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pour la sécurité de l'aviation civile

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# INVESTIGATION REPORT

# **Accident** to the Piper PA34-200T "Seneca III" registered **HB-LSD** on 7 December 2016 at Basel–Mulhouse airport (68)

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|---|---|
| **Time** | At 17:40[1] |
| **Operator** | Private |
| **Type of flight** | Non commercial operation, pleasure, cross country |
| **Persons on board** | Pilot |
| **Consequences and damage** | Pilot fatally injured, aircraft destroyed |

***This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.***

## Non-stabilized approach in LVP conditions, go-around, loss of control, collision with ground, fire

### 1 - HISTORY OF THE FLIGHT

*Note: the history of the flight is based on radar data and communications on the control tower frequencies.*

The pilot took off on an IFR flight plan from the Nuremberg airport (Germany) at 16:17 bound for the Basel-Mulhouse airport, the aeroplane's base.

At 17:21, the pilot contacted the Basel approach controller and indicated that he was at FL120 approaching the LIPKA waypoint. The controller told him to continue on the current heading for an ILS Z15 approach[2]. LVP[3] conditions were in force.

At 17:24, the controller provided the latest information regarding visibility: at runway 15, RVR[4] 900 m at touchdown[5], 700 m at mid-point and 1,300 m at stop end, no ceiling.

At 17:30, the pilot was authorized to carry out an ILS Z15 approach. Three minutes later, the controller provided him with new information about visibility: RVR 750 m at touchdown, 650 m at mid-point, 800 m at stop end, visibility of 350 m, no ceiling. The pilot replied "That sounds very bad" but he continued his approach, established on the LOC[6].

At 17:34, the pilot was transferred to the control tower frequency. The controller informed him that he was number 1 for landing on runway 15 and gave him new information about visibility: RVR 750 m at touchdown, 650 m at mid-point, 800 m at stop end. The pilot read back this information and announced that he was continuing his approach. The approach performed by the pilot followed the standard path and slope (Figures 1 and 2).

[1] Except where otherwise indicated times in this report are local.

[2] ILS Z15 procedure: minimum RVR 550 m, decision altitude 1104 ft, decision height 240 ft for this type of aeroplane.

[3] Low Visibility Procedures: at the Basel–Mulhouse aerodrome, the criteria for activating the LVP are: RVR ≤ 800 m or ceiling ≤ 200 ft.

[4] Runway Visual Range: distance over which the pilot of an aeroplane on the centreline of a runway can see the runway surface markings or the lights delineating the runway or identifying its centreline (source: Météo France).

[5] Paved runway 3,900 m x 60 m, LDA 3,900 m.

[6] LOC: Localizer.

At 17:39:20, when the aeroplane was around 1,300 m from the runway threshold, its flight path started to deviate to the left of the runway centreline (point ❶ of flight path), up to the motorway running along the side of the Basel-Mulhouse airport. The lateral deviation reached with respect to the runway centreline was around 260 m[7] (point ❸).

[7] For such a deviation, the lateral deviation indicator would be against the right limit on the PFD/HSI.

