



AIR ACCIDENTS  
INVESTIGATION INSTITUTE  
Beranových 130  
199 01 PRAGUE 99

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CZ-13-136

# FINAL REPORT

**Investigation of causes of an air accident  
of Socata TB 10 Tobago aircraft, registration mark D-EANH  
in Lánov  
on 11 May 2013.**

Prague  
March 2014

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This investigation was carried pursuant to Regulation (EU) of the European Parliament and of the Council No. 996/2010, Act No. 49/1997 Coll. on civil aviation, and Annex 13 to the Convention on International Civil Aviation. The sole and only objective of this report is the prevention of potential future accidents and incidents free of determining the guilt or responsibility. The final report, findings and conclusions stated therein pertaining to aircraft accidents and incidents, or possible system deficiencies endangering operational safety shall be solely of informative nature and cannot be used in any other form than advisory material for bringing about steps that would prevent further aircraft accidents and incidents with similar causes. The author of the present Final Report states explicitly that the said Final Report cannot be used as grounds for holding anybody liable or responsible as regards the causes of the air accident or incident or for filing insurance claims.

## Glossary of Abbreviations Used in this Report

AFIS	Aerodrome Flight Information Service
AGL	Above Ground Level
AMSL	Above Mean Sea Level
ARP	Aerodrome Reference Point
ARS	Air Rescue Service
BKN	Broken
°C	Temperature in Degrees Celsius
CU	Cumulus
CR	Czech Republic
E	East
EDDC	Dresden International Airport
ELEV	Elevation above Sea Level (derived from WGS84 coordinate system)
ft	Foot (unit of length = 0.3048 m)
FRS	Fire Rescue Service
GPS	Global Positioning System
h	Hour
hPa	Hectopascal (unit of atmospheric pressure)
HTU	Horizontal Tail Unit
kg	Kilogram (unit of weight)
km	Kilometre
kt	Knot (unit of speed = 1.852 km.h <sup>-1</sup> )
l	Litre
LKVR	Vrchlabí Public Domestic Airport
m	Metre
min	Minute
MHz	Megahertz
mm	Millimetre
MPa	Megapascal (unit of pressure)
MTOW	Maximum Take-off Weight
N	North
NE	Northeast
NIGHT	Night
NIL	None
OVC	Overcast
PPL(A)	Private Pilot Licence
psi	Unit of pressure (1 pound per square inch ≈ 6894.757293 Pa)
QNH	QNH Atmospheric pressure (reduced at mean sea level according to the standard atmosphere conditions, used for altimeter subscale setting to obtain elevation reading when on the ground)
RWY	Runway
SC	Stratocumulus
SCT	Scattered
SE	Southeast
SEP land	Qualification for single-engine piston aircraft
SSR	Secondary Surveillance Radar
THR	Threshold
UTC	Co-ordinated Universal Time
ÚZPLN	Air Accidents Investigation Institute
VFR	Visual Flight Rules

## **A) Introduction**

Owner: Private person  
Aircraft Manufacturer and Type: DAHER SOCATA, TB 10 Tobago  
Registration mark: D-EANH  
Place: Lánov, 204 m SE THR RWY29 LKVR  
Date and time: 11 May 2013, 10:37 (all times are UTC)

## **B) Synopsis**

On 11 May 2013 AAll was notified of an air accident of Socata TB 10 Tobago aircraft. When attempting to take-off from the Vrchlabí airport, the aircraft rolled over the entire unpaved RWY and went out of the RWY to the grass area on the right, outside a clearway. During low-level flight the aircraft in a roll attitude caught with the right edge of its wing on barriers on the ground and crashed against the Tedec hotel penthouse apartment. Due to the crash the aircraft was destroyed, the propeller was detached, both wing sides and tail units were detached and the aircraft fell down on the ground. The pilot and the passenger were seriously injured. The aircraft was destroyed.

Witnesses reported the air accident on the emergency line (150) and to the Police of the Czech Republic. On the same day an AAll inspector arrived at the place of the air accident and started investigating its causes.

