DATA SUMMARY

LOCATION

Date and time	**Monday, 24 September 2007; 17:07 local time[1]**
Site	**Dalias (Almeria)**

AIRCRAFT

Registration	**F-BTVI**
Type and model	**MORANE SAULNIER MS 893 E**

Engines

Type and model	**LYCOMING O-360-A3A**
Number	**1**

CREW

Pilot in command

Age	**52 years**
Licence	**Private pilot aeroplane**
Total flight hours	**640 h**
Flight hours on the type	**400 h**

INJURIES

	Fatal	Serious	Minor/None
Crew			**1**
Passengers			**3**
Third persons			

DAMAGE

Aircraft	**Significant**
Third parties	**None**

FLIGHT DATA

Operation	**General aviation – Private**
Phase of flight	**En route**

REPORT

Date of approval	**18 December 2007**

[1] All times in this report are local unless otherwise specified. To obtain UTC for the time of year in question, subtract 2 hours from local time.

1. FACTUAL INFORMATION

1.1. History of the flight

On Monday, 24 September 2007, an aircraft under French registry, F-BTVI, took off on a private flight from Ibiza Airport with a pilot and three passengers (the pilot's wife and two friends) onboard under visual flight conditions. Its destination was the La Axarquia Aerodrome in Malaga.

The pilot had planned the route using GPS and had filed an ATS flight plan at Ibiza Airport at 13:23, with an estimated departure time of 14:15 and a flying time of 3:15 h. The aircraft eventually took off at 14:37:44 and proceeded without incident during the first 2:05 h. At 16:42:45, the aircraft entered a mountainous region in which there were extensive cloud formations, according to the pilot's statement. The aircraft climbed from 4,000 to 7,388 ft to clear a mountain range which forced the pilot to deviate from course for a few minutes.

As the pilot himself stated, the cloud cover was so extensive and dense that he decided to descend and continue with the flight below the cloud layer, hoping to find less irregular terrain and clearer skies. He descended from 7,388 back to 4,000 ft. He finished the descent at 17:02:43, by which time the aircraft was in the vicinity of Padules, in the Gador Mountains. Upon noticing the increasingly elevated terrain, the pilot started gaining altitude in an attempt to clear the surrounding mountains. The impact took place at 17:07:11, with the aircraft in a climbing attitude and with full flaps so as to minimize the impact speed. The pilot notified ACC Seville of the accident 42 seconds later, relaying his exact position in subsequent communications.

Figure 1. Condition of the aircraft after the accident

Except for one passenger who was evacuated by a private vehicle 56 minutes after the accident, the remaining passengers, though slightly injured, were rescued by an INFOCA (forest fire emergency response) helicopter 1 hour and 16 minutes after the accident.

1.2. Wreckage and impact information

The aircraft was found in a southwesterly orientation, resting on its lower fuselage and perpendicular to a slightly inclined hill, with the front end pointing uphill. It appeared intact save for damage to the underside, the engine, the landing gear, which had bent backwards, the wing roots and the propeller.

Photographs taken of the cockpit after the accident indicated the following settings: rich mixture, maximum throttle, right fuel tank selected, horizontal stabilizer trim tab in neutral, altimeter at 5,450 ft. The magnetos, carburetor heat, battery, alternator and fuel pump were disconnected.

There were no signs of any fluid leaks in the aircraft. The amount of fuel left in the tanks, as indicated by the gauges, was 1/4 in the left tank and 1/2 in the right.

1.3. Personnel information

The pilot, a Swiss national, was 52 years old at the time of the accident and had been a licensed private aircraft pilot for 18 years. He had a valid class 2 medical certificate. According to his statement, he had 640 total flying hours, 400 of them on aircraft F-BTVI, which he had been flying since 1997.

The pilot's log showed no record of any previous flights duplicating the accident route. His only flight in the south of Spain had taken place a year before, between Cordoba and Castellon de la Plana, which is to the north of the impact site.

The pilot had made the following flights in the 5 days prior to the accident:

- 19-09-2007: from Annecy to Ampuria Brava and from there to Castellon.
- 20-09-2007: from Castellon to Ibiza.
- 24-09-2007: accident flight from Ibiza to Axarquia.