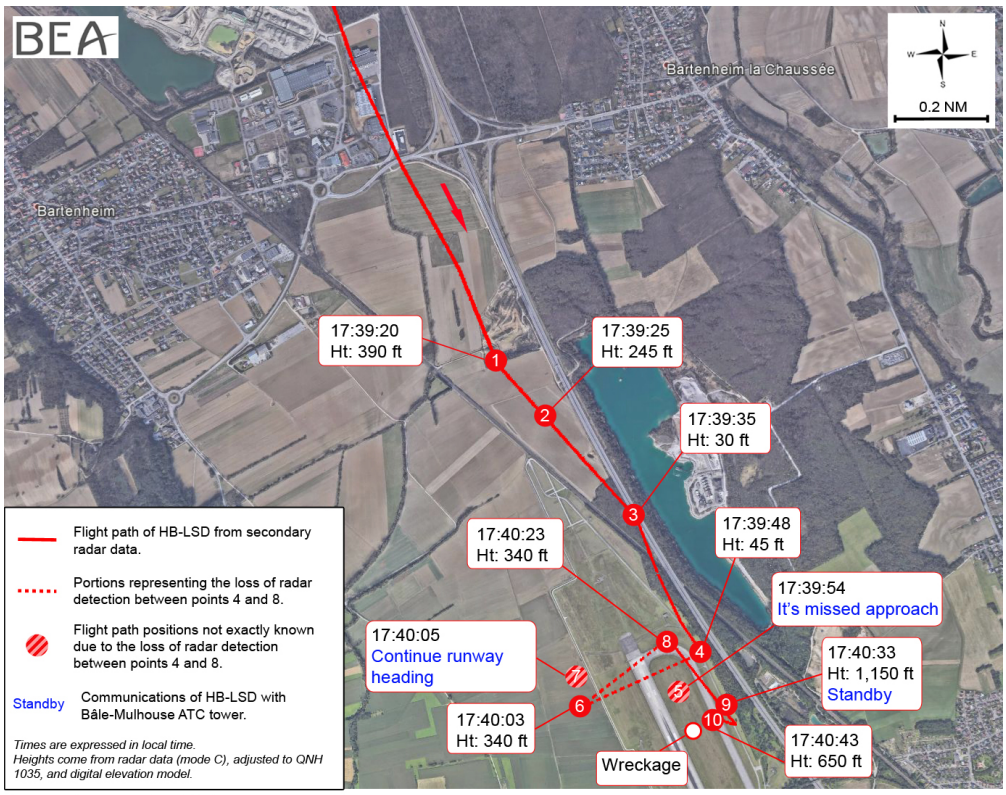
At 17:39:54, while the aeroplane was still on the left side of the approach path a few metres from the runway threshold, the pilot advised that he was going to conduct a missed approach (point ❺). The controller advised him to follow the standard go-around procedure along the runway centreline and then to climb to 5,500 ft QNH 1035. The pilot read back this missed approach procedure although the radar data showed that the aeroplane seemed to be in a continuous turn (point ❼).

At 17:40:26, the controller asked the pilot to confirm his transponder code. The pilot sent his last message at 17:40:33. The content of the last message was not audible.

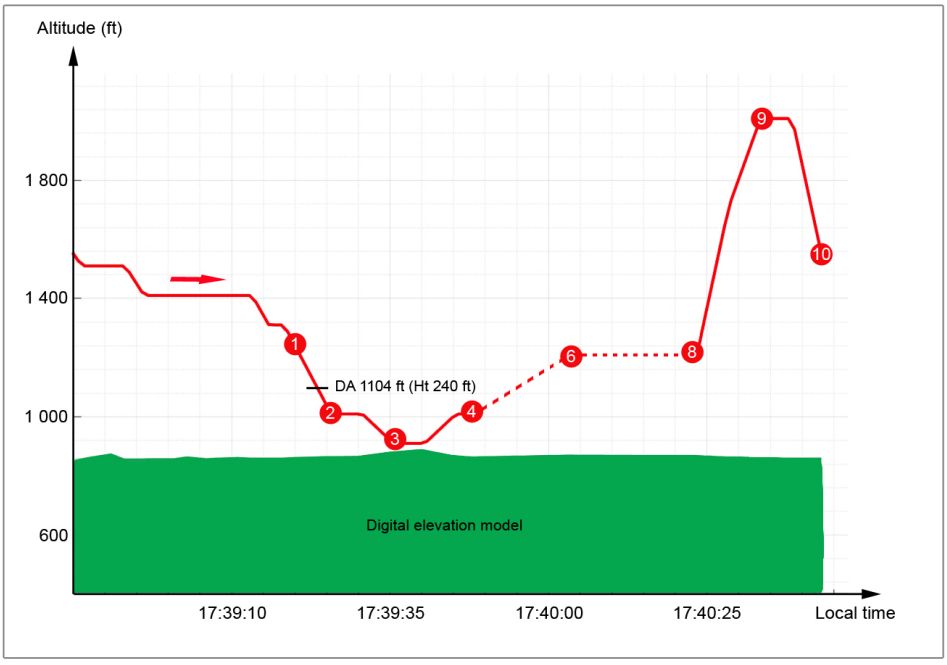
A few seconds later, the aeroplane struck the ground at the PAPI[8] of runway 15 and caught fire.

