BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile
www.bea.aero
@BEA_Aero

SAFETY INVESTIGATION REPORT

Serious incident between the BOMBARDIER - BD100 1A10 - "Challenger 300" registered HB-JGQ and the SCHEMPP HIRTH HS-5 Nimbus 3DM registered D-KPHJ on 23 May 2019 at Bâle-Mulhouse

Time	12:20[1]
Operators	Aeroplane: Premium Jet Ag (Switzerland) Glider: private
Type of flight	Aeroplane: ferry flight Glider: cross country
Persons on board	Aeroplane: captain (PF[2]); co-pilot (PM[3]); 1 cabin crew Glider: pilot and one passenger
Consequences and damage	None
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in February 2023. As accurate as the translation may be, the original text in French is the work of reference.	

Near collision between a glider and an aeroplane on an ILS approach, in controlled airspace

1 HISTORY OF THE FLIGHT

Note: The following information is principally based on Flight Data Recorder (FDR) data, statements, radio-communication recordings and Open Glider Net (OGN) data.

The pilot of the glider, accompanied by a passenger in the rear seat, took off from Sarrebourg-Buhl aerodrome (Moselle) at around 10:00 bound for Leutkirch (Germany). He flew over the Massif des Vosges mountains until he was west of Guebwiller (Haut-Rhin) and then headed towards the French-German border which involved him flying north of Mulhouse (Haut-Rhin).

The crew of the Challenger 300 took off from Zurich airport (Switzerland) at around 12:05 for a positioning flight to Basel-Mulhouse airport.

At around 12:20, when the aeroplane descended through 4,600 ft in the Basel TMA[4] in a left turn and with a speed of 210 kt, the PM saw the glider which was flying left-hand spirals nearby. He warned the PF who disconnected the autopilot and carried out an evasive manoeuvre by banking the aeroplane to 45° and by increasing the descent.

[1] Except where otherwise indicated, the times in this report are in Coordinated Universal Time (UTC). Two hours should be added to obtain the local time on the day of the event.
[2] Pilot Flying.
[3] Pilot Monitoring.
[4] Class D Basel TMA 3 extends vertically from 3,000 ft QNH to FL 145.

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

The glider had not been detected by the aeroplane's onboard systems and the TMA 3 controllers were not aware of its presence in the class D TMA.

The crew of the Challenger 300 continued the ILS approach on runway 15 and landed without further incident at 12:27. The glider pilot continued his route, crossed the border at 12:35 and landed at the planned destination aerodrome at 17:20.

2 ADDITIONAL INFORMATION

2.1 Pilots' experience and statements

2.1.1 Aeroplane

The 48-year-old captain held an Airline Transport Pilot Licence (Aeroplane) (ATPL(A)) and had logged 8,507 flight hours including 156 h on the Challenger 300 and 63 h in the previous three months.

The 35-year-co-pilot held a Commercial Pilot Licence (Aeroplane) (CPL(A)) and had logged 1,837 flight hours including 367 h on the Challenger 300 and 80 h in the previous three months.

The crew considered they were at a lateral distance of less than 30 m and a vertical distance of 1 m.

2.1.2 Glider

The 48-year-pilot held a Sailplane Pilot Licence (SPL) and had logged 1,491 flight hours, including 803 hours on type and 19 hours in the previous 30 days.

The pilot specified that the flight was carried out in the scope of a four-day cross-country flight. He indicated that he knew the sector and had already carried out cross-border flights out of Sarrebourg (Moselle). He had up to date aeronautical charts in his possession.

He added that after reaching an altitude of 4,200 ft near Munster (Haut-Rhin), he started a long, straight descent towards the German border. When he was slightly south of Colmar Meyenheim air base (Haut-Rhin), he carried out spirals to try and gain altitude again. Given the height of the glider at its lowest point which the pilot estimated at 450 m[5], he had considered using the engine but managed to find an uplift. It was as he was gaining altitude that he perceived the Challenger 300 at a lateral distance which he estimated as being between 70 and 100 m. He believed that at this precise moment of the flight, he was at an altitude 800 m[6]. He explained that he was surprised by the presence of this aeroplane at such a low altitude.

He was aware of the presence of TMA 3 and that its access was regulated. Believing that he was flying below it, he deemed it unnecessary to make radio contact. He indicated that he could not remember the transponder mode he had selected and affirmed that he switched on the transponder each time that this was necessary.

He indicated that he had neither filed a flight plan nor contacted a control unit with respect to crossing the French-German border as, in his opinion, it was not mandatory for a glider.

[5] Which corresponds to an altitude of around 650 m i.e. 2,130 ft.

[6] Which corresponds to a height above ground of around 600 m and an altitude of 2,630 ft.

Note: According to article R. 131-5 of the Civil Aviation Code, a flight plan must be filed when a flight carried out under Visual Flight Rules (VFR) comprises the crossing of the land or sea borders of Metropolitan France, whatever the direction. The flight plan must be communicated at least 60 min before the estimated departure from the gate. The border crossing point must be recorded in section 15 of the flight plan. Moreover, the pilot must record the estimated elapsed time to reach this point in section 18 after the abbreviation EET/.