1.4. Aircraft information

The aircraft, registered in France, was based at the French aerodrome of Annecy-Meythet and had all the necessary certificates and permits. As recorded in the log, at

the time of the accident the aircraft had accumulated a total of 4,213 flying hours and had been flown by the same pilot since 1997.

The aircraft's loading condition was as follows:

- Aircraft dry weight (05-09-2006): 618.16 kg and 0.854 m moment arm.
- Weight of pilot and copilot: 57 and 62 kg.
- Weight of passengers in rear: 76 and 55 kg.
- Weight of luggage: 25 kg in the baggage hold and 8 kg more in the rear seats.
- Fuel: the aircraft had been fully refueled before taking off from Ibiza. At the time of the accident, the fuel gauges indicated 1/4 for the left tank and 1/2 for the right.

These values yield weights of 1,011 kg at takeoff and 951 kg at the time of the accident. The center of gravity in both cases was located at its aftermost limit.

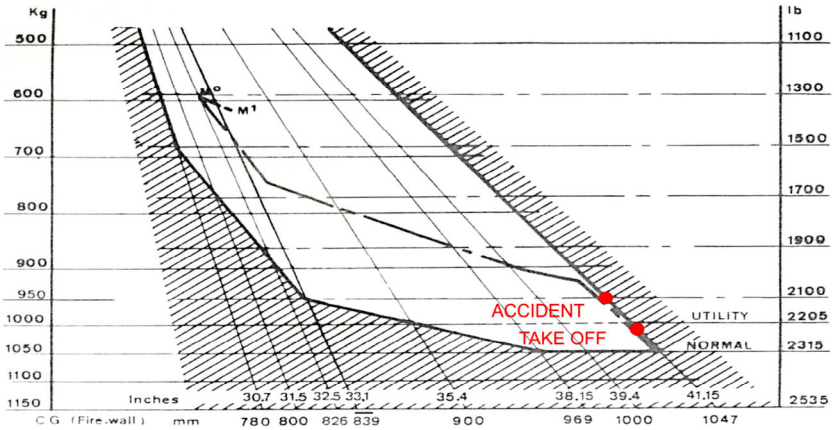

Figure 2. Position of CG during takeoff and accident

1.5. ATC information

1.5.1. *ATC communications*

Recordings of the ATC communications held between the Central sector of FIR Seville and the aircraft, Madrid Search and Rescue and emergency dispatchers were used to reconstruct the sequence of events. At 17:07:53, aircraft F-BTVI issued a distress call on the sector frequency informing of an accident: "Mayday, mayday, mayday. I just have an accident now." Updates on their exact position were provided during three subsequent calls made by the pilot, until he finally provided his GPS coordinates at 17:30:04.

Five minutes after the accident, the supervisor at ACC Seville notified RCC Madrid, who in turn initiated a series of calls to the Civil Guard and to RCC Palma. Thirteen minutes

after the accident, the supervisor of ACC Seville notified emergency dispatchers of the accident.

At 17:52:21, a private individual arrived at the accident site with his car. This person used the Central sector frequency to inform the controller that the nearest town with medical facilities was Laujar.

Ten minutes later a call was placed to the emergency dispatcher, informing of two injured persons in need of help and asking about the type of assistance on the way. The dispatcher reported that INFOCA (forest fire emergency response) aerial units had been deployed.

At 18:03:47, the pilot informed the controller that the person who had found them was going to take one passenger to the hospital. Twenty minutes later, at 18:23:50, the pilot informed the controller that a helicopter (the INFOCA unit) had arrived.

1.5.2. *Radar trace and GPS*

The GPS time references were validated by comparing the radar trace with the onboard GPS. The last radar contact with the aircraft, whose transponder code was 7000, was at 17:05:40 local time, two minutes before the accident took place.

