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Swiss Transportation Safety Investigation Board STSB

Aviation Division

Final Report No. 2260

by the Swiss Transportation Safety Investigation Board STSB

Concerning the serious incident (Airprox)
between the airplane Piper PA-28-181, HB-PLY,
and the airplane Hawker 800 XP, CS-DRC, operated by
NetJets under flight number NJE 424R
on 20 March 2014
at Zurich Airport

Ursachen

Der schwere Vorfall ist darauf zurückzuführen, dass ein Pilot im Nachtsichtflug in Zürich die Landepiste verwechselte und es dadurch zu einer gefährlichen Annäherung mit einem in entgegengesetzter Richtung im Instrumentenflug anfliegenden Flugzeug kam.

Zum schweren Vorfall haben beigetragen:

- ungenügende Vorbereitung für einen Anflug bei Nacht;
- unzweckmässiger Einsatz der Navigationsgeräte.

General information on this report

This report contains the Swiss Transportation Safety Investigation Board's (STSB) conclusions on the circumstances and causes of the serious incident which is the subject of the investigation.

In accordance with Article 3.1 of the 10th edition, effective from 18 November 2010, of Annex 13 to the Convention on International Civil Aviation of 7 December 1944 and Article 24 of the Federal Air Navigation Act, the sole purpose of the investigation of an aircraft accident or serious incident is to prevent further accidents or serious incidents from occurring. The legal assessment of accident/incident causes and circumstances is expressly no concern of the investigation. It is therefore not the purpose of this investigation to determine blame or clarify questions of liability.

If this report is used for purposes other than accident/incident prevention, due consideration shall be given to this circumstance.

The German version of this report constitutes the original and is definite.

All information, unless otherwise indicated, relates to the time of the serious incident.

All times in this report, unless otherwise indicated, are stated in coordinated universal time (UTC). At the time of the serious incident, Central European Summer Time (CEST) applied as local time in Switzerland. The relation between LT, CEST and UTC is:
LT = CEST = UTC + 1 h

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Final Report

Summary

Aircraft 1

Owner	Flying school Birrfeld AG, 5242 Lupfig
Operator	Flying school Birrfeld AG, 5242 Lupfig
Manufacturer	Piper Aircraft Corporation, Vero Beach, USA
Aircraft type	Piper PA-28-181
Country of registration	Switzerland
Registration	HB-PLY
Radio call sign	<i>Hotel Bravo Papa Lima Yankee</i>
Flight rules	Visual flight rules (VFR)
Type of flight	Private flight
Point of departure	Nuremberg (EDDN)
Destination	Birrfeld (LSZF), diversion landing in Zurich (LSZH)

Aircraft 2

Owner	NetJets Europe Sociedade Unipessoal, Portugal
Operator	NetJets, Transportes aéreos, S.A., Portugal
Manufacturer	Hawker Beechcraft, Wichita, Kansas, USA
Aircraft type	Hawker 800 XP
Country of registration	Portugal
Registration	CS-DRC
Flight number	NJE 424R
Radio call sign	<i>Fraction four two four Romeo</i>
Flight rules	Instrument flight rules (IFR)
Type of flight	Commercial flight
Point of departure	Torino (LIMF)
Destination	Zurich (LSZH)
Location	Short final approach to runway 32, Zurich Airport
Date and time	20 March 2014, 18:47 UTC
ATS unit	Zurich Tower
Airspace	Class D
Closest proximity of the two aircraft	Horizontal 1.9 NM, vertical 175 ft
Separation minima	None, traffic advice obligatory
Airprox category	ICAO category A, high risk of collision

Investigation

The serious incident occurred on 20 March 2014 at 18:47 UTC. The report came in on 21 March at about 10:30 UTC. After preliminary enquiries which are standard for this type of serious incident, the investigation was opened on 28 March 2014.

The STSB reported the serious incident to the Portuguese authorities. The country assigned an authorised representative.

The final report will be published by the STSB.

