Bundesstelle für
Flugunfalluntersuchung

German Federal Bureau of
Aircraft Accident Investigation

Investigation Report

Identification

Type of Occurrence:	Incident
Date:	28 April 2018
Location:	Bremgarten Special Airfield
Aircraft 1:	Airplane
Manufacturer:	Dassault-Breguet
Type:	Mystere Falcon 900B
Aircraft 2:	Airplane
Manufacturer:	Beech Aircraft Corporation
Type:	Beech B36TC
Injuries to persons:	No injuries
Damage:	None
Other Damage:	None
State File Number:	BFU18-0476-EX

Abstract

A Dassault Falcon 900B approached Bremgarten Special Airfield, opposite to the active landing direction, without radio contact. At the time of the occurrence, the pilot of a Beech 36TC on final approach to the active landing direction conducted a go-around procedure in order to avoid collision.

Factual Information

History of the Flight

At 1704 hrs[1], the Beech 36TC was on final approach to runway 05, active at the time, of Bremgarten Special Airfield. The pilot was in radio contact with the Flugleiter (A person required by German regulation at uncontrolled aerodromes to provide aerodrome information service to pilots) and requested landing information. Just ahead of runway 05 the pilot noticed oncoming traffic.

At the time, a Dassault Falcon 900B, with two persons on board, which had taken off at Catania-Fontanarossa Airport, Italy, was on final approach to runway 23. The Beech B36TC pilot informed the Flugleiter on frequency 124,030 MHz about his sighting. The Flugleiter answered that he was not in radio contact with the Falcon 900B flight crew.

The CVR recording of the Dassault Falcon 900B shows that the flight crew noticed about 5 min south of the airport that another arrival aerodrome had been selected in the flight management system. The PIC, who was also Pilot Flying (PF), corrected the entry and performed the respective approach briefing including the landing distance calculation for runway 05. The co-pilot, who was also Pilot Monitoring (PM), attempted to contact the Flugleiter at Bremgarten Special Airfield 3 min prior to landing: “Bremgarten local approach [Call Sign] is currently 5 miles to the south east inbound to land runway 23 in Bremgarten.” Approximately 30 s later, the PF requested the first landing flap position and the PM asked, if the speed brakes[2] could be retracted again. The PF answered in the negative.

About 1:15 min prior to landing, the PF asked the PM to extend the landing gear. At this time, the PF said to the PM that he should observe the airspace. The PF steered the airplane to the final approach of runway 23. The PM asked the PF: “We land on 05 or we have to go down wind?”. The PF said that he intended to land on runway 23. Then the PM asked: “We are going to land 23 with tailwind?”. Which the PF answered with: “It‘s a crosswind”. Another approach briefing for runway 23 was not performed. One minute prior to landing, the PM reported on radio frequency 122,000 MHz that they were on final approach to runway 23: “Bremgarten control, is

[1] All times local, unless otherwise stated.
[2] Speed brakes are a type of flight control surfaces used on an aircraft to increase drag or the angle of approach during landing.

on a final for runway 23 at Bremgarten." According to NOTAM, on 1 January 2018, this radio frequency was changed to 124,030 MHz.

Approximately 35 s prior to landing, the Gear Warning sounded. About 10 s prior to landing, the Sink Rate Warning sounded four times and shortly afterwards the Minimum Warning. At about 100 ft AGL, the PM completed the landing checklist. Just before touch-down, the PF noticed oncoming traffic: "Guy is coming right at us."

The Beech 36TC pilot saw the oncoming airplane and decided to perform a go-around procedure to the north, in agreement with the Flugleiter. The Falcon 900B flight crew continued the approach to runway 23 and landed at 1705 hrs. During the go-around procedure, the Beech 36TC pilot overflew the Dassault Falcon 900B, which had begun rolling on runway 23 at the time. The radar data shows a vertical distance of about 225 ft. The Flugleiter never had any radio contact with the Falcon 900B flight crew

Personnel Information

Falcon 900B Flight Crew

Pilot in Command

The 52-year-old PIC held an Air Transport Pilot Licence (ATPL(A)) issued on 14 May 2008 by the Federal Aviation Administration (FAA). The licence listed the ratings for the aircraft types CE-500, CE-650, DA-10, Dassault Falcon DA-20, Dassault Falcon DA-50, Dassault Falcon DA-900, G-1159, 1A-Jet, LR-Jet and Single-Engine Land.