The pilot had a Garmin GPS receiver onboard which was undamaged by the accident, and which allowed for data from the accident flight to be downloaded. Among these data were the planned route from Ibiza to La Axarquia made the day prior to the flight. The data included waypoints along the route, but not altitudes, save for those associated with the departure and destination airports. As shown in Figure 3, the flight followed the planned route at an average speed of 200 k/hr. After taking off from Ibiza at 14:37:44, the aircraft climbed to 6,500-7,500 ft to enter the mainland over Denia (point 2). Once past the mountainous area, it descended to an altitude of 4,000 ft (point 4), which was maintained for one hour. At 16:42:45 (point 5), the aircraft initiated a climb and later a 10-minute detour so as to clear a mountainous area with elevations of 6,500 ft. The maximum altitude reached was 7,388 ft (point 7). After flying over this peak, the aircraft resumed the planned track and initiated a descent to 4,074 ft, reaching that altitude 7 minutes before the accident. At that moment (point 8), the aircraft was in the vicinity of Padules at an altitude of 4074 feet and an airspeed of 203 k/hr (110 kt). The final 5 minutes of the flight (points 8 and 9) took place in the increasingly mountainous region of the Gador Mountains, with elevations going from 700-800 meters up to 1,730 meters. The aircraft climbed from 4,074 ft to the 1717 meters at which the accident took place as it decelerated from 110 kt to 50 kt. The final course was 226° and the altitude indicated on the GPS was 1,717 meters, matching the actual elevation of the terrain.

