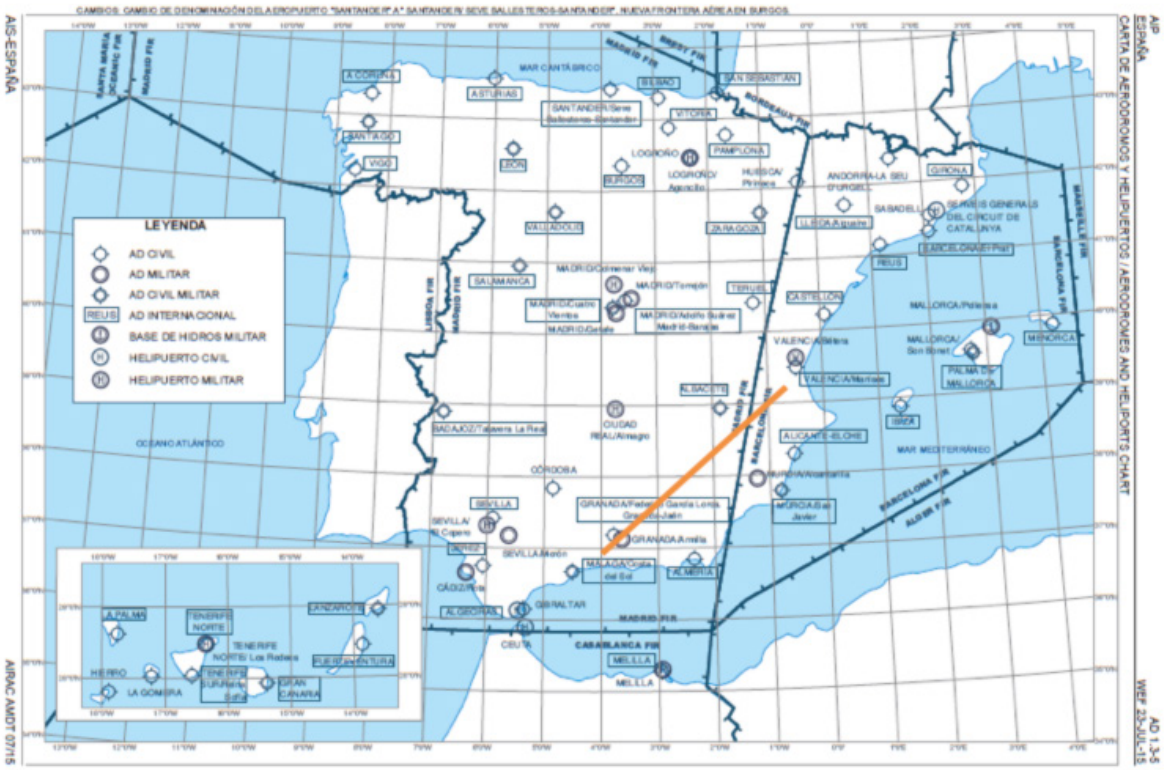

Figure 20. Aerodrome and heliport chart

Figure 21. Chart of restricted aerodromes

For the Granada-Valencia route, the nearest alternate aerodrome was Albacete. This civil-military airport is open to civil traffic in the winter from 08:00 to 13:30. The Alicante-Elche and Murcia-San Javier airports are further away from this route. And, the closest alternate restricted aerodromes, besides Beas de Segura, were Almansa and Ontur.

The Almansa aerodrome in Albacete, ICAO identifier LELM, has one dirt runway in a 15/33 orientation that is 1,000 m long and 60 m wide. It is at coordinates 38º 53.68' N / 001º 06.80' W.

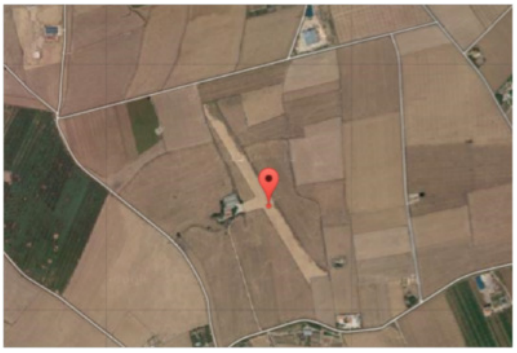

Figure 22. Aerial view of the Almansa aerodrome

The Ontur aerodrome in Albacete, ICAO identifier LEOT, has one asphalt runway in a 13/31 orientation that is 1,100 m long. It is at coordinates 38º 36.859' N / 001º 31.509' W.