2.2 Aircraft information

2.2.1 Aeroplane

The Challenger 300 is a multi-pilot aeroplane. It is equipped with an onboard Traffic alert and Collision Avoidance System (TCAS) It issues Traffic Advisories (TA) to warn the crew of possible threats and Resolution Advisories (RA) to ensure a suitable separation according to the threat. It is capable of detecting all aircraft which have transponders set to ALT.

2.2.2 Glider

The Schempp Hirth HS-5 is a self-launching glider which has a reciprocating engine on a retractable mount installed in the upper part of the fuselage. At the time of the incident, the engine was retracted.

The glider was equipped with a mode S transponder and a GNSS LX Navigation 7007 variable speed indicator/computer incorporating a FLARM module to prevent collisions between aircraft equipped with this system.

2.3 Meteorological information

The meteorological conditions estimated by the French Met Office, Météo-France, at the time of the near collision were the following: visibility greater than 10 km, broken clouds based at 8,000 m, temperature 20°C and QNH 1018.

There was:

- a northerly surface wind of 4 to 7 kt;
- an easterly wind between 2,000 and 5,000 ft of 5 to 10 kt;
- calm wind at 10,000 ft.

The wind could be considered as light in the altitude band used by the glider and therefore not significantly affecting the level of turbulence generated and the drift effect.

2.4 Read-out of recorded data

The data from the FDR equipping the aeroplane was read out and used to map the flight path below (see Figure 1).

As the glider's FLARM data had not been saved by the pilot, it was only possible to map part of the glider's flight path using the Open Glider Network (OGN) which receives in real time, the information sent by the FLARMs installed on board gliders via a network of ground receiving antennae (see Figure 1). According to the position of the glider, as well as the location and availability of the receiving antennae, certain sections of the flight path were missing.

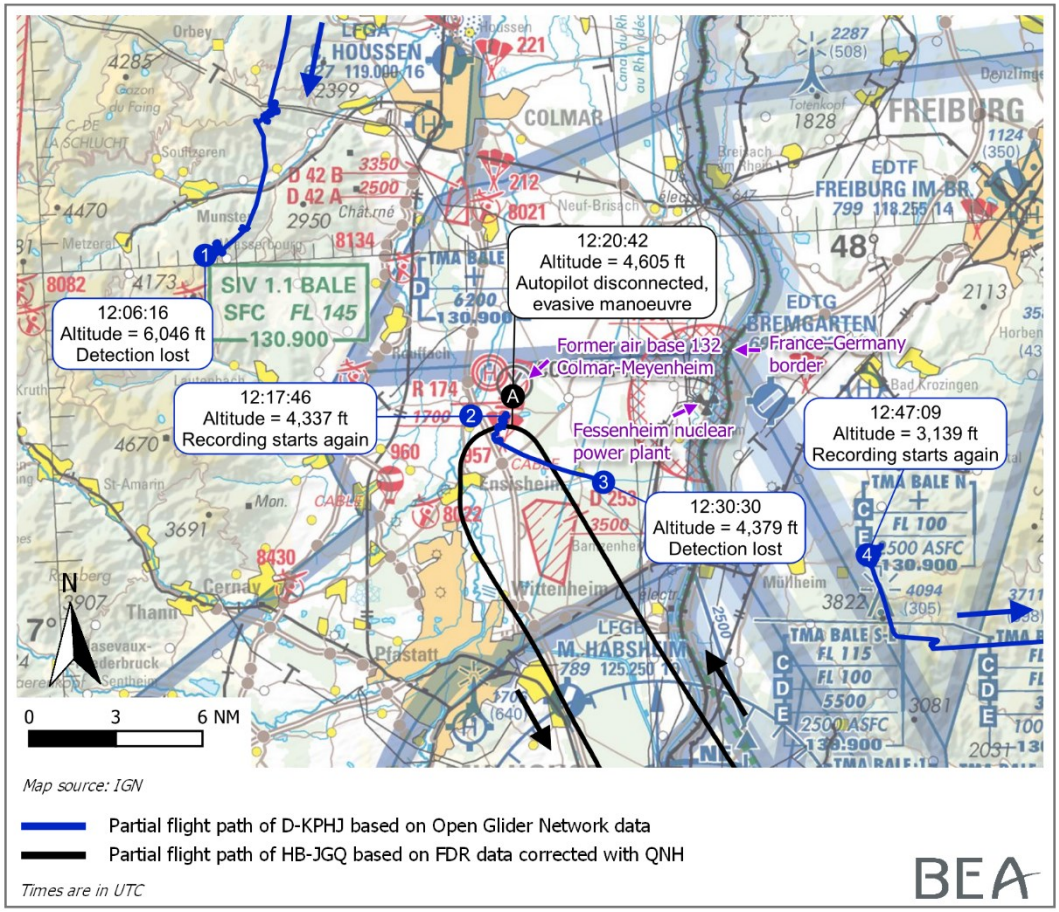

Figure 1: flight paths of both aircraft

Note: SUP AIP 085/19 valid from 28 March to 6 November 2019 mentioned a recommended transit route to ensure separation between RWY 19 procedures at Colmar-Houssen airport and certain VFR transit flights.

