

Investigation Report

Identification

Type of Occurrence:	Serious incident
Date:	9 August 2011
Location:	Near radio beacon WLD
Type of aircraft:	1. Airplane 2. Airplane
Manufacturer / Model:	1. Cessna Aircraft Company / Cessna 172RG 2. Mooney Aircraft Corporation / M 20R
Injuries to Persons:	None
Damage:	None
Other Damage:	None
Information Source:	Investigation by BFU
State File Number:	BFU 7X011-11

Factual Information

At 1204 hrs¹ an airprox between a Cessna 172RG and a Mooney M 20R occurred in airspace E about 3 Nautical Miles (NM) north-west of the radio beacon WLD (WALDA) in an altitude of 4,100 ft AMSL. The Cessna flew in accordance with

¹ All times local, unless otherwise stated.

At 1202:20 hrs at a distance of about 3 NM the STCA changed from predicted to current. The radar targets changed from yellow to red. Another acoustic signal did not occur and was not intended.

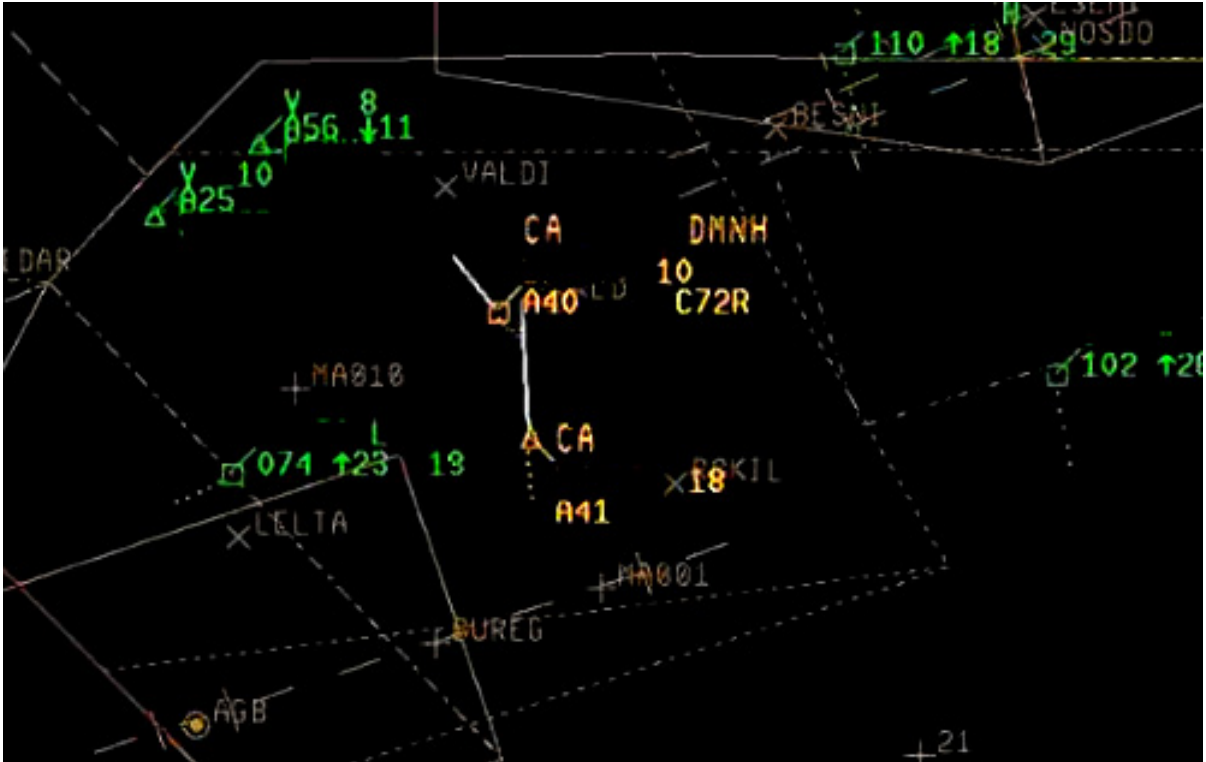


Image 2: 1202:20 hrs – Current alert

Source: Air traffic service provider

At 1203:05 hrs the Cessna crew reported "(...) ready for approach after completing this holding" and at 1203:09 hrs received a clearance for a standard instrument approach to runway 25: "... after completion of the holding you are cleared for the standard ILS runway 25". At the time, the Cessna had a heading of about 310°. Shortly afterwards the crew initiated a right-hand turn. At the time the distance between the two aircraft was about 2 NM.