Figure 23. Aerial view of the Ontur aerodrome

1.18.3. Application for flight planning and real-time navigation used by the pilot

The pilot had installed on his tablet the Air Navigation Pro application, which is advertised as an air navigation app that allows for flight planning and includes a real-time moving map, cartography, geo-referenced approach charts and a database of waypoints and air spaces. Air Navigation Pro accurately simulates flight instruments (HSI, VOR, ADF, ground speed gauge, altimeter and compass) by obtaining GPS information and displaying it on the instruments.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. Analysis of the weather on the day of the accident

Based on information provided by AEMET:

a. The low-level map called for mountain waves in the area where the flight was taking place.

b. The GAMET message, applicable during the return flight, forecast moderate orographic waves in the mountains in the northeast of the Madrid FIR2.

Mountain waves are particularly dangerous when flying with a headwind, as in this case. In this situation, the pilot should either avoid the mountains or fly very high. If the airplane enters an area with strong wave action, the recommended course of action is to turn around before it is too late. If the route takes the airplane parallel to a mountain range, the leeward side must be avoided, even if the mountain waves are moderate or weak.

The map below shows the aircraft's position (in red) when the pilot decided to divert to the Beas de Segura aerodrome (marked with a yellow star). At that time, the airplane was at coordinates 38º 17' 47" N, 02º 26' 04" W, near the town of Alcantarilla (Albacete). As the figure shows, the pilot was flying over the Natural Park of Sierras de Cazorla, Segura y Las Villas, on the leeward side, with the Beas de Segura aerodrome located on the other side of the range.

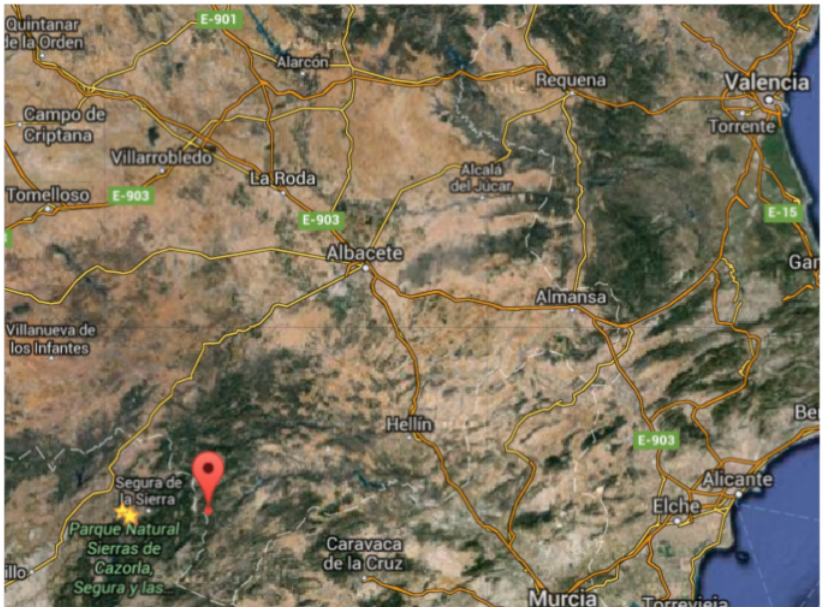

Figure 24. Aircraft's position when the pilot contacted the controller to report he was diverting Beas to de Segura

The graph below shows the final moments of the aircraft before it crashed into the mountain. Based on the last radar position, it was flying at an altitude of 6900 feet and it impacted the mountain at an elevation of 3875 feet, meaning it descended 3025 feet (922 meters) in approximately 2.5 miles (4 km).