The read out of this data brought to light:

- Altitude values which were different to those indicated in the statement made by the glider pilot. The maximum altitude reached at around 12:05 close to Munster before starting the transition was around 6,200 ft, i.e. 2,000 ft more than the altitude indicated by the pilot. There was a similar difference at the time of the loss of separation at 12:20:40[7].
- The glider entered Basel TMA 3 at around 12:15 at an altitude of around 5,200 ft and exited it at around 12:35 at an altitude of around 3,900 ft. The pilot thus flew for around 20 min in the class D TMA 3 without radio contact.

2.5 Radio contact in class D airspace obligation

According to article SERA[8] 6001, continuous air-ground voice communications are required for all flights in class D airspace. VFR flights receive traffic information in respect of VFR flights and traffic

[7] The glider pilot was not able to explain this difference between the recorded data and his own perception.
[8] Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation, known as SERA (Version in force on the day of the incident).

avoidance advice on request. This provision is the subject of a communication campaign by the French civil aviation safety directorate (DSAC) via ad hoc posters[9].

Figure 2: DSAC airspace poster

2.6 Use of transponder

Article SERA 13001 requires the crews of aircraft carrying a transponder, to operate it at all times during flight with a specific code specified in article SERA 13005 (7000 in the absence of VFR air traffic services). It specifies that aircraft without sufficient electrical power supply (as is the case for gliders) are exempted from the requirement to operate the transponder at all times, "*Except for flight in airspace designated by the competent authority for mandatory operation of transponder*."

In France, the Order of 21 June 2001, amended in 2010 and still in force at the time of publication of this report, specifies[10] that the carriage of a transponder, mode A+C with an altitude encoder or a mode S transponder, level 2, at least with an altitude encoder, is compulsory for all aircraft:

- In class B, C and D airspace.
- To follow certain routes or to enter certain airspaces made known to users by means of aeronautical information[11].
- To carry out a night flight other than local.

Note: If national provisions conflict with European provisions, then the latter supersede the former. If the national provisions clarify or complement the European provisions, then both types of requirements may apply at the same time. The provisions of the Order of 21 June 2001, amended in 2010, are currently considered complementary to those of SERA and therefore remain applicable. However, an update of this Order is planned in the near future.

[9] Certain posters are available on the Direction Générale de l'Aviation Civile website.

[10] Although pre-dating the entry into force of the SERA, its provisions had not been repealed and remained applicable over national territory.

[11] Such as Transponder Mandatory Zones (TMZ), as specified in SERA 6005 (b).

Directives concerning the activation of the transponder were recalled during the DGAC "Be seen, see and avoid" symposium on 29 November 2018[12] and an airspace poster clearly indicates that activating the transponder is an obligation (see Figure 3).

Figure 3: DSAC airspace poster

Contrary to the explicit wording of the SERA, which differentiates between the notions of carrying and activating transponders, the French regulations in force at the time of the incident only mention the obligation to carry a transponder and seem to assume an obligation to activate it, as can be seen, in particular, on the DSAC poster published at the time of the "Be seen, see and avoid" symposium.

The "see and avoid" principle was mentioned in a recent BEA report[13].

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability.

Scenario

The pilot of the glider entered the Basel class D TMA 3 and flew within it for around 20 min without making any radio contact or activating his transponder. In a left turn at an altitude of 4,600 ft, the glider's flight path entered into conflict with that of the Challenger 300 being radar vectored to its destination of Basel-Mulhouse airport. In a descending left turn during the approach, the crew of the aeroplane saw the glider and carried out an evasive manoeuvre. As the glider pilot had not activated his transponder, the aeroplane's TCAS did not detect the presence of the glider and thus the conflicting flight paths. In addition, in the absence of radio contact, mandatory in Basel TMA 3, the air traffic controllers were not aware that the glider pilot was flying through this airspace and did not ask him to activate his transponder.

[12] Summary document of symposium (in French).

[13] Serious incident to the Diamond DA42 registered F-HCTA and the Rolladen Schneider LS8 registered HB-3284 on 27 July 2016 at Pont-sur-Yonne.

As not all of the glider's flight path data was retrieved, it was not possible to determine and confirm the vertical and horizontal distances between the glider and the aeroplane estimated by the pilots.

Contributing factors

The following factors contributed to the near collision between the glider and the aeroplane:

- The glider pilot's incursion into the class D TMA without radio contact.
- The non-activation of the transponder in class D airspace in which the DGAC had not decided that its use was mandatory - the SERA regulations allowing for this possibility.

The aeroplane crew's monitoring of the outside environment during the approach meant that the collision between the two aircraft was avoided. This serious incident confirms not only the importance of monitoring the outside environment, even for pilots performing flights under IFR, but also and above all, the benefit of using the transponder for all flights.

The BEA investigations are conducted with the sole objective of improving aviation safety and are not intended to apportion blame or liabilities.