The cause of the incident was investigated by an AAll commission. The investigation team comprised:

Investigator-in-charge: Ing. Zdeněk FORMÁNEK  
Commission members: Ing. Stanislav SUCHÝ

In compliance with ICAO Annex 13 the state of the manufacturer appointed an authorised representative.

The Final Report was issued by:

AIR ACCIDENTS INVESTIGATION INSTITUTE

Beranových 130

199 01 PRAGUE 99

on 17 March 2014

## **C) This Final Report Consists of the Following Main Parts:**

- 1) Factual Information
- 2) Analysis
- 3) Conclusions
- 4) Safety Recommendations
- 5) Appendices

# 1 Factual information

## 1.1 History of the Flight

History of the flight has been derived from the testimony of another person on board and of the witnesses from the Vrchlábí airport. It was not possible to subject the pilot to examination due to the seriousness of his health condition.

### 1.1.1 Circumstances Preceding the Event Flight

On 8 May 2013 the pilot together with another person departed from the Schönhagen airport for a VFR flight and following a flight lasting 1 h 34 min landed at LKVR. The flight was carried out as failure-free, the weather during landing was fine, the grass surface of RWY was wet after rain. The pilot brought the aircraft to a full stop at the stand and left for Lánov where he checked in a boarding house with another person. On the following day the pilot refuelled the aircraft, but was unable to perform any flight due to unsuitable weather. On 10 May the weather was bad again and it was raining. In the morning on 11 May 2013 the pilot was following the development of weather on the planned flight route in an application on his mobile phone. On the basis of such information, he learnt that the weather would be suitable in the area of his planned route for an intended overflight back to Germany from LKVR to Dresden and then up to the area of Berlin.

After arriving to the airport, the pilot conducted pre-flight preparation of the aircraft at the stand. It was not raining, the sky was overcast; however, the pilot saw another aircraft departing from the airport. The AFIS Controller with another person went to the pilot at the stand and informed him in English that the condition of the runway was very bad because of preceding persistent rainfall. They recommended the pilot not to perform any flights. They told the pilot that the runway at LKVR was soft and water-logged and there was a risk that the propeller might strike the ground and the aircraft could overturn in such wet terrain. The pilot understood the information, nevertheless, he said he would try a take-off anyway and would fly to Dresden. He boarded the aircraft with another person and continued with activities aimed at taking off.

The AFIS Controller returned to his control position. He saw the aircraft taxiing at the northern edge of RWY 29 where it stopped and was getting ready for the take-off. The pilot did not establish radiotelephony communication on LKVR AFIS frequency and commenced a take-off run. Approximately in the middle of the runway he discontinued the take-off run and was taxiing back to an asphalt area by hangar. According to the AFIS Controller a witness from the airport was speaking to him, recommending him not to attempt a take-off. The pilot was considering the best place on the runway and the best direction for a take-off. Consequently, he was again taxiing to the northern edge of RWY 29 where he started a take-off run, intending to take-off. After taxiing some 300 – 400 m, he finished a take-off run and stopped on the runway because the wheels sank into the water-logged surface. The AFIS Controller with another witness approached the aircraft on the runway and found the wheels sunk in mud. They attempted to push the aircraft out of mud, but failed. They agreed to remove the aircraft from the runway by tractor towing. The pilot fastened his own tow bar to the nose wheel and was helping to tow the aircraft by lifting the aircraft nose. The aircraft was towed by a tractor to an asphalt area and later by the pilot to a washing area where he dismantled the wheel covers, full of mud and grass. He washed the aircraft wheels, covers and underbody with pressurised water. He placed the wheel covers in the cockpit. The

witness again told the pilot that the runway condition was unsuitable due to heavy water-logging and that he should cancel his flight. Nevertheless, the pilot did not communicate much with him.