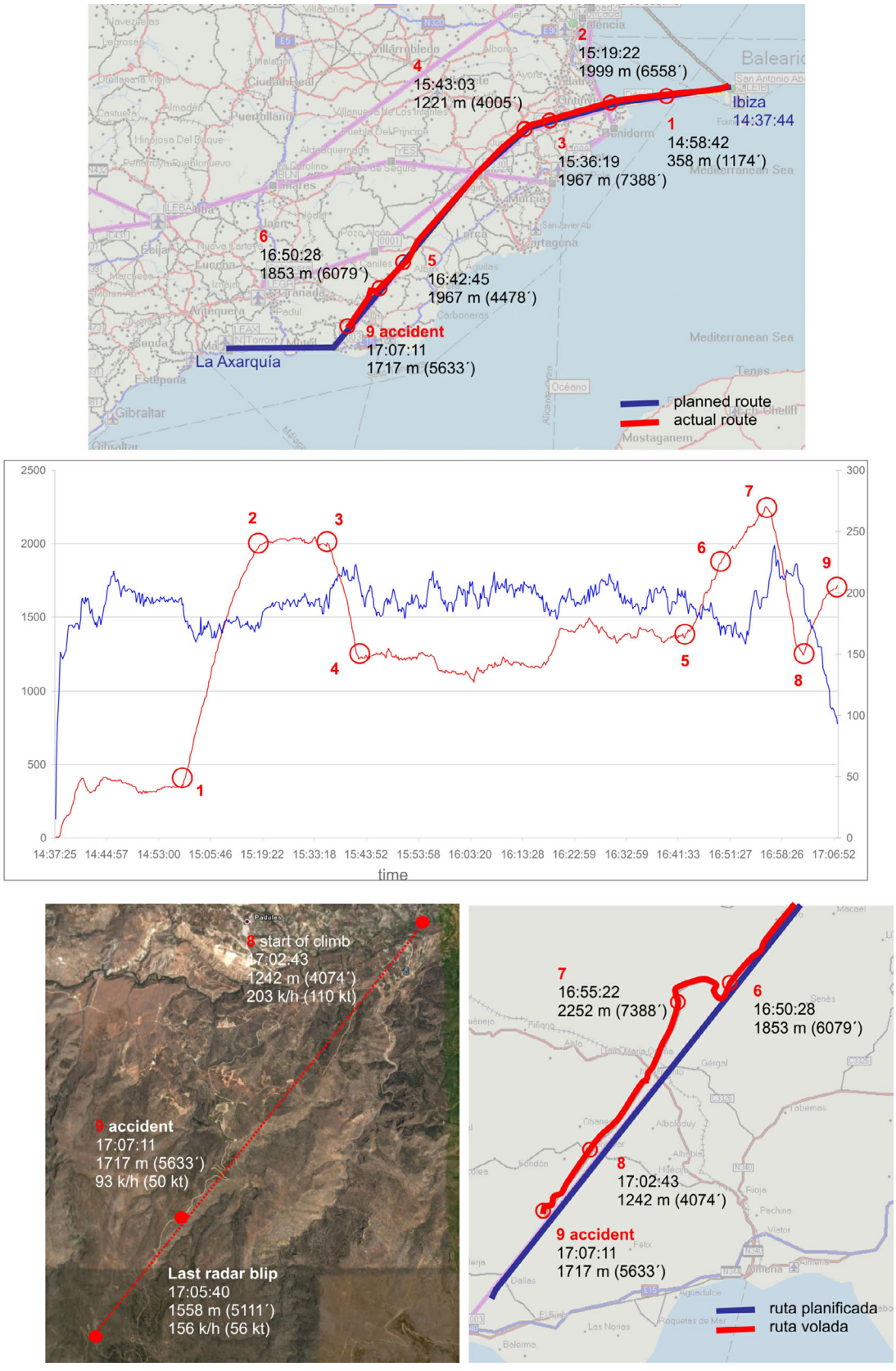

Figure 3. Aircraft trajectory

1.6. Meteorological information

The weather forecast for the province of Almeria on 24 September 2007 called for partly cloudy or clear skies, except for the coastal region. The winds were to be light and variable, with breezes along the coast.

Satellite and radar information for the Gador Mountains showed that between 17:00 and 18:00 on 24 September 2007, the weather at an altitude of 5,450 ft would most likely have started out as mostly cloudy, with cumulus and stratocumulus clouds giving way to mostly clear skies by 18:00 with stratocumulus clouds. Winds were weak and the temperature would have been between 11 and 12 °C.

1.7. Tests and research

1.7.1. *Pilot's statement*

The pilot stated that the flight from Ibiza proceeded normally until the first mountains appeared, 30 NM to the northwest of Almeria, and with them the first cloud formations, which covered the mountainous areas and reached an altitude of 4,500 ft. He cleared a 6500-foot high mountain before descending to 4,000 ft to go under the clouds, not above them, since he was unsure of finding opening through which to descend later. As he descended, he became aware of the increasing elevation and proximity of the terrain, so he decided to head for a valley. Once inside the valley, he noticed mountains all around without sufficient space in which to turn around, so he tried climbing as fast as possible to clear the mountains over their lowest point. The aircraft's rate of climb was too low, however, and faced with the certainty of crashing into the mountain, the pilot decided to lower the flaps one notch, followed by full flaps 30 seconds later so as to minimize the impact speed. He crashed into the mountain at an altitude of some 5,500 ft with full flaps and with a climb attitude.

After impact, smoke started issuing from the engine, which prompted him to turn off all the systems. Later, after verifying there was no fire, he energized the electronics so he could use the radio to inform ACC Seville of the accident and of his location.

At the time of impact, all occupants were wearing their seat belts and visibility was good.

The flight had been planned using GPS and later transferred to a chart.

1.7.2. *SAR helicopter pilot's statement*

As the SAR helicopter approached the accident site, the pilot noted the presence of clouds at 5,000 ft which prevented them from finding a clearing through which to access the site.

1.7.3. *INFOCA helicopter technician's statement*

The INFOCA technician aboard the helicopter which transported the passengers noted the presence of fog at the accident site, but no wind. Despite the fog moving upward toward the summit, they were still able to land. He likewise stated that the site was easy to find thanks to the precise coordinates they had been given.

1.8. Survival aspects

The impact took place at the minimum airspeed the aircraft could sustain with full flaps, which resulted in minimum damage. The safety belts maintained their integrity and the window opened easily, allowing all onboard the aircraft to exit under their own power. The crash locator beacon was activated after the accident.

As a consequence of the accident, the passenger seated in the right rear seat suffered a broken nose. The other passengers received slight injuries to their foreheads, knees and elbows. One passenger was taken to Laujar de Andarax 56 minutes after the accident in the private car of the person who found them. Since the remaining three occupants only had bruises, they were able to be evacuated in the INFOCA helicopter to Alhama de Andarax. All received medical treatment and were released within 9 hours.

The INFOCA helicopter, which was requested by the emergency dispatcher and which was deployed from the Alhama de Almeria Forest Fire Center, 20 km away from the accident site, was the first to arrive at the site, 1 hour and 16 minutes after the accident.