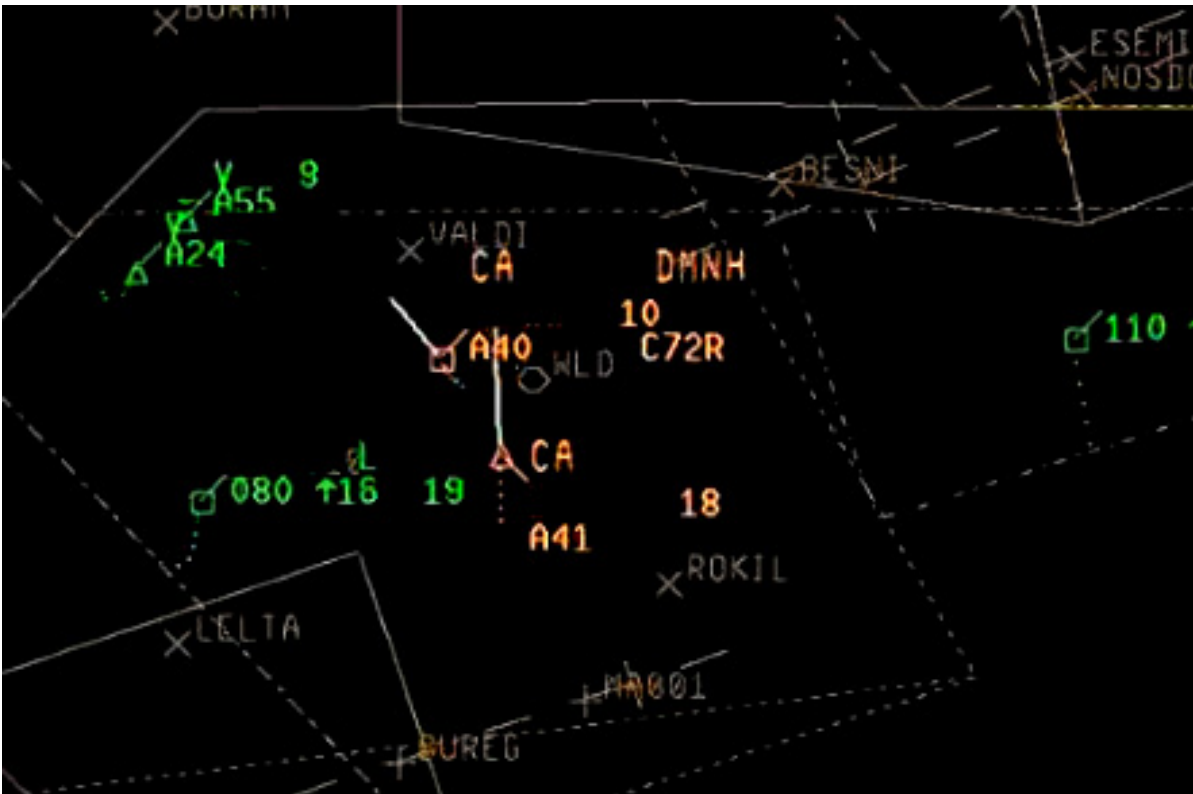


Image 3: 1203:05 hrs

Source: Air traffic service provider

At 1204:14 hrs while the Cessna was just about passing 060° the airprox with the Mooney occurred. At 1204:17 hrs the flight instructor subsequently informed the controller who had just taken over the position about the occurrence. He answered: "... roger, you are inside airspace E".

Prior to the airprox the Cessna crew had not received traffic information. The flight instructor stated he had seen the Mooney "just about to the right ... in the same altitude". The airprox had been so extreme that an avoidance manoeuvre had not been possible. He had informed the student pilot who then had looked up from his instruments and turned his head to the left. The student pilot stated he could not remember whether or not he had flown with the IFR training glasses - which only allow the view to the instruments but not outside - at the time of the airprox. He had seen the Mooney as "it flew from the rear right to the front left below (the Cessna)". The distance had been very small.