### 1.1.2 Event Flight

The AFIS Controller recorded the time of take-off pertaining to the first flight and the Dresden aerodrome as a destination in the flight book. There were other attempted take-offs, but he has not changed the time. According to him the last take-off was attempted approximately at 10:40. The AFIS Controller and the witness were standing in front of the hangar. Both of them saw the pilot taxiing to the north-west edge of RWY 11 where the aircraft stopped. The pilot was not communicating on the AFIS frequency and started a take-off run some 30 m before the threshold of RWY 11 at its left edge and was moving slightly across the runway in the direction of the right edge of RWY 11. The AFIS Controller therefore went quickly to his control position. From there he could see the front wheel every so often lifting from the runway surface and water with mud splashing off the wheels. Although the engine was going at full throttle, the aircraft did not accelerate enough to be able to take-off. From his point of view the aircraft was stretched to a big angle. He further added that the flaps had not been extended, but he was not sure. He was watching the aircraft attempting a take-off until the aircraft disappeared beyond the horizon. During that time the aircraft did not take-off, it was only taxiing on the ground.

Meanwhile, the witness standing in front of the hangar, was watching the take-off manoeuvre until the aircraft was out of sight. According to the witness' testimony, its wheels were going on the ground. It is possible that the aircraft was some 10 cm above the surface, but he could not assess it due to a big distance.

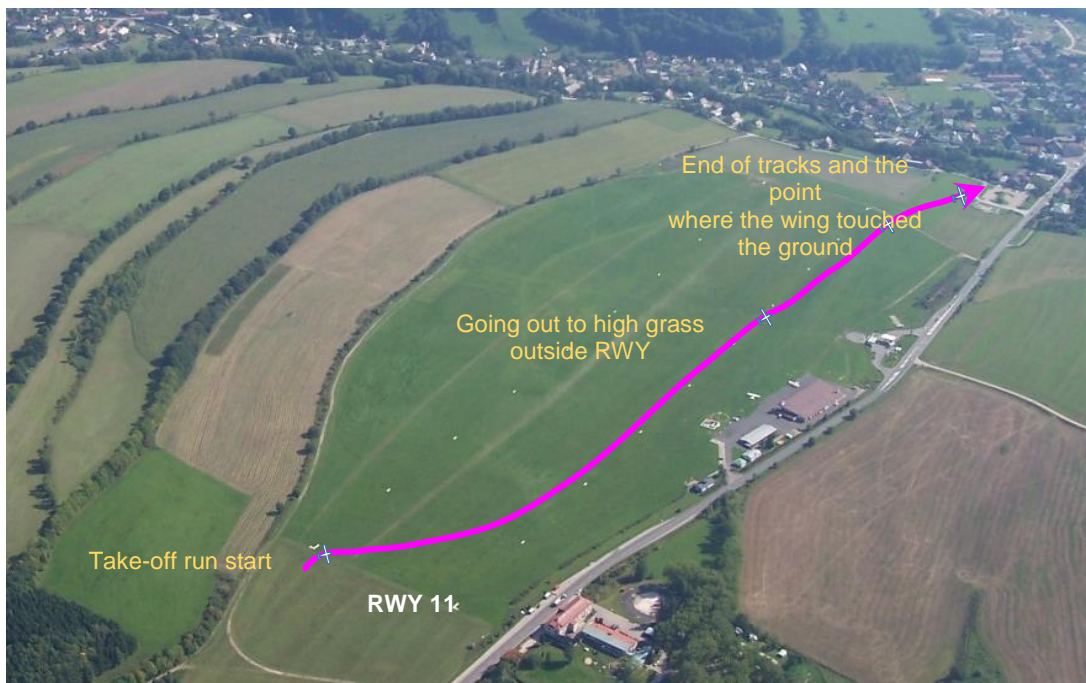


Fig. 1 Situation plan of aircraft movement

The landing gear wheel tracks in grass show that the aircraft during a take-off run went some 600 m, then went out of the right edge of RWY 11. It continued its take-off run on the grass surface of the aerodrome, going slightly to the right off the flight

course. At the end of the aerodrome it crossed a dirt track approximately 204 m away from the hotel building and kept attempting a take-off. The left wheel track and the right wheel track ended approximately 89 m and 65 m away from the hotel building, respectively. Based on the tracks in grass approximately 47 m away from the hotel building, the aircraft wing started catching on high grass. These tracks ended approximately 36 m away from the building. The aircraft in a roll crashed against a fence pale and bushes some 31 m away from the building against which it crashed in a roll of some 45 degrees on the right side, at the level of window woodwork of a penthouse apartment.