Synopsis

On 20 March 2014 at 17:12 UTC, the pilot of the PA-28-181, registered as HB-PLY, started in Nuremberg for a VFR flight to Birrfeld. Shortly after take-off, he decided to divert to Zurich because of the onset of twilight. After the first call, Zurich Tower gave him clearance to approach via the Whiskey route. At 18:46:43 UTC, he was given clearance to land on runway 28. At the same time, the business jet 800 XP with flight number NJE 424R was on the short final approach to runway 14 and, at 18:46:59 UTC, was also given clearance to land by the tower. 20 seconds later, the pilot of HB-PLY reported that he had approached the wrong runway and would initiate a go-around. By mistake he had approached runway 32 which was approached by NJE 424R from the opposite direction. After a left turn, a second approach to runway 28 was made, which led, however, again in direction of runway 32. A third approach was carried out supported by heading instructions from the tower and the pilot subsequently landed safely on runway 28. The serious incident happened 34 minutes after nightfall.

Causes

The serious incident attributes to the fact that a pilot flying VFR by night mixed up the runways in Zurich. This led to dangerous proximity to an airplane approaching from the opposite direction flying under IFR.

Contributing factors to the serious incident were:

- Inadequate preparation for an approach by night;
- Inappropriate use of the navigation devices.

Safety recommendations

No safety recommendations were made in the context of this investigation.

1 Facts

1.1 Background and course of the serious incident

1.1.1 General

The recordings of the radio communication and the runway lighting controls, radar data as well as statements of crew members and the air traffic controller were used for the following description of the background and the history of the flight. During the entire flight of NJE 424R, the commander acted as the pilot flying (PF) and the co-pilot as the pilot not flying (PNF). The pilot of HB-PLY was on board by himself.

On the side of the air traffic service (ATS), the aerodrome control (ADC) of the ATS unit Zurich Tower was involved.

At the time of the serious incident, there was continuous IFR approach traffic to runway 14. The main starting runway was runway 28.

The flight of HB-PLY was initially carried out under VFR by day. At the time of the serious incident, VFR by night applied to HB-PLY. The flight of NJE 424R was carried out under IFR.

1.1.2 Background

The pilot of the PA28-181, registered as HB-PLY, had fuelled the airplane in the morning of 20 March 2014 and had started from the Birrfeld airport (LSZF) for a VFR flight to Nuremberg (EDDN), where he attended a business meeting.

On the flight plan, he had stated a 15:45 UTC starting time for the return flight to Birrfeld. Because of a delay of the business meeting, he sent a delay message (DLA) for a new 16:45 UTC starting time. Traffic on the Nuremberg airport caused a further delay, leading to a final take-off time of 17:12 UTC.

In the flight plan, the planned flight route to Birrfeld was given as “*DCT ASPAT DCT TEKSI DCT ARSUT DCT NEDOV DCT TRA DCT*” and specified with the note “*RMK/ROUTE VIA S EDMC EDSN TRA SECTOR WEST*”. The planned flight distance, excluding take-off and landing, was therefore 173 NM, slightly more than a great-circle distance of 167 NM. Friedrichshafen (EDNY) was specified as diversion airport. The pilot had stated a flight time of 1 h 10 min and a speed of 110 kt. The fuel supply at the time of take-off was sufficient for 3 h 30 min.

1.1.3 Course of the serious incident

At 17:12 UTC, the pilot of HB-PLY took off from Nuremberg airport by himself on a VFR flight to Birrfeld. Already shortly after take-off, he decided to change his destination airport because of the onset of twilight and to carry out a diversion landing in Zurich. He notified the flight information service Zurich Information on frequency 124.7 MHz as well as the airport manager in Birrfeld on frequency 123.55 MHz about this. Nightfall was at 18:13 UTC on this evening.

At 18:39:13 UTC, the pilot of HB-PLY contacted Zurich Tower as follows: “*Zurich Tower, good evening, this is Hotel Bravo Papa Lima Yankee, approaching Whiskey at three thousand feet, for landing.*” The ADC air traffic controller immediately gave him clearance to enter the control zone via the Whiskey route (see illustration 1) and held out the prospect of a landing on runway 28.

The pilot of HB-PLY followed the approach path and at 18:43:15 UTC made contact above reporting point W1 at a flight altitude of 3000 ft AMSL¹. The air traffic controller subsequently gave him the following clearance: “*Hotel Lima Yankee,*

¹ AMSL: *above mean sea level*

roger, after Whiskey two, join left downwind for runway two eight.” The pilot confirmed this clearance and at 18:44:40 UTC, shortly after passing reporting point W2, he entered what he thought was the left-hand downwind approach to runway 28 (see illustration 1 and appendix 1). This phase was navigated with visual references without the use of navigation instruments.