The last medical examination took place on 15 December 2017. The class 1 medical certificate listed the limitation „Must wear corrective lenses, possess glasses for near/intermediate vision. Not valid for any class after 31 December 2018".

The PIC had a total flying experience of 13,015 hours, of which about 2,235 hours were flown on Dassault Falcon 900B.

Co-pilot

The 43-year-old co-pilot held an ATPL(A) issued on 23 November 2013 by the FAA. The licence listed the ratings for the aircraft types Dassault Falcon DA-50, Dassault Falcon DA-1159, 1A-Jet, SF340 and Multi-Engine Land.

The last medical examination took place on 27 November 2017. The class 1 medical certificate listed the limitation “Must wear corrective lenses“.

The co-pilot had a total flying experience of 12,610 hours, of which 1,652 hours were flown on Dassault Falcon 900.

Beech 36TC Pilot

The 70-year-old pilot held an EU Private Pilot Licence (PPL(A)) issued on 9 October 2013 by the Luftfahrt-Bundesamt in accordance with Part-FCL. The licence listed the rating for Single Engine Piston land (SEP(Land)) as PIC, valid until 30 September 2019. In addition, the rating for SEP(Land) under instrument flight rules (IR) was listed. It was valid until 30 September 2018.

His class 2 medical certificate, with the limitation VML (correction for defective distant, intermediate and near vision), was issued on 18 January 2018 and valid until 29 January 2019.

According to his personal pilot log book, he had a total flying experience of 2,902 hours, up until 21 May 2018.

Aircraft Information

Dassault-Breguet Mystere Falcon 900B

The Dassault-Breguet Mystere Falcon 900B is a short and medium range transport aircraft equipped with three turbofan engines.

Manufacturer	Dassault-Breguet
Type	Mystere Falcon 900B
Year of manufacture	1988
Manufacturer’s serial number	045
Operating Time	9,340 hours
Landings	6,212
Maximum Take-off Mass	20,640 kg
Engine type	TFE731-5BR-1C

The aircraft was registered in the United States of America and operated in commercial passenger transport.

The operator had provided the Deferred Maintenance Item Tracking[3] list of the aircraft. There were no entries of any technical faults.

Beech Aircraft Corporation - Beech 36TC

The Beech 36TC is a single engine low-wing aircraft in aluminium construction. It was operated by a private operator.

Manufacturer	Beech Aircraft Corporation
Type	Beech 36TC
Year of manufacture	1992
Manufacturer's serial number	EA543
Operating Time	2,674 hours
Maximum take-off mass	1,755 kg
Engine Type	Continental TS10-520-21B

The aircraft had a German certificate of registration and was used for private flights. A maintenance organisation performed the required inspections of the airplane, the engine and the propeller. The inspections were performed within the required intervals.

Meteorological Information

At the time of the incident it was daylight. At Bremgarten Special Airfield weather data was not recorded. According to the statement of the aerodrome operator, the weather was assessed with CAVOK. The wind came from a northern direction with 8 kt. The aviation routine weather report (METAR) of EuroAirport Basel Mulhouse Freiburg of 1700 hrs was used to assess the weather at the region.

> At 1700 hrs, runway visibility range was more than 10 km. Wind direction was 010° with 09 kt. Could was 1/8-2/8 at 5,300 ft, 5/8-7/8 at FL170 and FL260. Temperature was 20°C, dewpoint 9°C, and QNH 1,010 hPa.

[3] The FAA defines Deferred Maintenance as “the postponement of the repair or replacement of an item of equipment or an instrument.”

Aids to Navigation

The approaches of both airplanes were conducted under VFR, without the use of ground aids to navigation.

Radio Communications

Radio communications between the Flugleiter at Bremgarten Special Airfield and the Beech 36TC pilot were conducted in German. Transcripts of these recordings were made available to the BFU.