## 1.2 Injuries to Persons

Injury	Crew	Passengers	Others (inhabitants, etc.)
Fatal	0	0	0
Serious	1	1	0
Light/No injury	0/0	0	0

## 1.3 Damage to Aircraft

The aircraft has been destroyed.

## 1.4 Other Damage

The building suffered a damage in the amount of CZK 296 000.

## 1.5 Personnel Information

### 1.5.1 Pilot

- Male, aged 75 years,
- Holder of a valid Private Pilot Licence PPL (A),
- SEP land qualification valid until 11 September 2013, other NIGHT qualification,
- Medical Certificate Class 2 valid until 16 April 2014.

#### 1.5.1.1 Flying experience

Overall aircraft flying experience according to the records made by the pilot in the flight logbook as at 11 May 2013:

- All types in total: 2 012 h 30 min
- Over last 90 days (on TB 10): 13 h 59 min

On 11 May 2013 the pilot attempted a take-off from LKVR three times.

According to his flight logbook, from February through May 2013 the pilot flew in Germany both at the airports with grass and paved runways.

### 1.5.1.2 Pilot's Programme and Rest

Another person on board said that in her opinion the pilot was experienced as she had flown with him several times before and he had flown abroad. In terms of health, his condition was perfect in her opinion. He worked as a physician. The pilot had been to the Vrchlabí airport before. This time the aim was to visit the Giant Mountains (Krkonoše).

As regards rest, another person on board stated that they had gone to bed at about 20:00 on Friday. She excluded the possibility that he had drunk alcohol in the evening before departure. On 11 May 2013 he got up between 05:00 and 05:30. After breakfast in the boarding house they went to the Vrchlabí airport to get ready for departure. He decided to depart owing to favourable en-route weather on the way to Germany. If the weather was bad, the pilot was willing to depart on the following day, 12 May 2013, when he was supposed to be on medical duty in the evening. In her opinion, he had a sufficient time reserve.

### 1.5.2. Passengers

Female, 60 years, no flying experience. Citizen of the Federal Republic of Germany.

## 1.6 Aircraft Information

### 1.6.1 General Specifications of the Aircraft

Type:	TB 10 Tobago
Registration mark:	D-EANH
Manufacturer:	Daher Socata – France
Year of manufacture:	1994
Serial number:	1626
Certificate of airworthiness inspection:	Valid till 16 October 2013
Total hours as at 11 May 2013:	1 336 h 53 min
Liability Insurance:	Valid
Power plant	
Engine – type:	Textron Lycoming 0-360-A1AD
Manufacturer:	Avco Corporation, Lycoming Engines
Serial number:	L-33779-36A
Total hours:	1 336 h 53 min
Propeller – type:	Hartzell HC-C2YK-1BF1F 77666
Serial number:	CH 30970 A
Total hours:	1 901 h 53 min

This type of an aircraft is a single-engine, four-seat, all-metal low-wing monoplane with fixed main landing gear and a nose wheel. It has standard control with mechanic transfer of power to control surfaces of the aircraft and electrically controlled wing flaps.

### 1.6.2 Aircraft Operation

On 11 May 2013 the pilot conducted a pre-flight check of the aircraft, including engine warming up. As the aircraft wheels sank into mud on the runway during the second take-off run, the pilot dismantled aerodynamic wheel covers. When talking to the

AFIS Controller, he mentioned no problems with the aircraft. Another person on board did not remember the details of the individual attempted take-offs.

### 1.6.3 Calculation of the Total Weight of the Aircraft

As the actual weights of persons have not been known, the standardised values of weights of passengers have been used for calculation of the total weight of the aircraft.