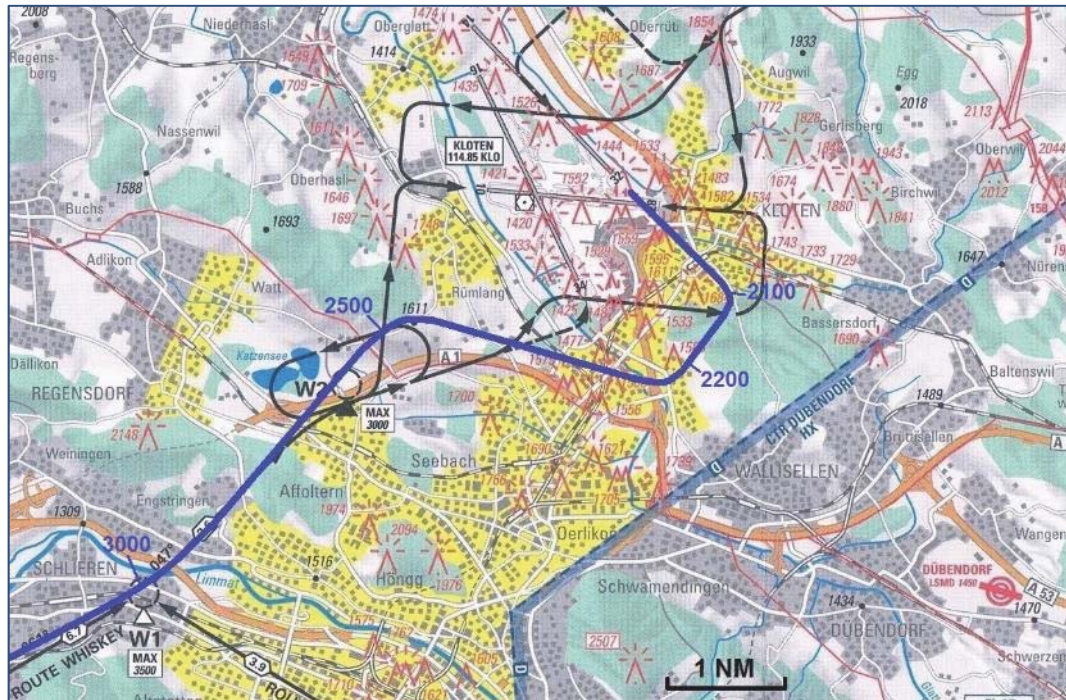


Illustration 1: Detail of the visual approach chart of Zurich Airport. Approach path and flight altitude AMSL of HB-PLY in blue. The airfield traffic pattern height is given as 2500 ft AMSL. Reproduction of the map approved by Federal Office of Topography (JA123456).

At 18:46:00 UTC, the crew of the business jet with flight number NJE 424R made contact on the frequency of Zurich Tower: “Tower, fraction four two four Romeo, short final.” The airplane was carrying out an instrument approach to runway 14.

At this time, the runway lighting which is controlled by the tower was switched on to 3 % high intensity lighting (HI) at runway 14 and to 1 % HI at runway 28. Low intensity lighting (NI) was switched off at runway 14 because of maintenance work and switched on at runway 28. The centre line lighting of runway 14 are type HI and were also visible from the approach direction 32 (see chapter 1.6.2).

At 18:46:40 UTC, the pilot of HB-PLY made contact from what he thought was the final approach to runway 28. His flight altitude was 2100 ft AMSL. The air traffic controller saw HB-PLY and, according to his own information, assumed that it was on a shortened approach to the intended runway 28. He immediately gave the pilot clearance to land on runway 28. At 18:46:59 UTC, he gave the crew of NJE 424R clearance to land on runway 14.

During the short final approach to runway 32, immediately after he had flown over runway axis 28, the pilot of HB-PLY realised that he was approaching the wrong runway. His altitude at this moment in time was approximately 1700 ft AMSL. The flight paths of both airplanes were already being recorded by the ground radar SAMAX by that time (see illustration 2).