Radio communications between the Falcon 900B flight crew and Zurich Area Control Centre (ACC) was conducted in English. The transcript and audio flies were made available for investigation purposes. The transcript and the CVR recording show that the Falcon 900B flight crew never had any radio contact with the Flugleiter of Bremgarten Special Airfield.

The transcript shows that he flight crew, in agreement with Zurich ACC, terminated the IFR part of the flight plan in the area of the radio beacon Hochwald, about 4 min. prior to landing.

Shortly before leaving the frequency, the PM asked about the frequency for Bremgarten Special Airfield: “[…] and the frequency for Bremgarten local is 122,0 correct?”.

Zurich ACC corrected the radio frequency “[…] 124,030, you can leave frequency, bye bye“.

Aerodrome Information

Bremgarten Special Airfield is located about 1.6 NM west of Eschbach and 2 NM south of Hartheim. Aerodrome elevation is 695 ft AMSL. The special airfield is equipped with an asphalt runway of 1,650 m length and 45 m width, with the directions 051°/231° (05/23). A grass strip, located north of the runway, of 600 m length and 30 m width with the directions 051°/231° (05/23) was also available.

The special airfield was certified for aircraft with a maximum take-off mass of up to 20 t. Take-off and landing had to occur in accordance with VFR. According to the statement of the Flugleiter, the operator had received off-field take-off and landing permission issued by the responsible aeronautical authority, Regierungspräsidium Stuttgart Strassenwesen und Verkehr.

Excerpt of this permission:

> […]
>
> In accordance with § 25 of the Federal Aviation Act (LuftVG) in combination with § 18 of the German Aviation Regulation (LuftVO) and § 24 LuftVO, the Chicago Jet Group, Sugar Grove, Illinois 60554 is allowed and approved to, with the aircraft
>
> - of the type Falcon 900, registration mark: XXX[4]
> - with their pilots
> - at Bremgarten Special Airfield
> - Purpose of the flights: Executive Flight
>
> Between 28 April 2018 and 30 May 2018 to land and take-off once.
>
> […]

On 1 January 2018, the frequency of Bremgarten Info changed from 122,000 MHz to 124,030 MHz. The Aeronautical Information Publication published the relevant NOTAM and updated aerodrome charts.

Due to the occurrence on 28 April 2018, the aerodrome operator sent another NOTAM on 8 May 2018 to Deutsche Flugsicherung GmbH for publication.

Flight Recorders

The Falcon 900B was not equipped with a FDR; which was not required by aeronautical regulations (14 CFR 135.152[5]).

Information on the Falcon 900B CVR:

Manufacturer CVR	L-3COM
Model	FA 2100
Part Number	20100-1020-00
Serial Number	211

[4] Aircraft of occurrence
[5] Code of Federal Regulations, Title 14 - Aeronautics and Space Chapter I - Federal Aviation Administration, Department of Transportation, Subchapter G; Subpart C Section 135.152 - Flight data recorders; January 1, 2011

After the CVR had been seized, the data was read out at the BFU flight data recorder laboratory.

The recorder did not show any damage.

Four audio channels with 30 minutes of recording length and one with 120 minutes mixed and area channel recordings were available. Audio channel 2 recorded the cockpit communication.

The audio quality was assessed as “good”. Audio channels 1 and 3 recordings were empty.

Flightpath

Figure 1 shows the aerodrome chart (AIP, of 12 December 2017) of Bremgarten Special Airfield and the approximate flight paths of both aircraft. It is based on the written description of the Beech 36TC pilot and the radar data of the Falcon 900B, which the air navigation service provider at Strasbourg, France, had recorded.