Weight of an empty aircraft	700 kg
Standardised weight of the pilot	104 kg
Standardised weight of the passenger	85 kg
Total weight of fuel in the aircraft	152 kg
Total weight of baggage	58 kg
<b>Total weight</b>	<b>1 099 kg</b>

The maximum take-off weight of the aircraft is 1 150 kg.

## 1.7 Meteorological Information

### 1.7.1 Synoptic Situation

According to the report of the Aeronautical Meteorological Service of the Czech Hydrometeorological Institute, a waved cold front was passing slowly through the CR to north-east. On 8 May 2013, very warm wind from south was flowing before the front and there was no precipitation. The front entered Bohemia on 9 May 2013 with showers and storms. During the night on 10 May 2013, a frontal wave developed on this front over the Alps and throughout the day and night on 11 May 2013 kept influencing the entire territory of Bohemia by means of stratiforms and persistent rain and it was moving very slowly to Moravia.

### 1.7.2 Current Situation

According to expert estimate the meteorological situation at the place of air accident was as follows:

Surface wind:	290°- 350° / 3 – 6 kt
High-altitude wind:	2000 ft AGL 020° / 5kt /+10°C
Visibility:	approx. 10 km
Weather:	nearly overcast, 08:00 – 11:00 no precipitation
Cloudiness:	SCT CU, SC 2 000 - 2 500 ft AGL / TOP SC 5 000-6 000, CU 6 000 - 8 000 ft AGL, BKN / OVC LYR ABV 8 000 ft AMSL
Turbulence:	NIL
Regional QNH:	1 003 hPa

The AFIS Controller stated that at the time of take-off it was overcast (6 – 8/8), there were clouds at approx. 1 000 m and no wind. The top of the Black Mountain (Černá hora) was covered with remaining fog.



### 1.7.3 Precipitation Amount

Day	Precipitation amounts from the precipitation gauge station in Vrchlabí
08/05/2013	0,0 mm
09/05/2013	10,6 mm
10/05/2013	11,3 mm
11/05/2013	10,2 mm

Over two days from 9 to 10 May 2013 the total precipitation amounted to 21,8 mm. Precipitation stopped approx. at midnight from 10 to 11 May 2013. With regards to the precipitation amounts the grass LKVR RWY was highly likely to be heavily water-logged, i.e. the surface was soft and easy to sink in.

At the time between 08:00 – 11:00 on 11 May 2013 when the pilot was deciding what to do, it was not raining, however, between 11:00 – 12:00 it started raining again and by the end of the day precipitation increased by further 10,2 mm.

In cold air following the waved cold front the conditions for a VFR flight from LKVR to EDDN were favourable<sup>1</sup>). Between 08:00 and 11:00 the weather was cloudy, no precipitation, visibility of 20-25 km, (SCT SC, CU 2 000 – 2 500 ft AGL). For the satellite picture and radar picture of the situation at the time of the air accident see Appendix No. 2.

### 1.8 Radio Navigational and Visual Aids

According to the testimony of the AFIS Controller, there was a signal at the signal area banning landing.

### 1.9 Communications

During 11 May 2013 the AFIS control position was activated. The frequency of 125,325 MHz was available for communication. The AFIS Controller did not hear any communication from the pilot on this frequency. When investigating the cockpit of the crashed aircraft, the frequency on the radio set could not be identified.

### 1.10 Aerodrome Information

The Vrchlabí public domestic airport is located 2,5 km E of the centre of the town of Vrchlabí. The elevation above sea level of RWY 11/29 with the dimensions of 840 x 125 m is 1 611 ft / 491 m. In the direction of the N edge of THR RWY 11 the terrain dips gently to ARP and rises steadily to THR RWY 29 (ELEV 1 608/490). In the take-off direction of RWY 11 there is an unpaved gently dipping grass area, 140 m long, surrounded by a local road in Lánov.

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<sup>1</sup> According to the SYNOP report at MET station in Liberec and the METAR report at the EDDC station (Dresden).

Operational availability of LKVR is VFR day and parachute jumping. RWY bearing capacity under standard conditions is 5 700 kg / 0,4 MPa. AFIS is provided both in Czech and English.