Illustration 2: Recording of the ground radar SAMAX with highlighted flight paths of NJE 424R (green) and HB-PLY (blue) at 18:47:17 UTC, shortly before the go-around of HB-PLY.

At 18:47:18 UTC, the pilot of HB-PLY reported: *“Erm, negative, I’m on the wrong runway, I make a go-around, yeah.”* The air traffic controller instructed him immediately to fly a left turn. Following the lighting protocol, the HI lighting of runway 14 was subsequently reduced from 3 % to 1 %.

The crew of NJE 424R did not spot the light aircraft approaching from the opposite direction and landed normally on runway 14. They stated later that their air traffic alert and collision avoidance system (TCAS) had provided neither a traffic advisory nor a resolution advisory.

After the go-around, the pilot of HB-PLY was instructed by the air traffic controller to again join the left downwind of runway 28. Shortly afterwards, the pilot turned again in the direction of final approach 32 and made contact at 18:49:41 UTC: *“Zurich Tower, Hotel Lima Yankee, I have a problem identifying two eight, can you help me here?”* Using heading instructions, the air traffic controller then guided the pilot to the left downwind 28 (see appendix 1). Because of the low altitude, he was also instructed to climb to the airfield pattern altitude of 2500 ft. When HB-PLY turned into the long final approach of runway 28, the air traffic controller switched on the threshold identification lights (TIL) of runway 28 in order to make the identification of the runway easier for the pilot. At 18:54:16 UTC, he gave the clearance for landing and HB-PLY subsequently landed safely on runway 28 at 18:55 UTC.

1.1.4 Time and location of the serious incident

Geographical position

Zurich Airport, short final approach to runway 32

Date and time	20 March 2014, 18:47 UTC
Light conditions	Night; the end of dusk was at 18:13 UTC
Height above sea level or flight level	1700 ft AMSL

1.2 Information on people concerned

1.2.1 Commander NJE 424R

Person	Dutch national, born 1968	
Licence	Airline transport pilot licence aeroplane (ATPL (A)) in accordance with European Aviation Safety Agency (EASA)	
Flying experience	Total	6000 h
	Of which on type	2280 h
	Last 90 days	57 h
	Of which on type	57 h

All available information indicates that the commander reported for duty well rested and healthy. There is no indication that tiredness was a factor at the time of the serious incident.

1.2.2 Co-pilot NJE 424R

Person	Belgian national, born 1973	
Licence	Commercial pilot licence aeroplane (CPL (A)) in accordance with EASA	
Flying experience	Total	4600 h
	Of which on type	2467 h
	Last 90 days	91 h
	Of which on type	91 h

All available information indicates that the co-pilot reported for duty well rested and healthy. There is no indication that tiredness was a factor at the time of the serious incident.

1.2.3	Pilot HB-PLY		
	Person	Swiss national, born in 1974	
	Licence	Private pilot licence aeroplane (PPL (A)) in accordance with joint aviation requirements (JAR), issued by the Civil Aviation Authority of Austria	
	Ratings	Night flight NIT	
	Flying experience	Total	485 h
		Of which on type	300 h
		Last 90 days	5 h
		Of which on type	5 h

The pilot of HB-PLY held an American private pilot licence with IFR rating and had night flying experience of about 44 hours. He had acquired the night flying experience in Altenrhein and Friedrichshafen as well as at airports in North America. His last night landing took place on 3 November 2013. So far, he had only flown to Zurich during the day.

All available information indicates that the pilot reported for duty well rested and healthy. There is no indication that tiredness was a factor at the time of the serious incident.

1.2.4	Air traffic controller		
	Person	Swiss national, born 1985	
	Function	Aerodrome control (ADC)	
	Licence	Air traffic controller license based on EC directive 805/2011 issued by the Federal Office of Civil Aviation (FOCA)	

Duty commenced on day of 13:20 UTC
incident

All available information indicates that the air traffic controller reported for duty well rested and healthy. There is no indication that tiredness was a factor at the time of the serious incident.

1.3 Aircraft information

1.3.1	HB-PLY		
	Aircraft type	Piper PA28-181	
	Specification	Single-engined low-wing monoplane of all-metal construction, with fixed landing gear in nose-wheel configuration and four seats	
	Manufacturer	Piper aircraft corporation, Vero Beach, USA	
	Owner	Flying school Birrfeld, 5242 Lupfig	
	Operator	Flying school Birrfeld, 5242 Lupfig	
	Approved operation	VFR by day and by night	
	Equipment	A transponder was fitted. No collision avoidance system was fitted.	