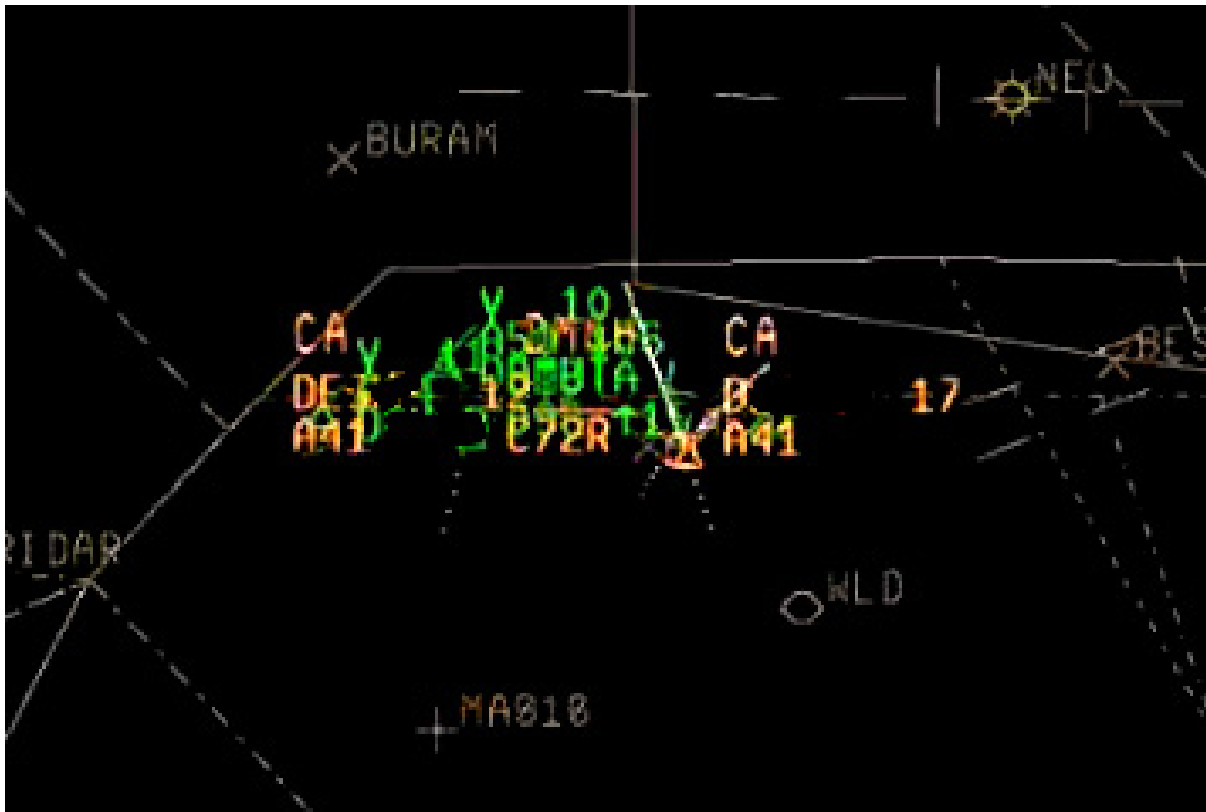


Image 4: 1204:14 hrs - Time of the closest proximity

Source: Air traffic service provider

The Mooney conducted a VFR flight from Bolzano, Italy, to Coburg, Germany. One pilot and two passengers were aboard. At the edge of the control zone Augsburg, the pilot of the Mooney noticed a Cessna 172 which was about 2 NM left in similar altitude and about to cross the Mooney's flight path. The traffic warning system of the Mooney (TCAD9900B) showed the Cessna 100 ft below. The pilot of the Mooney did not see the need for an avoidance manoeuvre because she was coming from the right, flew a little higher and could observe the Cessna and its flight path very well the entire time. The Cessna had then crossed the flight path below and been in sight at all times.

The passenger in the left back seat of the Mooney stated the other airplane had been indicated on the traffic warning system in the same altitude coming from the left. Due to the good visibility below the cloud base it had been possible to visually recognise the Cessna very early on. It then crossed the Mooney's flight path behind and below the airplane.

Both airplanes continued their flights.

While the airprox was happening the controllers conducted their shift change at the work station in question. The persons involved stated that due to the complexity it had taken 10 minutes to complete. The controller still on duty had been busy with radio communication and traffic observation during the entire time of the shift change.

The incoming controller stated he had taken a seat next to the outgoing controller to become familiar with the situation. The situation at the work station was characterised by a high complexity due to weather-related flight path deviations of the controlled airplanes and the interference by multiple radio communications. The approach sectors Munich North High and Low had been combined. The interviewees stated this combination was normal. Munich High was used as "Überlauf" (overflow) if traffic is very high or the weather is very unfavourable. When questioned about the weather-related flight path deviations, the controller stated that one hour before there had been no prediction and the bad weather had come as a surprise. The question whether the work load had increased significantly due to the flight path deviations she answered with yes. She negated the question, however, whether a separation of the sectors would have been useful. To the question as to how long it would take to open Munich High she said it would take at least five minutes. First of all, the supervisor has to be informed. He then would have to get someone with the appropriate ratings. There was not always someone on duty. The controller judged the traffic volume as medium and rather complex.