At the time of air accident the grass on the RWY was approx. 10-15 cm high. Outside RWY shoulders the grass in the area of the airport was 15-25 cm high. Outside the area of the airport the grass was approx. 35-40 cm high.

According to the testimony of the AFIS Controller warning was provided by means of a signal at the signal area.

## **1.11 Flight Recorders and Other Means of Recording**

There was no device on board of the aircraft which could be used for the purpose of investigation.

## **1.12 Wreckage and Impact Information**

### **1.12.1 General**

The aircraft crashed against the penthouse apartment of the hotel building at the edge of the village of Lánov. The crash partially damaged the roof structure at the place of the wall of an attic room. The place is located at 607 m from LKVR ARP, 204 m from the left threshold mark of RWY 29 and at 90 m on the left side from the extended edge of the RWY. At the place of air accident the ELEV is 473 m. The geographic coordinates of the final position of the aircraft were 50°37'16,35" N and 015°39'13,03" E.

The first fragment of a sheet from wing covering was located 12,7 m away from the building.

The aircraft wreckage was located at the right side with its x-axis in a shallow ditch next to the building. The crash pulled the engine with a part of the engine bed away. It was located to the right from the aircraft fuselage and the propeller together with a spinner has been broken off. The engine cover and bed have been deformed. The pilot cockpit had a broken left lateral wall and floor. The cockpit hood on the left side has been lifted. The airframe has been deformed after the cockpit at the place of the fin unit and HTU.

The right half of the wing has been torn at the wing root and was located with its leading edge up by the building wall. At the leading edge there was a hole 0,3 m wide and approx. 0,12 m deep at 0,55 m away from the wing root. The right wingtip arc has been torn apart and there was soil in cracks. Aileron hinges were complete, the wing flap has been nearly retracted, and the flap control segment has been torn away from the aileron deflection control tube. The tank on the right wing side has been perforated and approx. 20 l of fuel have been drained off. The aileron automatic control rod and the control cable have been broken.

The left side of the wing has been separated by breaking of wing spars and hinges at the root. It has been divided in two parts. At the internal leading edge there was a broken hole, approx. 0,28 m wide and approx. half the profile deep, at 1,36 m from the root. The external part, approx. 1,5 m long, was lying partially on the fuselage. It has been deformed and the headlamp cover has been perforated. The stall warning detector has been deformed. The fuel tank on the left wing side has been perforated.



Fig. 2 Place of the air accident

The fin has been crashed on the right side and broken in the lower third. The end part of the fuselage has been ripped off. The rudder has been deformed in the upper part of the trailing edge, but the control rod was complete. The horizontal tail unit has been broken, deformed and laid under the end of fuselage. The right wingtip arc has been crashed in the front. The control rod was complete. The trim cables were complete. The rod and cables were cut during wreckage handling.

#### 1.12.2 Cockpit

The structure has been deformed by a front and left-hand-side crash. Plexi-glass glazed cockpit door has been partially smashed.

Cockpit equipment, flight and other instruments have not been substantially damaged. The altimeter set to the pressure of 1 015 hPa showed the altitude of 835 ft. Other instruments and indicators for engine control were in the normal positions. Magneto was off and the key has been taken out. It was switched to this position and the key was taken out by a fireman who also disconnected an accumulator for the sake of safety at the place of accident.

The carburettor heat control, throttle, propeller performance and control levers were in the front position at the middle control panel. The position of wing flap control lever could not be determined. The indicator was in the off position. The trim control lever was set in the middle position according to the indicator. The main electric circuit and generator breakers were on. The fuel pump and revolving light switches were on, other mains switches were off. The fuel tap was in the "right tank" position.

The radio station was on in the COM 2 position, the SSR transponder was in the standby position. The automatic control switch was on. The navigation equipment switch was switched to the GPS position. The accident localiser switch was off, the device was disconnected during the FRS intervention by an aeroclub staff member.

#### 1.12.3 Control

The controllers in the cockpit have been preserved. All disconnection and deformation of rods and cables has been caused by forces resulting from the crash and destruction of a part of wing and tail surfaces. Due to deformation it was impossible to determine trim setting.