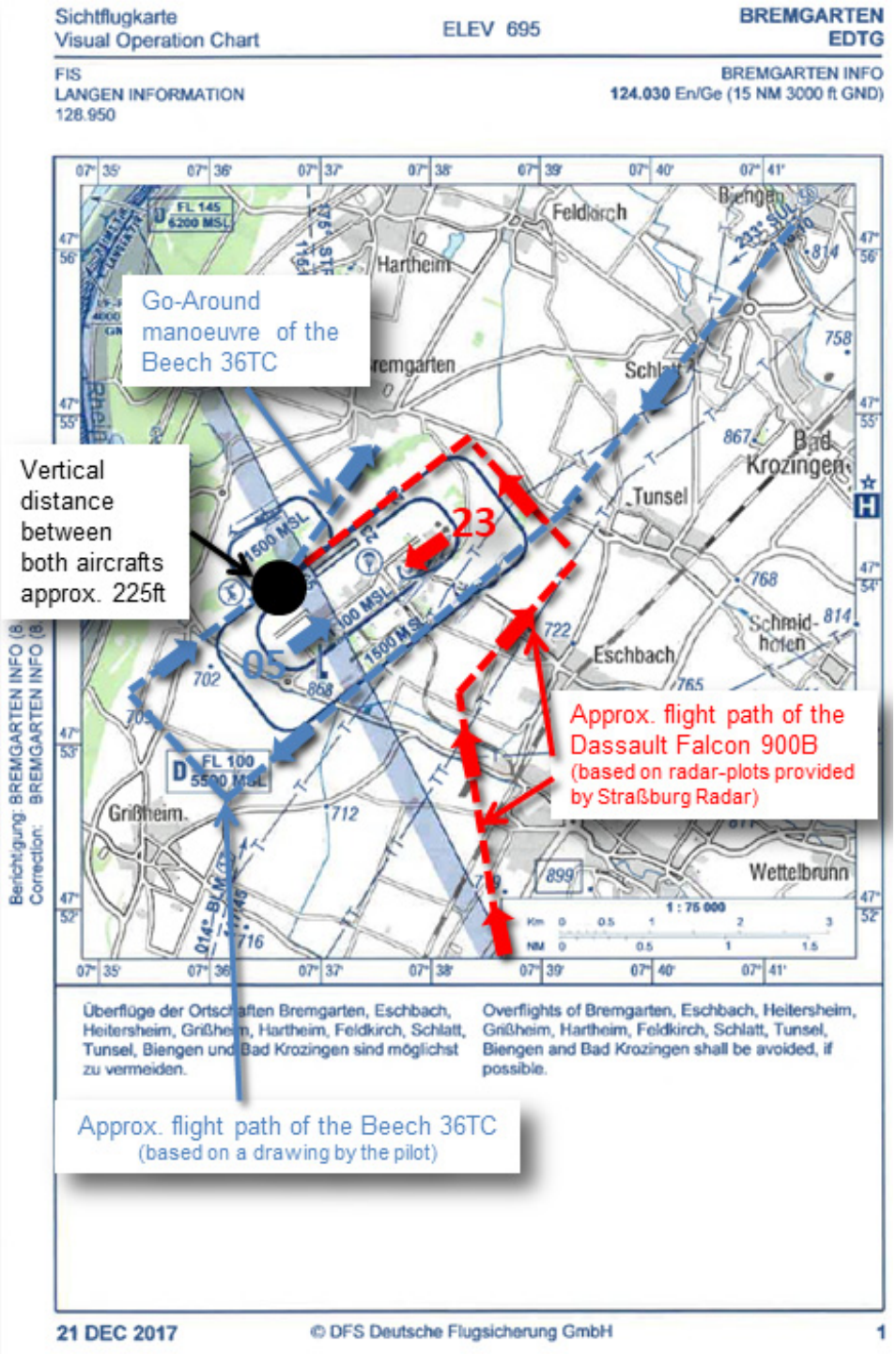

Fig. 1: Aerodrome chart with approximate flight paths of both airplanes Source: AIP, adaptation BFU

Fire

There was no fire in flight or on the ground.

Additional Information

Operator Procedures

The BFU was not provided with any documentation regarding the operator's procedures (e.g. pre-flight preparation of the flight crew, crew coordination, approach pre-flight procedures at uncontrolled airports, etc.)

Stabilized Approach Criteria

The operator provided the BFU with an excerpt of the training handbook "Part 135 Trainings Program, Falcon Series DA-50, Flight Maneuvers", Revision 13, 20 December 2016. The following is an excerpt of the training handbook with the criteria for a stabilized approach.