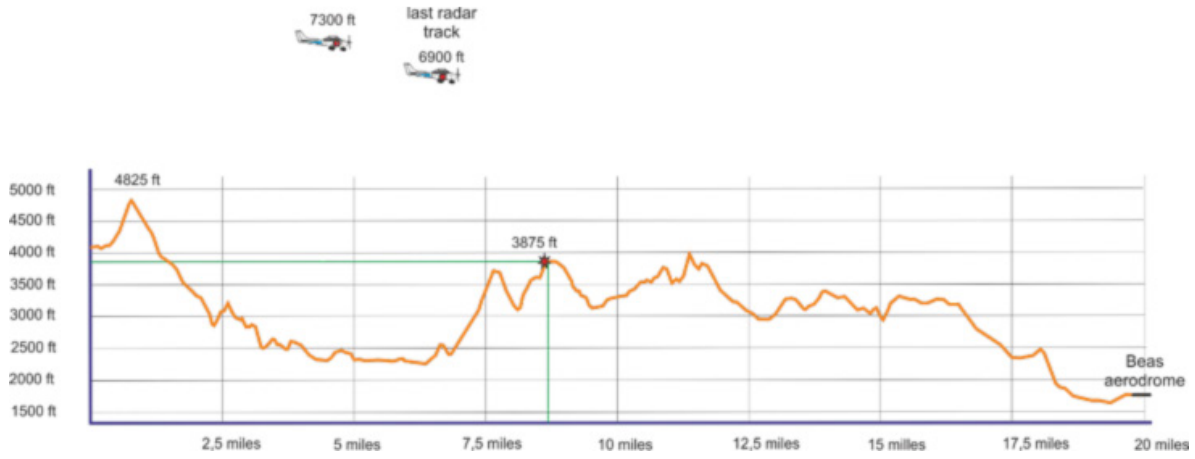

Figure 25. Aircraft's position in the final seconds of the flight

Investigators were unable to determine whether the pilot, when planning the route, was aware of the weather conditions forecast for that day. If he had known the conditions, he may have underestimated the severity of the mountain waves forecast for that day.

2.2. Analysis of the alternate aerodromes on the route

In his flight plan, the pilot had identified the alternate aerodromes to Granada as the Almeria airport and the La Axarquia aerodrome (located in Velez-Malaga, province of Malaga). For the en-route phase, he had not identified any alternate aerodromes.

Given the weather conditions, with mountain waves in the east, the best option would have been to select the alternate aerodromes of Almansa and Ontur, which are not in mountainous areas.

When the pilot contacted the controller to inform him of his desire to divert to the Beas de Segura aerodrome, he was closer to that one that to the one at Ontur. Although the fuel remaining at that point would have allowed him to divert to Ontur, the pilot must have thought that since he only had 30 minutes before sunset and he was on a visual flight, it would be safer to land at Beas de Segura[6] before the sun set.

[6] On the day of the accident, sunset at Beas de Segura was at 18:42 local time.

The figure below shows the position of the aircraft in red when the pilot decided to divert to the Beas the Segura aerodrome, and the locations of the Beas de Segura and Ontur aerodromes (both marked with a yellow star).

Figure 26. Positions of the Ontur and Beas de Segura aerodromes

2.3. Analysis of the outward and return flights

The level and speed, in knots, for the outward flight from the Granada to Valencia airports are provided in the figure below. The graph shows the flight profile between 08:19:18 and 10:02:04 local time.

The average cruise speed was 120 knots, higher than the 100-kt cruise speed indicated in the flight plan.

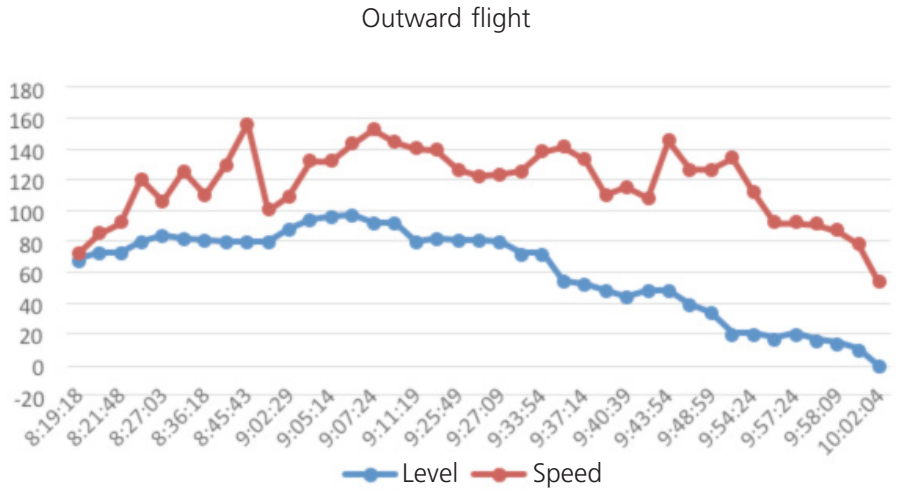

Figure 27. Flight level and speed on the outward flight

The level and speed, in knots, for the return flight are provided in the figure below. The graph shows the flight profile between 16:48:19 and 18:58:34 local time.