[8] Precision Approach Path Indicator.

At 17:40:58, the pilot of a Cessna 525 Citation Jet informed the controller of a fire on the runway.

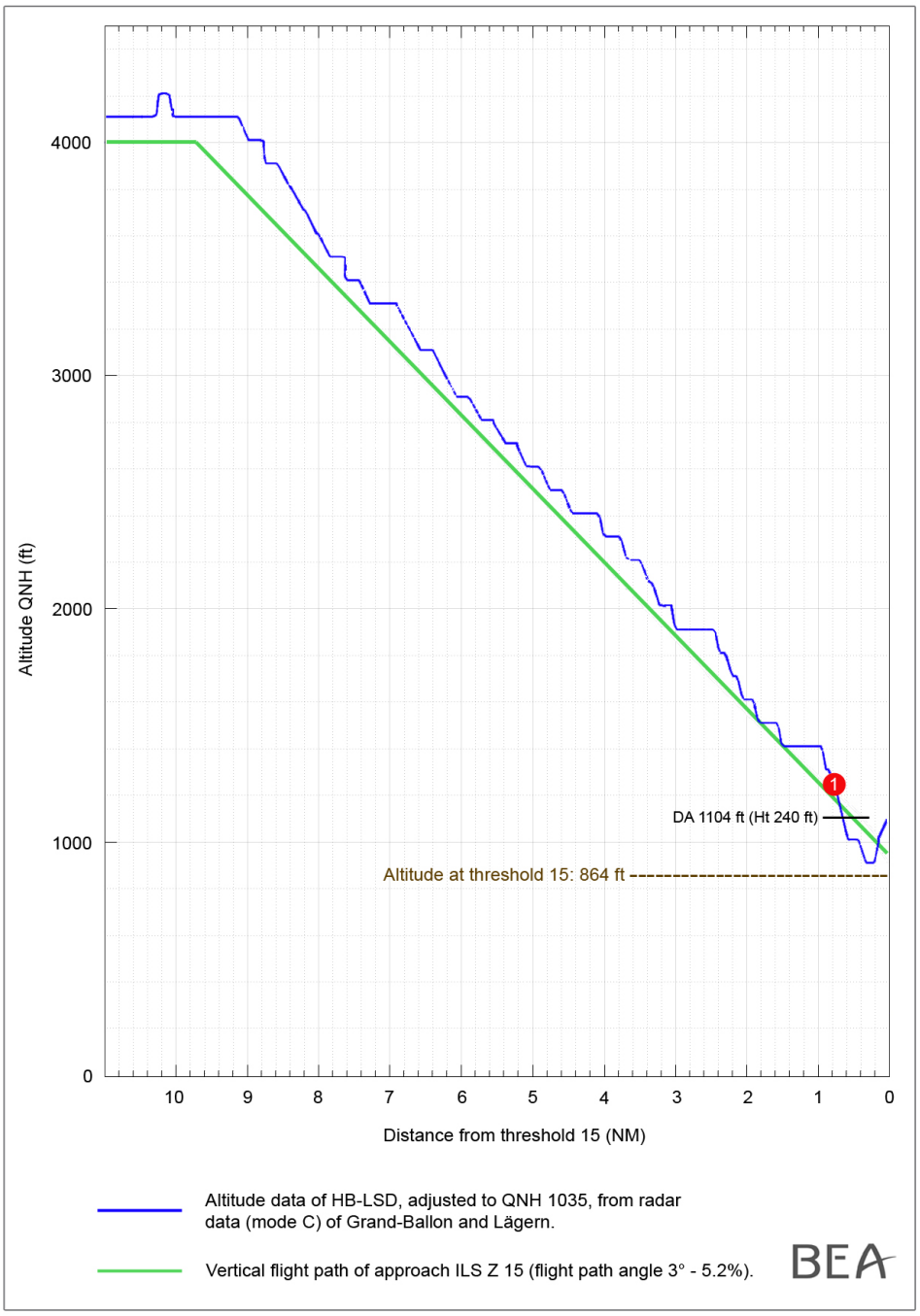



*Background map source: Google Earth.*




*Source : BEA*

Figure 1: Path of HB-LSD




*Source : BEA*

Figure 2: Comparison of vertical profile of HB-LSD with theoretical 3° approach slope

## 2 - ADDITIONAL INFORMATION

### 2.1 Site and wreckage information

The homogeneous damage on the propellers was consistent with the presence of a significant engine torque at the time of impact with the ground. The pitch settings of both engine propellers were symmetrical.