PART 135 TRAINING PROGRAM *FALCON SERIES [DA-50]* *FLIGHT MANEUVERS*

STABILIZED APPROACH

This training program uses the stabilized approach concept. All approach profiles (VMC/IMC) listed in this chapter are based upon achieving a stabilized approach, as depicted in the Flight Safety Foundation Approach-and-Landing Accident Reduction (ALAR) Tool Kit, Section 7.1. All flights must be stabilized by 1,000' above the airport elevation in instrument meteorological conditions (IMC) and by 500' above the airport elevation in visual meteorological conditions (VMC). An approach is stabilized when **all** of the following criteria are met:

1. The aircraft is on the correct flight path;
2. Only small changes in heading/pitch are required to maintain the correct flight path;
3. The aircraft speed is not more than V_{REF} + 10 KT indicated airspeed and not less than V_{REF};
4. The aircraft is in the correct landing configuration;
5. Sink rate is no greater than 1,000' per minute; if an approach requires a sink rate greater than 1,000' per minute, a special briefing should be conducted;
6. Power setting is appropriate for the aircraft configuration and is not below the minimum power for approach as defined by the aircraft operating manual;
7. All briefings and checklists have been conducted;
8. Specific types of approaches are stabilized if they also fulfill the following:
   a. Instrument landing system (ILS) approaches must be flown within one dot of the glideslope and localizer
   b. A Category II or Category III ILS approach must be flown within the expanded localizer band
   c. During a circling approach, wings should be level on final when the aircraft reaches 300' above airport elevation;
9. Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

An approach that becomes unstabilized below 1,000' above airport elevation in IMC or 500' above airport elevation in VMC requires an immediate missed approach or go-around.

Fig. 2: Stabilized approach criteria of the operator Source: Operator

Visual Approach Procedures

BFU Study 803.1 - 17

In 2017, the BFU published the Study Concerning Airproxes and Collisions of Aircraft in German Air Space 2010 - 2015. The following is an excerpt:

> *1.2.4 Visual and Instrument Flight Rules and „See and Avoid“ Principle*
>
> *Small aircraft and aerial sports equipment (General Aviation) mostly use Visual Flight Rules (VFR) in low altitudes in the uncontrolled Airspace G and the controlled Airspaces D and E. During low level flight military aircraft are also flying in accordance with VFR. Commercial flights with large transport aircraft and business aviation are generally conducted in accordance with Instrument Flight Rules (IFR).*
>
> *Visual Flight Rules*
>
> *Visual Flight Rules (VFR) are a set of regulations for VFR flights. Typically, VFR flights are not separated from other air traffic by any air traffic control unit. The “See and Avoid” principle applies. Therefore, observing the airspace is one of the most important tasks of the pilot. This is especially true for flight operations in the vicinity of an airport and in a traffic pattern with increased traffic volume. […]*
>
> *See and Avoid is subject to a number of limitations such as light intensity, contrast, view constriction from the cockpit due to design, approximate angle and speed, personal visual performance and reaction time. […]*

Rules of the Air of Aircraft

The Official Journal of the European Communities L 281/1 of 30 October 2012 listed the Commission Implementing Regulation (EU) No. 923/2012. SERA.3210 - Standardised European Rules of the Air stipulated the right-of-way for aircraft and SERA.3225 flight operations at airports and their vicinity.

Excerpt:

SERA.3210 Right-of-way

> *[…] c) An aircraft that is obliged by the following rules to keep out of the way of another shall avoid passing over, under or in front of the other, unless it passes well clear and takes into account the effect of aircraft wake turbulence.*

1. Approaching head-on. When two aircraft are approaching head-on or approximately so and there is danger of collision, each shall alter its heading to the right. […]

[…] 4. Landing an aircraft in flight, or operating on the ground or water, shall give way to aircraft landing or in the final stages of an approach to land. […]

SERA.3225 Operation on and in the vicinity of an aerodrome

An aircraft operated on or in the vicinity of an aerodrome shall:

(a) observe other aerodrome traffic for the purpose of avoiding collision;

(b) conform with or avoid the pattern of traffic formed by other aircraft in operation;

(c) except for balloons, make all turns to the left, when approaching for a landing and after taking off, unless otherwise indicated, or instructed by ATC;

(d) except for balloons, land and take off into the wind unless safety, the runway configuration, or air traffic considerations determine that a different direction is preferable.