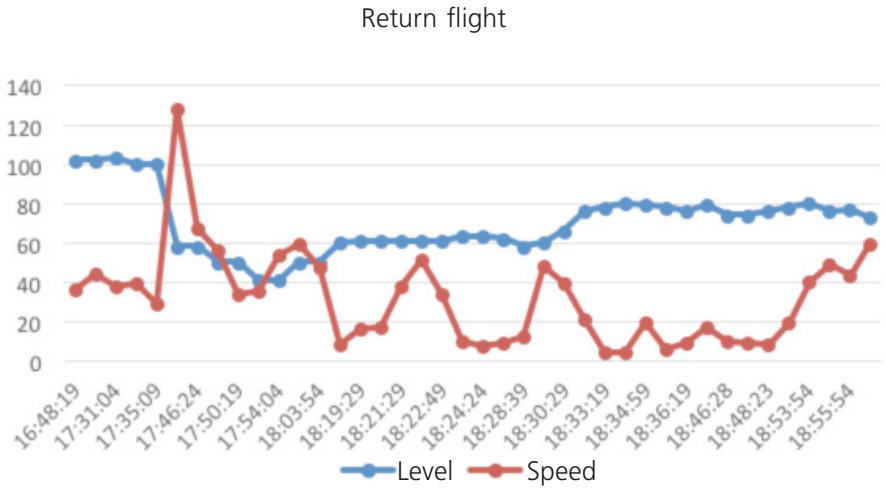

Figure 28: Flight level and speed on the return flight

The average cruise speed before the pilot contacted the controller to report his intention to divert to Beas de Segura was 48 knots. This transmission was made at 18:13:33, by which time the pilot had been flying for 2:13 hours. Between then and the time of the accident, the average speed fell to 23 knots, meaning that diverting to the Beas de Segura aerodrome and changing the heading resulted in the wind braking the aircraft even more.

An analysis of the two flights reveals that during the outward flight there would not have been a crosswind, as predicted by AEMET, but rather a tailwind, which resulted in the cruise speed being 20 knots higher than planned. The pilot did not have a crosswind on the return flight either, as again forecast by AEMET; instead, he had a headwind that was slowing the progress of the airplane. The fact that the weather conditions favored him on the outward flight may have led the pilot to expect a weaker headwind on the return flight.

On the return flight, as soon as he took off from the Valencia Airport, the cruise speed was well below the speed indicated in the flight plan. Despite this, the pilot continued with his plan for over two hours. The pilot, then, who was navigating aided by the Air Navigation Pro software installed on his tablet, exhibited poor route management since he should have realized that he was not reaching the waypoints at the expected times.

2.4. Analysis of the pilot's actions

As noted in the previous section, the pilot had been flying for over 2 hours at a cruise speed that was well below that indicated in the flight plan, without making any decisions to amend his planned route. The lack of experience of the pilot, who had just obtained his pilot's license a few months earlier; his faulty interpretation or lack of knowledge of the meaning of the meteorological conditions during the flight, and which had helped him during the first flight; overreliance on navigation software; and a lack of route planning to address any potential conflicts that could arise during the flight could all have contributed to the pilot's delayed decision.

By the time he decided to deviate from his planned route, it was almost sunset and he selected the nearest alternate aerodrome, without considering the fact that it was between mountains and that weather conditions were not suitable for diverting to that aerodrome.

Moreover, when he changed heading to fly to the Beas de Segura aerodrome, the wind slowed the aircraft even more. And yet the pilot did not consider his decision despite being constantly warned by the controller of his low ground speed and of the weather conditions he would encounter at that aerodrome.

3. CONCLUSIONS

3.1. Findings

- The pilot had a valid and in force license and medical certificate.
- The aircraft's documentation was valid and it was airworthy.
- The pilot did not report any kind of technical problem in the aircraft during the flight.
- Mountain waves and strong winds were forecast for the area along the flight path.
- The pilot encountered a wind direction that was different from what had been forecast.
- The amount of available fuel did not contribute to the accident.
- The pilot had not planned any alternate airports for the en-route phase.

3.2. Causes/Contributing factors

The investigation concluded that this accident was likely caused by a controlled flight into terrain. The aircraft wreckage indicated that the impact with the ground had taken place at some pitch and bank angle and a high speed.

The following contributed to the accident:

1. Improper route management by the pilot, who had already been flying for over 2 hours at a cruise speed that was well below the speed in the flight plan before deciding to deviate from his planned route.

2. The fact that sunset was near may have forced the pilot to incorrectly select the landing aerodrome by only considering the proximity of the aerodrome, without taking into account weather conditions in the area or the aerodrome's location between mountains.

4. SAFETY RECOMMENDATIONS

None.