The electromechanical flap control was in the position of "flaps retracted".

#### 1.12.4 Power Plant

Due to the crash against a wall and the fall down to the ground the engine has been displaced to the right of the fuselage. The propeller together with a spinner has been broken off the crank shaft before the propeller hub flange from the engine. The propeller blades and spinner have been deformed by the crash.

The nose crash and engine displacement have damaged and deformed the carburettor control rods.

The aircraft was inspected at the place of air accident and then transported to the storage area. For the state of aircraft wreckage see the photographs in Appendix No. 1.

#### 1.12.5 Detailed Inspection of the Power Plant

The damaged crank shaft at the main bearing outlet before the spreading ring and the shaft seal before the propeller hub flange was rotating without any greater stress with standard resistance. The drive gearbox was functional and was conveying torque to aggregates (fuel pump, vacuum pump, propeller governor, and dual magneto drive) without any damage. The magneto acoustically signalled the activity or functionality of exhaust coupling. When measuring the compressed pressure ratio, given the dry cylinder walls, the average value of 30 psi was measured (the standard is 60-80 psi).

The ignition harness has been removed. Visual inspection revealed no damage. The cables were complete and connected to the outlets of spark-plug connector dual magneto. Electric conductivity test has not identified any defects. The dismantled spark-plugs, Champion RHM38E type, have been tested by SPCT 100. The test has not detected any defect. The dual magneto, D4L N -3000, P/N 10-785124-106, S/N F109315G model, including the exhaust coupling, has also been dismantled. No defects or excessive mechanic wear-and-tear or pitting of connectors have been detected.

The surface of dismantled operating cylinders corresponded to the engine service life without losing a honing pattern, the pistons were visually in order, free of coloration due to excessive temperature. The piston rings were in good condition. When inspecting the valve gear, no defects of individual components have been detected.

Inspection of oil installation focused on the condition of the oil purifier, completeness of piping from the oil tank and control tap. The tank has been broken due to the crash, the content of the oil tank has partially leaked through the hole at the place where the crank shaft was damaged during the air accident. A sufficient oil sample has been taken. The oil tank cover has been closed. The oil purifier has not been contaminated and no traces of metal abrasion and mechanical impurities have been detected.

The engine fuel system was free of defect. The control rod has been connected and secured in the prescribed manner.

Inspection of fuel installation focused on the condition of the fuel purifier before the carburettor and on the carburetor. Inspection detected no impurities and sediments in the installation. The fuel purifier was fully functional. The carburettor was of an approved type and was fitted with jets of appropriate diameter, while the carburetor was correctly set. The controls have been connected and secured. The inner space of the gas mixer has not been contaminated, the air purifier has been broken away at the place of the flange. The purifier has not been contaminated and was through-going.