HB-PLY had comprehensive navigation equipment for VFR flights by day and by night. All devices were in a functioning condition. Furthermore, the pilot had a portable GPS device and used this as his primary navigation tool. Electronic approach charts were carried on board and displayed on a tablet computer.

For the lighting of the flight instruments, individual lights for each instrument were available as well as instrument lighting for the entire instrument panel. According to the pilot, the individual lighting of the heading indicator was not working and the instrument lighting was switched off when he was approaching Zurich. The heading indicator could therefore not be read in the dark. Heading information was available on the GPS device.

It was found that the lighting of the heading indicator and of the attitude indicator is independent on all other instrument lighting. It is operated via the same control knob that is used for switching on the external navigation light of the airplane. This does not correspond with the function of this knob as described in the aircraft flight manual (AFM) and labelled in the cockpit. However, full functionality of all lighting elements was confirmed.

1.3.2	NJE 424R	
	Aircraft type	Raytheon Hawker 800 XP
	Specification	Twin-jet corporate aircraft
	Manufacturer	Hawker Beechcraft, Wichita, Kansas, USA
	Owner	NetJets Europe Sociedade Unipessoal, Portugal
	Operator	NetJets, Transportes aéreos, S.A., Portugal
	Equipment	TCAS II version 7.0

1.4 Meteorological information

1.4.1 General weather conditions

Switzerland was on the edge of a high-pressure system over South-Eastern Europe in dry warm air.

1.4.2 Weather at the time and location of the serious incident

The relevant airport weather report for Zurich read:

METAR LSZH 201850Z VRB02KT CAVOK 14/05 Q1017 NOSIG=

This means in long form:

On 20 March 2014, the following weather conditions were observed shortly before the 18:50 UTC airport weather report was dispatched:

Wind	Variable wind direction, 2 knots
Visibility	10 km or more
Clouds	No clouds below 8000 ft above ground No cumulonimbus clouds (CB) or towering cumulus (TCU)
Weather	No significant weather phenomenons
Temperature	14 °C
Dew point	5 °C

Atmospheric pressure QNH 1017 hPa (pressure reduced to sea level, calculated with the values of the ICAO standard atmosphere)

1.4.3 Astronomical information

Position of the sun Azimuth: 284 degrees Height: -12 degrees

Position of the moon Waning, still below the horizon

Light conditions Night

1.4.4 Webcam picture



Illustration 3: Webcam on finger dock E, looking west-southwest, picture taken at 18:30 UTC

1.5 Communication

Communication between the pilot and air traffic control was in the English language and not affected by technical issues.

1.6 Airport information

1.6.1 General

Zurich Airport is in the north-east of Switzerland. It has a system of three runways with the following dimensions:

Runway name	Dimensions	Altitude of the runway threshold
16/34	3700 x 60 m	1390/1386 ft AMSL
14/32	3300 x 60 m	1402/1402 ft AMSL
10/28	2500 x 60 m	1391/1416 ft AMSL

The two runways 16 and 28 cross at the airport reference point. The approach corridors of runways 16 and 14 cross approximately 850 metres north-west of the runway 14 threshold.

The airport reference altitude is 1416 ft AMSL, the reference temperature is defined as 24.0 °C.

1.6.2 Runway lighting

The runways of Zurich Airport have a lighting system that is centrally operated by the ADC in the tower. There is a distinction between high intensity (HI) and low intensity (NI) lighting. HI lighting shines in the approach direction of the respective runway and the intensity can be adjusted in increments between 1 % and 100 % whilst the NI lighting shines all-around. The intensity of the NI lighting cannot be

adjusted and its luminosity is equivalent to approximately 0.3 % of the lowest HI lighting intensity.

The centre line lighting of runway 14 is designed as HI, shining in both runway directions, which means the lighting is also visible from runway direction 32. At the time of the serious incident, the lighting intensity was set to 3 %. The precision approach path indicator (PAPI) of runway 32 was switched off.