Aerodrome Traffic at Bremgarten Special Airfield

The NFL I 247/10, 2 December 2010, Item 2 recommended the following for traffic pattern:

[...] airplanes, aero tow, powered gliders with engine running and ultralight aircraft, approaching the asphalt runway use the outer south-eastern traffic pattern for airplanes at 1,500 ft MSL. […]

Take-off and Landing Mass

Para 22a of the Air Traffic Order (LuftVO), of 29 October 2015, regulates flight operations with airplanes for commercial passenger transport or goods.

(1) The pilot of an airplane with a maximum take-off mass of more than 14,000 kg shall take-off or land at an airport of the sovereign territory of the Federal Republic of Germany for a commercial passenger or goods flight, only if:

1. Instrument departure procedures and instrument approach procedures are stipulated and

2. air traffic control is present.

(2) The local aeronautical authority may grant exceptions from subpart 1 if any danger of the safety of air traffic is not to be expected. These exceptions may be restricted, limited or conditional.

Pre-flight Preparation

The Federal Aviation Administration's document 14 CFR Subpart B – Flight Rules of 6 October 2006 published the following under § 91.103 Pre-flight Action:

Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include

(a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements. […]

(b) For any flight, runway lengths at airports of intended use, and the following take-off and landing distance information. […]

Landing at Airports without Radio Contact

Controlled airports are equipped with an aerodrome control service and an active control zone to handle traffic volume. The Tower Controller usually controls approaching, departing and passing traffic.

At uncontrolled airports, traffic control does not occur. Each pilot is responsible for the adherence to a safe distance and the positioning within the aerodrome traffic. A Flugleiter at an airport transmits information, but does not have any control authority.

The Advisory Circular - Subject: Non-Towered Airport Flight Operations, AC N:90 - 66B, of 18 March 2018 stated the following:

[…] 9.7 No-Radio Aircraft

Pilots should be aware that procedures at airports without operating control towers generally do not require the use of two-way radios; therefore, pilots should be especially vigilant for other aircraft while operating in the traffic pattern. Pilots of inbound aircraft that are not capable of radio communications should determine the runway in use prior to entering the traffic pattern by observing the landing direction indicator, the wind indicator, landing and departing traffic, previously referring to relevant airport publications, or by other means. […]

Tasks and Authority of a Flugleiter

The Hessische Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung (regional aviation authority) issued a model departmental note (V 6-F-61-m-52-15-06) in which the tasks and the authority of a Flugleiter at an uncontrolled airport were described.

> *[...] 3.4.1 The Flugleiter is authorised and obligated in the scope of his tasks to give information to participants of air traffic and third parties and - if required- to issue instructions in hazardous situations. […]*
>
> *3.4.3 The instructions of a Flugleiter are required if they serve a) to maintain safe and proper airport operations or b) to ensure adherence to the valid regulations for air traffic at the airport and its vicinity.*
>
> *3.4.4 Subject of the instructions:*
>
> *a) Instructions according to property rights, e.g. determining runway direction depending on wind conditions or determination of the runway to be used,*
>
> *b) Take-off and landing prohibition [...]*
>
> *4.4.2 The Flugleiter provides supporting information for the pilot in command and information concerning*
>
> *a) aerodrome traffic at the airport and its vicinity, especially landing direction and traffic volume*
>
> *b) operation directions and equipment of the airport and their changes,*
>
> *c) known important conditions and operating time changes of the surrounding aids to navigation*
>
> *d) other circumstances which are important for the safe operation of aircraft in flight or on the ground (e.g. visibility and wind conditions, flock of birds or bird migration in the area of the airport).*
>
> *4.4.3 The Flugleiter supports the pilot in command with filing a flight plan with the DFS unit responsible, obtaining air traffic control clearances and weather information as well as the delivery of runway reports.*
>
> *4.4.4. On request of the air traffic control unit, the Flugleiter transmits air traffic control instructions and air traffic control information to pilots. […]*

Regulation at Bremgarten Special Airfield

The NFL 1-1601-19 Flugplatzbenutzungsordnung (the rules governing the airport) for Bremgarten Special Airfield EDTG of 4 April 2019 stipulated the following in regard to take-off and landing equipment:

> *[...] 2.3 Take-off and Landing Equipment*
>
> *For take-off, landing and taxiing, the runways and the taxiways and other especially marked areas are to be used. The pilots are bound to the instructions of the Flugleiter or Aviation Supervision Office. […]*

Radio Communications at Uncontrolled Airports

In 2000, the Deutsche Flugsicherung (German air navigation services provider) published the German Language Publication for Aviation NFL Teil II 37/2000 „Grundsätze des Bundes und der Länder für die Regelung des Flugverkehrs an Flugplätzen ohne Flugverkehrskontrollstelle (Elementary laws of the Federal Government and the Countries regulating air traffic at uncontrolled airports). Chapter 3.3. Radio Communications described the following:

> *[...] Important basics and phraseology for radio communications in VFR operation are published in the Aeronautical Information Publication VFR.*
>
> *During approaches, at least 5 min. prior to reaching the airport, radio communications with "INFO" has to be established. Depending on the type and scale of the aerodrome traffic, the flight operations regulations may stipulate that at least prior to entering the base leg all pilots have to report this unbidden. […]*

The airport regulations of Bremgarten Special Airfield[6] stipulated under General the following:

> *[...] During aerodrome traffic, willingness to listen has to be maintained. […]*

[6] NFL I 157/09, 18. June 2009

Analysis

Persons

Dassault Falcon 900B Flight Crew

The Dassault Falcon 900B pilots held the required and valid licences to conduct the flight.

Beech 36TC Pilot

The PIC held the required and valid licence to conduct the flight.

Actions of the Persons Involved

Falcon 900B Flight Crew

Flight Management System Entry

Due to the entry of the wrong aerodrome of destination in the Flight Management System, and the correction only 5 min prior to landing, it is highly likely that the flight crew became aware that the remaining distance would be decreased.

Because of the entry error and the reduced flight distance, the flight crew had to act accordingly in order to adhere to the flight path the Flight Management System had calculated. It is highly likely that at the time Crew Resource Management was limited due to stress and essential tasks, such as approach briefing and airspace observation, were neglected. One option would have been to lengthen the flight path, e.g. by flying a holding pattern close to the airport, to have more time to complete the corresponding tasks.

Decision of the Approach Direction

The stress in the cockpit was increased by the PF's spontaneous decision to approach runway 23. The CVR recording does not give any indication as to the motivation of the PF's decision. The recording does, however, indicate that the PM was surprised by this decision. The PF did not conduct another approach briefing including go-around procedure.

Since it was an uncontrolled airport, aerodrome traffic had to be observed. That the Beech 36TC approaching runway 05 was not observed shows that they did not observe the airspace with necessary care. The Falcon 900B flight crew has not

adhered to the Standardised European Rules of the Air, the right of way rules and the rules of the special airfield.

Stabilised Approach Criteria

The CVR recording shows that the approach to runway 23 was not conducted in accordance with the stabilised approach criteria stipulated in the training handbook, “Part 135 Trainings Program, Falcon Series DA-50, Flight Maneuvers“, Revision 13. Landing configuration was established very late which resulted in a Gear Warning and a Sink Rate Warning. According to the training handbook chapter Stabilized Approach, a go-around procedure should have been performed.

The late landing configuration and the subsequent increased approach speed contributed to the fact, that the flight crew focussed on the conduct of the flight and did not observe the oncoming Beech 36TC.

Radio Communications

During the radio contact with Zurich ACC about 4 min prior to landing, the flight crew intended to receive confirmation of the correct radio frequency of Bremgarten Special Airfield (Bremgarten Info). It was no longer the correct radio frequency, but the controller transmitted the correct radio frequency. Because no radio contact with the Flugleiter at Bremgarten was established, the BFU assumes that the flight crew had selected the incorrect radio frequency during the approach, the landing and the subsequent taxiing.

During the approach the flight crew would have had the opportunity to contact Zurich ACC and ask for the correct radio frequency. But this did not occur.

Had the flight crew selected the correct radio frequency for Bremgarten Special Airfield and established radio contact, the Flugleiter could have given them the information about the active runway and the approaching traffic.