Only the roll control cables could be identified and examined; they were integral with the control surfaces. The flap control was in the "*fully extended*" position.

The fuselage along with the movable and fixed surfaces could not be examined because of the fire damage. It was not possible to determine whether the aeroplane deicing and anti-icing systems were in operation.

The examination of the site and wreckage makes it possible to conclude that the aeroplane struck the ground with a nose-down pitch and wings level.

## 2.2 Meteorological information

Météo France (French weather information service provider) estimated the weather conditions at the Basel–Mulhouse airport at the time of the event as follows:

- presence of freezing fog;
- visibility 300 m;
- no ceiling;
- north wind of 2 kt;
- temperature and dew point -0.8°C;
- 100% humidity;
- moderate icing from ground to a height of 150 to 200 m.

On 7 December 2016, the aeronautical night started at 17:14.

The METAR at 16:00 local time for the Basel–Mulhouse airport reported:

- wind direction 310° at 5 kt, with variations between 280° and 340°;
- visibility 400 m;
- RVR of 700 m for runway 15 and decreasing;
- presence of freezing fog;
- vertical visibility not measurable;
- temperature and dew point 0°C.

The TAF at 14:48 local time for the Basel–Mulhouse airport, giving the weather forecast from 14:00 local time, reported:

- wind direction 310° at 5 kt;
- visibility 600 m;
- presence of fog;
- broken clouds at 100 ft;
- and temporarily between 16:00 and 01:00 the next day:
  - visibility 100 m;
  - presence of freezing fog;
  - vertical visibility not measurable.

## 2.3 Pilot information

The pilot, aged 61 years, had a private pilot's licence since 1993, issued by the Swiss Federal Office of Civil Aviation, the licence was valid at the time of the accident. He held single-engine piston, multi-engine piston, night flight and instrument flight ratings.

The pilot also had level 4 English language skills. He held a valid class 2 medical certificate on the day of the accident.

The pilot performed flights to the United States and South Africa and on this account held licences from these countries. He mainly flew on the two aeroplanes that he owned, a Piper PA34 and a Cessna 210.

At the time of the event, he had logged around 3,248 flight hours as captain. During the last 90 days, the pilot had flow 33 h 45 min, of which 4 h 50 min on HB-LSD. He had flown 1 h 30 min during the last 30 days prior to the day of the accident solely on HB-LSD. He had flow outwards from Basel-Mulhouse to Nuremberg the morning of the day of the accident.

The data taken from the pilot's log books showed that his flight hours were divided as follows:

- 1,955 flight hours on the single-engine aeroplane;
- 1,293 flight hours on the twin-engine aeroplane.

The pilot had performed a total of 1,228 instrument flight hours, 120 night flight hours (equally VFR and IFR flights) and 108 night landings.

## 2.4 Aircraft information

The HB-LSD, built in 1979, belonged to the pilot and had logged 3,292 flight hours before the accident flight. It was maintained in accordance with the maintenance programme specified by the manufacturer.

On 13 November 2015, the pilot had had an airborne Garmin GTN 650 GNSS[9] system installed. This system combined the GNSS navigation, precision approach, transponder, TAWS[10] , TAS[11] and lightning detection functionalities. An Aspen Avionics EFD1000 PFD[12] was also installed at this time.

## 2.5 Spectrum analysis

It was possible to carry out a spectrum analysis based on the pilot's communications on the control tower frequency. It was thus possible to determine that the engine speed was stabilized at 2,450 revolutions per minute (rpm) during the five minutes prior to the go-around. When the pilot advised that he was going to perform a go-around, the engine speed increased to 2,576 rpm[13].