The edge lighting of runway 14 is available as HI and as NI lighting. The HI edge lighting was set to 3 % and only visible from runway direction 14. Because of maintenance work, the NI edge lighting was switched off at the time of the serious incident.

The lighting of runway 28 was as follows: NI edge and NI approach lighting switched on; HI edge, HI centre line and HI approach lighting 1 %; PAPI 3 %. At 18:54:26 UTC, during the third approach of HB-PLY, the threshold identification lights (TIL) were switched on to an intensity of 10 %. All switch commands by the air traffic controllers on the lighting board are electronically recorded in a lighting protocol.

1.7 Additional information

The view of Zurich Airport was captured in a flight simulator of the Swiss Air Force (see illustrations 4 and 5). Even if the lighting conditions are not exactly those described in chapter 1.6.2, these pictures illustrate the influence of different positions and flight altitudes on the recognisability of runway 28.



Illustration 4: Flight path as taken by HB-PLY: view of Zurich Airport from the left baseleg of runway 32 at an altitude of 2200 ft AMSL in the simulator. Runway 28 is barely visible.



Illustration 5: Flight path according to approach chart: view of Zurich Airport from the left baseleg of runway 28 at an altitude of 2400 ft AMSL in the simulator. Runway 28 is visible in the foreground.

2 Analysis

2.1 Technical aspects

There is no indication of pre-existing technical defects which could have caused or influenced the serious incident.

2.2 Human and operational aspects

2.2.1 Air traffic control

The approach of HB-PLY was initially without any problems. Therefore, the air traffic controller did not see any reason to pay increased attention to this flight. When giving landing clearance, he noticed that the plane had already turned into the final approach direction. Therefore, he anticipated a shortened approach to runway 28. The air traffic controller only realised the danger when the pilot reported that he was approaching the wrong runway and initiating a go-around. He immediately instructed a left turn back in direction of downwind approach 28. This was a safety-conscious decision because of the approaching traffic to runway 14 and the unlit hill ranges in the east, and it defused the situation.

After the second approach of HB-PLY had been unsuccessful as well, the pilot requested help and the air traffic controller supported him efficiently with heading and altitude information. He also switched on the runway threshold lighting in order to make it easier for the pilot to identify runway 28. Despite a high frequency load, the air traffic controller reacted calmly as well as efficiently and thus he substantially contributed to a good outcome of the serious incident.

2.2.2 Crew of NJE 424R

The crew of NJE 424R did not notice the serious incident. They did not receive an advisory from the TCAS, nor did they spot HB-PLY with its relatively weak landing lights as it was flying towards them at a distance of approximately 4 km.

2.2.3 Pilot of HB-PLY

According to the ATC flight plan, the flight from Nuremberg to Birrfeld had been planned with a flight time of 1 h 10 min and a take-off time of 15:45 UTC. Shortly before 16:00 UTC, the pilot sent a delay message (DLA) for a new starting time of 16:45 UTC. Nightfall was at 18:13 UTC on this evening. With this updated plan, a landing in Birrfeld before nightfall would only just have been possible.

The planned flight distance without take-off and approach was 173 NM which would have resulted in a flight time of 1 h 35 min at the planned speed of 110 kt. Even without the added five minutes each for take-off and approach which are standard in flight planning, a starting time of 16:45 UTC would not have been sufficient for a landing in Birrfeld before nightfall. It was already clear that the planning was too optimistic and a landing in Birrfeld by day no longer possible when the DLA was sent. Therefore, handing in a new flight plan and requesting a slot for the approach in Zurich would have been required.

The actual take-off in Nuremberg was at 17:12 UTC. The approach was normal up to reporting point W2. Subsequently, the pilot noticed the distinctively bright illuminated runway 32 whilst he was unable to identify runway 28. He approached runway 32. This is understandable as runway 32 was more brightly illuminated and easier to spot among its surroundings than runway 28. Runway 28, in contrast, was partially hidden behind buildings and more difficult to identify because of numerous bright light sources in its surroundings. In addition, even after he had turned into the baseleg, the pilot could not identify runway 28 because of his position which was too far south, and the altitude which was too low (see chapter 1.7).

In contrast to runway 28, the HI lighting of runway 14 was also clearly visible as directed lighting from the direction of runway 32 which might have contributed to the mix-up of the runways.