Beech 36TC Pilot

The pilot saw the oncoming Falcon 900B and decided, in agreement with the Flugleiter, to perform a go-around procedure to the north. By this action, a collision was avoided by applying the principle “See and Avoid”, as described in the BFU Study.

Flugleiter

The Flugleiter did not have any radio contact with the Falcon 900B flight crew and therefore no knowledge that they were on approach.

Aircraft

Dassault Falcon 900B

As part of the Air Operator Certificate (AOC), the aircraft was certified for commercial passenger transport. In accordance with aviation regulation, the aircraft had a certificate of registration.

The aircraft documentation did not list any technical faults which could have limited or influenced a safe flight.

The aircraft was not equipped with a FDR which was not required by FAA regulation. Therefore, the BFU was not able to reconstruct the entries of the flight crew, autopilot modes, aircraft configuration and aircraft parameters. The flight path could only be analysed based on radar data. The actions of the flight crew could only be assessed based on CVR recordings. This data is insufficient and incomplete for analysis purposes. Therefore, the BFU refers in chapter Safety Information to a FAA document.

Beech 36TC

The aircraft had a proper certificate of registration.

Weather

The weather, prevailing at the time of the occurrence, shows that visibility limitations for pilots did not exist.

Airport

Bremgarten Special Airfield had not published any approach and departure procedures in accordance with Instrument Flight Rules.

Application of Right of Way

During VFR flights, avoidance of collisions occurs in accordance with the principle “See and Avoid”. The right of way rules stipulated in the Commission Implementing

Regulation (EU) No. 923/2012 basically assume visual contact of the conflicting traffic and prescribe the conduct after “Seeing”. In the present case, the Beech 36TC was immediately ahead of the runway threshold of the active runway. The Falcon 900B was on approach to the non-active runway. Commensurate with the right of way, the Falcon 900B flight crew would have had to give the right of way to the Beech 36TC. This did not occur, however.

Conclusions

The Beech 36TC pilot was in radio contact with the Flugleiter of Bremgarten Special Airfield and saw the oncoming Falcon 900B. By initiating a go-around procedure, a collision could be avoided.

The case that radio contact between an aircraft and a Flugleiter at an uncontrolled airport is not established was neither regulated in NFL II 37/2000 nor in the AIP. The principle “See and Avoid” worked at this uncontrolled airport. In this context, the BFU refers to the Study 803.1-17 published in 2017.

Contributing Factors

- Insufficient airspace observation by the Falcon 900B flight crew.
- Selection of an invalid radio frequency. This is the result of insufficient pre-flight preparation.
- Insufficient Crew Resource Management within the crew. On the part of the PIC, there were no timely agreements concerning the planned landing direction.
- Self-generated pressure for time because of the spontaneous decision of the PIC to change the landing direction. Therefore, landing configuration was established late and resulted in an unstabilised approach.

Safety Information

Due to the fact that no Flight Data Recorder was installed, the BFU supports the document published by the Federal Aviation Administration (FAA) on 16 March 2020

Fact Sheet – FAA's Response to NTSB's "Most Wanted" Safety Recommendations", https://www.faa.gov/newsroom/faas-response-ntsbs-most-wanted-safety-recommendations

> *Recommendation A-13-13: Require all existing turbine-powered, non-experimental, non-restricted-category aircraft that are not equipped with a flight data recorder or cockpit voice recorder and are operating under 14 CFR Parts 91, 121 or 135 to be retrofitted with a crash-resistant flight recorder system. The crash-resistant flight recorder system should record cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible, and parametric data per aircraft and system installation, all as specified in Technical Standard Order C197, "Information Collection and Monitoring Systems."*

Investigator in charge:	Norman Kretschmer
Field investigation:	Pilz

Braunschweig 11 May 2022

This investigation was conducted in accordance with the regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and the Federal German Law relating to the investigation of accidents and incidents associated with the operation of civil aircraft (*Flugunfall-Untersuchungs-Gesetz - FlUUG*) of 26 August 1998.

The sole objective of the investigation is to prevent future accidents and incidents. The investigation does not seek to ascertain blame or apportion legal liability for any claims that may arise.

This document is a translation of the German Investigation Report. Although every effort was made for the translation to be accurate, in the event of any discrepancies the original German document is the authentic version.

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