To the question why she did not give the Cessna any traffic information she said she did not have the time and did not notice the airprox. She had been busy with the remaining traffic, the interference by multiple radio communications, the weather-related flight path deviations and making sure the arriving traffic is handed over to final approach control in time and in the right altitude. At the same time the shift change with the incoming controller took place.

To the enquiry how she viewed the task to give traffic information in airspace E regarding VFR traffic, she said: "Any time, if it is possible." On enquiry she added: "If I see it and have the time - if traffic permits."

During the interview the controller could not remember whether she had visually realised the STCA. She could not remember whether she had heard a warning signal.

She further stated that in the area where the airprox took place it was difficult to identify VFR targets. As justification she stated that these were often not provided

with an altitude indication or there was an overlapping of the labels (information regarding destination, altitude, transponder, etc.).

Label overlap can sometimes prevent access to important flight information. Partly, labels interfere with other targets.

Personnel Information

Cessna 172RG Crew

Flight Instructor

The 71-year-old flight instructor held an Airline Transport Pilot's License (ATPL(A)) issued by the Luftfahrt-Bundesamt (German civil aviation authority, LBA), in accordance with ICAO and JAR-FCL valid until 19 September 2015. He had a flying experience of more than 26,000 hours.

Student Pilot

The 43-year-old student pilot held a Private Pilot's License (PPL(A)) issued by the Luftamt Südbayern, Germany, in accordance with ICAO and JAR-FCL valid until 14 May 2014. He had a flying experience of 322 hours.

Mooney M 20R Crew

The 43-year-old pilot held a Private Pilot's License (PPL(A)) issued by the Luftamt Nordbayern, Germany, in accordance with ICAO valid until 9 July 2014. She had a flying experience of 187 hours.

Air Traffic Control

The 40-year-old controller held an air traffic controller licence issued in accordance with ICAO by the Federal Supervisory Authority for Air Navigation Services valid until 4 August 2012.

Aircraft Information

Cessna 172RG

The aircraft is a four-seat, single-engine, high-wing airplane with retractable landing gear. The aircraft had a valid German certificate of registration and was operated by a German flight training organisation.

Mooney M 20R

The aircraft is a four-seat, single-engine, low-wing airplane with retractable landing gear. The aircraft had a valid German certificate of registration.

The airplane was equipped with a navigation system (Garmin GNS 530) and a traffic warning system (TCAD9900B). This system provides information including altitude indication on other aircraft in the area fitted with a transponder.

Meteorological Information

The aviation routine weather report (METAR) of 1120 hrs of Neuburg/Donau Military Airfield documented the following weather conditions: Ground visibility was more than 10 kilometres, wind 260°/15 kt, cloud base 3,200 ft AGL with 5 to 7 oktas high piled up cumulus clouds, light rain showers

The METAR of Augsburg Airport of 1150 hrs documented the following weather conditions: Ground visibility was more than 10 km, wind 240°/14 kt, cloud base 2,500 ft AGL with 1 to 2 oktas. Another cloud layer was in 9,000 ft AGL with 5 to 7 oktas.

The flight instructor in the Cessna stated at the place of the occurrence the cloud cover was broken with a lower limit of 4,500 ft AMSL. Visibility had been more than 10 km.

Communication

The air traffic service provider in question recorded radio communications and made them available as transcript and sound file for investigation purposes.

The Cessna crew had radio contact with Munich Radar.

The Mooney crew did not have radio contact with any air traffic control unit.

There was no audio recording of the control centre of the air traffic service provider.

Flight Recorders

The radar recordings of the air traffic service provider were available for the investigation.

Airspace

Airspace E is a controlled airspace in which flights in accordance with Instrument Flight Rules (IFR) and flights in accordance with Visual Flight Rules (VFR) take place. IFR flights are separated to each other but not to VFR flights. As far as possible, IFR flights receive traffic information regarding VFR flights. VFR flights receive traffic information, if possible, if they are in contact with an air traffic service provider (e.g. FIS).

In addition, for VFR flights the following is required: A flight visibility of 8 km, distance from clouds 1.5 km horizontally and 1,000 ft vertically. Above 5,000 ft AMSL a transponder is required.