## 2.6 Witness statements

### 2.6.1 Pilot's examiner

The examiner had known the pilot for around fifteen years and extended his IFR and MEP ratings every year. The pilot also contacted him to revise approaches and flights under IFR.

The last flight that the examiner made with the HB-LSD pilot was the annual flight proficiency check for IFR and MEP ratings on 5 May 2016. This flight was carried out on HB-LSD. The examiner said that the pilot knew his aeroplane very well and had vast experience in IFR.

[9] Global Navigation Satellite System.

[10] Terrain Awareness and Warning System: system designed to prevent controlled-flight-into-terrain accidents.

[11] Traffic Advisory System: system designed to prevent collisions between aeroplanes in flight.

[12] Primary Flight Display.

[13] The aeroplane flight manual states that the maximum speed is 2,575 rpm.

### 2.6.2 Witness statement from a car driver

At the time of the accident, the car driver was travelling along the A35 motorway to Strasbourg. At around 17:40 he was by the Basel-Mulhouse airport. While driving in the left lane of the motorway, he saw three very bright white lights from a small aeroplane flying over the motorway with a steep rate of descent. He specified that the aeroplane's centre light was aligned with the motorway. He estimated that it was flying at a height of around fifteen metres. He then heard the pilot initiate a go-around and observed, by means of the aeroplane lights, that the aeroplane had stopped descending without being able to assert that it had gained altitude. Lastly, he saw the aeroplane start a slight turn to the right.

## 3 - LESSONS LEARNED AND CONCLUSION

### 3.1 Scenario

During his approach, the pilot of HB-LSD was informed by the air traffic controller of the instrument meteorological conditions in force at the Basel-Mulhouse-Fribourg airport. His response indicated that he was aware that these conditions were unfavourable. The pilot chose to carry out this approach which specifies an instrument descent until acquiring visual references on the runway no later than at the decision height. If these references are not acquired at this altitude, the pilot performs a go-around.

The radar data showed that the pilot had followed a nominal approach slope but that at 1 km from the threshold of runway 15 and at 100 ft above the decision height, he deviated to the left of the centreline, towards the motorway. Given the fog, the darkness (it was night time) and the high density of rush-hour traffic on the motorway, it cannot be excluded that the pilot mistook the motorway for the runway. In this case, the pilot may have thought that he had established visual contact with the runway and then may have decided to continue his visual approach, no longer monitoring the instruments which would have allowed him to detect a cross-track deviation with the guidance provided by the ILS.

After flying over the motorway at an approximate height of 30 ft, the pilot realised that it was not the runway and slightly gained altitude while following a direction parallel to the runway centreline. He advised that he was conducting a missed approach while he initiated a turn to the right. The investigation was not able to determine the reasons which led the pilot to execute this turn.

The pilot then made a 360° right turn in around 30 seconds at an approximate height of 340 ft above the runway threshold. At the end of the turn, the aeroplane had climbed to a height of 1,150 ft in around ten seconds at an average rate of 4,800 ft/min. These substantial variations in the observed flight path, both vertically and horizontally, seem to indicate that the pilot was experiencing spatial disorientation, probably due to the absence of exterior visual references and the confusion which can exist in this critical situation.

On completion of a new right turn and after a rapid climb, the aeroplane very probably stalled and then struck the runway safety area. The weather conditions could have caused icing. It was not possible to determine whether the final loss of control could be associated with an icing phenomenon.

### 3.2 Conclusion

The pilot deviated from the instrument approach path, probably because he was using erroneous external visual references acquired a short time before the decision height. These were predominantly situated to the left of the path followed during the ILS approach. This inconsistency did not lead to the pilot immediately conducting a missed approach. The pilot became aware of his mistake at a late stage, at 30 ft above the motorway. He then started to perform a go-around and lost control of his aeroplane during this manoeuvre.

This accident illustrates the importance of making sure that the information from the aeroplane instruments is consistent with the information based on the external visual references, in particular in IMC and during an ILS approach for which the guidance instruments are precise. This monitoring can be difficult in the transition phase between the instrument approach and the visual approach when the conditions are marginal.