The heading indicator was available as a navigation tool for flying the traffic pattern and identifying the correct runway. However, it could not be read as the lighting was absent. The individual instrument lighting as well as the instrument lighting for the entire instrument panel were functioning but not switched on. The non-standard control of the instrument lighting may have contributed to this.

Several other tools were available, for example a GPS device and the navigation devices for the reception of the ILS signals from runway 28. The pilot was familiar with the operation of these devices because of his instrument flight competence. Nevertheless, he chose not to use them. Considering his lack of night flying experience at Zurich Airport, this decision was not advisable.

The communication with the air traffic controller ADC was calm and without any problems. The fact that the pilot realised his mistake, reported it immediately and subsequently asked the air traffic controller for help substantially contributed to defusing the serious incident. A situation with a high risk of collision would have arisen particularly if the pilot had not realised his mistake or if NJE 424R had initiated a go-around.

With a view to ensuring obstacle clearance by night, it was not appropriate for the pilot to carry out the second and third approach below the published traffic pattern altitude of 2500 ft, and in addition, it impeded the overview. The support of the air traffic controller consequentially included the instruction to climb to 2500 ft.

A visual approach to an airport by night requires detailed preparation. The lack of time before departure and the short-term selection of Zurich as the alternate airport left the pilot little space for this preparation. In addition he obviously underestimated the navigation demands by night and forewent the use of the available navigation tools. In the present case the preparation for a visual approach to Zurich airport was inadequate.

3 Conclusions

3.1 Findings

3.1.1 Technical aspects

- The airplanes were approved for flying under VFR by night and IFR respectively.
- The investigation did not find any indication of pre-existing technical defects which could have caused or influenced the serious incident.

3.1.2 Crews

- The pilots held the required licences for the flight.
- There is no indication of impairment to the pilots' health during the incident flight.

3.1.3 Air traffic control staff

- The air traffic controller held the required licences for carrying out his duties.
- There is no indication of impairment to the air traffic controller's health at the time of the serious incident.

3.1.4 History of the flight

- During a VFR flight of HB-PLY from Nuremberg (EDDN) to Birrfeld (LSZF), the pilot decided to carry out a diversion landing in Zurich because of the onset of twilight.
- The approach of HB-PLY to Zurich Airport (LSZH) was at night and problem-free up to reporting point W2.
- The approach was continued from reporting point W2, without using navigation, by mistake to runway 32. This runway was approached from the opposite direction at the same time by a business jet with flight number NJE 424R.
- During the short final approach to runway 32, immediately after crossing runway axis 28, the pilot of HB-PLY realised that he was approaching the wrong runway and initiated a go-around.
- The business jet landed on runway 14 as planned.
- During the second approach of HB-PLY, the pilot again realised difficulties identifying runway 28 and reported this to the air traffic controller. The third approach was carried out with the support of the air traffic controller and the airplane subsequently landed on runway 28.

3.1.5 General conditions

- The weather had no influence on the development of the serious incident.
- The end of dusk was at 18:13 UTC.
- The centre line lighting of runway 32 was visible from a southerly direction and set to an intensity of 3 %.
- The precision approach path indicator (PAPI) of runway 32 was switched off.
- Runway 28 had standard lighting including PAPI.
- The lighting of the heading indicator of HB-PLY was functioning but not switched on.

- At the time of the serious incident there was continuous IFR approach traffic to runway 14.

3.2 Causes

The serious incident attributes to the fact that a pilot flying VFR by night mixed up the runways in Zurich. This led to dangerous proximity to an airplane approaching from the opposite direction flying under IFR.

Contributing factors to the serious incident were:

- Inadequate preparation for an approach by night;
- Inappropriate use of the navigation devices.

- 4 Safety recommendations, safety advice and measures taken since the serious incident**
- 4.1 Safety recommendations**
None
- 4.2 Safety advices**
None
- 4.3 Measures taken since the serious incident**
None

Payerne, 21 November 2016

Investigation Bureau STSB

This final report was approved by the Board of the Swiss Transportation Safety Investigation Board STSB (Art. 10 lit. h of the Ordinance on the Safety Investigation of Transportation Incidents of 17 December 2014).

Berne, 05 December 2016

Appendices

Appendix 1: Radar picture of the HB-PLY flight path