Organisations and their Procedures

The Manual of Operations Air Traffic Services (MOATS) regulates the use of radar by air traffic service providers. Item 421.1 states: *"Radar shall be used by an ATC unit to: (...) assist pilots (...), in special situations and by issuing traffic information."* The MOATS defines traffic information as *"Information issued by an air traffic service unit to alert a pilot to other known or observed air traffic which may be in the proximity to the position or intended route of flight and to help the pilot to avoid a collision."*

Item 223.1 states: "Radar controllers / executive controllers shall, in particular, perform the following tasks: (...) monitor the progress of flights; issue information to aircraft about unknown targets and adverse weather areas which are observed on the radar screen, if deemed necessary and permitted by the current workload situation; aircraft shall be vectored around such areas upon request. (...)"

ICAO Annex 11 stipulates the following for airspace E:

"IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as is practical. Class E shall not be used for control zones."

Analysis

All persons involved held the required licenses. Technical deficiencies were neither determined on the aircraft involved nor at the air traffic control unit.

Cessna 172RG Crew

It was an IFR training flight with the intend to train holding procedures and instrument approaches. In airspace E the regular rules of the air apply for IFR flights and therefore the Cessna coming from the left would have had to give way to the Mooney coming from the right. The Cessna initiated a right-hand turn as the Mooney was in the same altitude in the five o'clock position. The design of the Cessna (high-wing airplane) and the bank angle during the right-hand turn could be the cause why the crew did not see the Mooney in time from the inside of the turn.

Mooney M 20R Crew

The pilot of the Mooney stated at a distance of about 2 NM she had the Cessna in sight. In addition, it had been displayed on the traffic warning system and there was visual contact up until the two aircraft passed each other. The pilot rated the situation as uncritical and maintained course and altitude. Maintaining course and altitude ultimately resulted in the airprox of 0.09 NM in almost the same altitude. A timely course change would have avoided the situation.

Air Traffic Control

The controller characterised the traffic situation at the time of the occurrence as medium and very complex. In addition, the shift change occurred at the same time. The work load was also increased by weather-related flight path deviations and interference by multiple radio communications.

The controller did not recognise the impending airprox. In the complex situation, the visual and acoustic warning signals of the STCA were not sufficient to draw her attention to the possible conflict. A stronger visual highlighting and an acoustic warning via the headset, during the predicted alert but more so during the current alert could have helped to draw the controller's attention to the impending conflict. The controller might have given traffic information possibly connected with an avoidance recommendation. On enquiry, she stated that the STCA acoustic warning

could not always be heard. She said, possible factors were the wearing of headsets and other background noise.

When the Cessna crew received the clearance for the instrument approach for runway 25 the radar targets of both, the Cessna and the Mooney, were red (current STCA). It can be assumed that the controller would have noticed the conflict if her focus had been on the radar target of the Cessna during the radio message.

Due to the temporary overlapping of the labels and the radar targets the indication on the radar screen was at times unclear (see image 4). The clarity on the radar screen would be considerably increased if the overlapping of information were avoided and therefore the workload would be decreased.

The answer to the question regarding the responsibility to give traffic information in airspace E ("Any time, if it is possible") and the answer of the incoming controller ("... roger, you are inside airspace E") allow the conclusion that the ICAO Annex 11 part "All flights receive traffic information as far as practical" was misinterpreted. In principle, all relevant and available information which increase flight safety should be passed on to pilots involved.

Conclusions

The Serious Incident was caused by the following:

- The crew of the Cessna did not see the Mooney.
- In spite of having the Cessna in sight, the crew of the Mooney did not change the course.
- The controller did not realise the conflict and did not give traffic information or avoidance recommendation to the Cessna crew.

Contributory factors:

- The visual and acoustical warnings (STCA) were not sufficient to draw the controller's attention to the impending conflict.
- The controller had a high workload due to the complexity of the air traffic.
- Because the labels overlapped it was not possible at times to accurately track the radar targets and to extract data from the labels.

Safety Recommendation

On 22 April 2013 the BFU issued the following Safety Recommendations:

Recommendation No 01/2013

The air traffic service provider should change their in-house procedures concerning the passing of traffic information and ensure that traffic information for hazard prevention is passed on to aircraft independent of airspace category and flight rules.

Recommendation No 02/2013

The air traffic service provider should check and optimise, if applicable, their Short Term Conflict Alert System (STCA) in regard to the effectiveness of the generated acoustic and visual warnings.

Investigator in charge: Blanke

Braunschweig: 22 April 2013

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 - FIUUG*) 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.

Published by:

Bundesstelle für
Flugunfalluntersuchung
Hermann-Blenk-Str. 16
38108 Braunschweig

Phone +49 531 35 48 - 0
Fax +49 531 35 48 - 246

Mail box@bfu-web.de
Internet www.bfu-web.de