2. ANALYSIS

2.1. Flight analysis

On Monday, 24 September 2007, after flying for two and a half hours, aircraft F-BTVI impacted a mountain in the Gador Mountains in Almeria. The flight had proceeded normally for the first 2 hours and 5 minutes, but encountered problems upon reaching the mountainous region northeast of Almeria and finding cloud formations there.

The pilot, sufficiently experienced and knowledgeable on the aircraft, had rested for 4 days in Ibiza and was on a pleasure flight with his wife and two friends. Neither fatigue nor stress, therefore, is thought to have affected the pilot's abilities. Along these same lines, the flight had been planned the day before and the actual takeoff time was only slightly behind schedule (22 minutes). Likewise, the departure time, along with the season of the year, provided ample time to make the flight under daylight conditions, which allow nervousness or haste during the flight to be ruled out.

The aircraft's condition at takeoff was in compliance insofar as weight and center of gravity requirements. Neither the wreckage nor the pilot's statement suggest the existence of a technical problem affecting the operation or handling of the aircraft.

Based on the pilot's statement and the GPS data, it seems the pilot planned the course without taking into account the elevation. This could explain the events of the final 25 minutes of the flight, during which he had to deviate from his route to clear a mountain before deciding to descend to 4,000 ft while crossing over irregular terrain. After the detour, he returned to his planned route; in other words, five minutes before the accident, when he decided to descend to 4,000 ft, the pilot was over an area which he had planned to cross. Had the pilot been aware of the contour of the terrain over which he was flying, he probably would have decided against losing so much altitude. The low altitude at which they were flying 5 minutes before the accident, along with the upward-sloping terrain in the area, made it impossible for the aircraft to clear the surrounding mountains. The pilot had no knowledge of the area of the accident since he had never flown there before, his normal area of operations being outside Spain and he being a resident of Switzerland.

The weather forecast indicated the possibility of clouds, particularly over mountainous areas, where they tend to form more easily. The pilot's description of the cloud cover was consistent with the radar and satellite images for the Gador Mountains, which showed the presence of cumulus and stratocumulus clouds. The pilot's decision to continue flying below the cloud cover to preclude the possibility of not finding an opening later through which to descend suggests that he did not think the clouds would dissipate. It may have been more prudent, then, to have backtracked and searched for an alternate route.

The pilot's control of the emergency situation is considered adequate insofar as his decision to minimize the impact speed. Though fully extending the flaps would have lowered his climb angle, it also allowed him to impact the mountain at 50 kt, resulting in minimum harm to the occupants and the aircraft. After the impact, the magnetos and electrical switches were turned off to avoid the risk of fire in the aircraft. The mixture and fuel switches, however, were not cut off, as they should have been. In this sense, and contrary to the proper positioning of the flaps, the position of the throttle lever at full power and the rich mixture were inconsistent with preparing the aircraft for an impact during which they should have been in the opposite positions.

3. CONCLUSIONS

3.1. Findings

- The pilot and aircraft met all necessary requirements for carrying out in the flight in question.

- There were no technical problems associated with the aircraft.
- The pilot, 52, had flown 400 hours aboard the accident aircraft.
- It was the pilot's first flight in the area.
- The pilot had rested for 4 days prior to the flight.
- The actual departure time differed only slightly from that planned by the pilot.
- The departure time ensured daylight conditions throughout the flight.
- The pilot had planned the waypoints the day before. The planning had not taken into account terrain elevations at said waypoints.
- The weather forecast for the area of the accident indicated the possibility of clouds.
- The aircraft impacted at 17:07:11 against a mountain in the Gador Mountains while in a climb attitude with full flaps and at 50 kt.
- Search and rescue and emergency services were informed of the accident and the location within 5 minutes.
- A passer-by who happened upon the wreckage 56 minutes after the accident used his private car to evacuate one passenger.
- The remaining three occupants were rescued 1 hour and 16 minutes after the accident by an INFOCA helicopter dispatched by emergency services.

3.2. Causes

The controlled impact of aircraft F-BTVI with a mountain in Almeria's Gador Mountains resulted from flying at an excessively low altitude within a mountainous region. A lack of knowledge of the elevations in the region, along with the decision to continue flying under unfavorable meteorological conditions, are considered to have contributed to the accident.

4. SAFETY RECOMMENDATIONS

None.