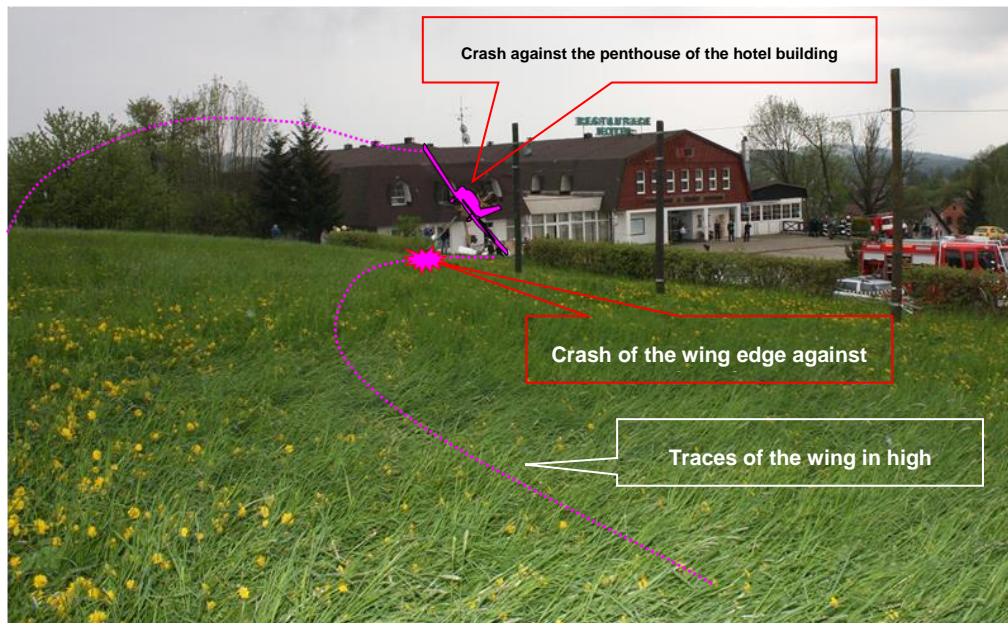


Fig. 3 Situation plan of aircraft movement prior to the crash

### 1.13 Medical and Pathological Information

The pilot and another person were transported by ARS helicopters to the University Hospital in Hradec Králové. Given his serious injuries and danger to life the pilot was admitted to the Emergency Ward. According to the Medical Examination Report no alcohol was detected in the blood stream of the pilot and another person.

On 24 May 2013 the pilot was repatriated to a health facility in Germany. According to the information of the Public Prosecution Office in Berlin, the pilot died on 12 June 2013 without being examined.

### 1.14 Fire

The aircraft wreckage has not caught fire.

### 1.15 Survival Aspects

The witness from the airport, who was watching the attempted take-off, immediately after hearing a bang and not seeing the aircraft flying reported the incident on the emergency line. Professional fire brigade from Vrchlabí immediately set off to the place and voluntary fire brigade from Lánov and ARS were also summoned.

### 1.16 Tests and Research

NIL

### 1.17 Organisational and Management Information

The aircraft owner and operator was a private person.

## 1.18 Additional Information

### 1.18.1 Responsibility of Pilot-in-Command for Compliance with the Rules of the Air

The air regulation Rules of the Air L 2 stipulates for the Czech Republic in provision. 2.3 *Responsibility for Compliance with the Rules of the Air* as follows:

#### 2.3.1 Responsibility of Pilot-in-Command

The pilot-in-command of an aircraft shall, whether operating the controls or otherwise, be responsible for the operation of the aircraft in conformity with the rules of the air, except that the pilot-in-command shall take another course of action in situations that warrant such departure necessary in the interests of safety.

### 1.18.2 Flight Manual

The Flight Manual assumes for take-off with flaps in the take-off position (10 degrees) at MTOW of 1 150 kg the speed of nose landing gear lifting  $V_{LOF} = 63$  kt ( $117$  km h<sup>-1</sup>). The pilot is supposed to achieve safe speed of initial climb of approx. 70 kt ( $130$  km h<sup>-1</sup>) and ascend at this speed up to 300 ft. For determining the take-off run distance the Flight Manual stipulates a table applicable to paved, dry, straight runway in no-wind condition. For ambient air temperature of 15 °C at the airport and the pressure above sea level of the airport of 1 611 ft the unstick distance is approx. 474 m. For other than the above mentioned conditions, especially when grass is wet and high (higher grassland), the distance increases by 39 per cent. The Manual alerts to the necessity to add a reserve of more than 39 per cent when taking-off on soft surface and mud, which represents another 185 m.

### 1.18.3 Air Traffic at the Vrchlabí Airport

At the Vrchlabí airport a flight of Cessna 172M aircraft was carried out in the morning. A passenger from the aircraft mentioned in her testimony that on 11. May 2013 at 08:30 she flew together with other two passengers on board in a flight for which she paid at the Vrchlabí airport. The pilot informed them before take-off that should they not come to the airport from such a great distance, he would otherwise have postponed the flight until the following day due to a water-logged runway. After landing after some 45 minute flight the passenger saw an aircraft towed by a tractor from the runway. After landing the pilot told them that they nearly failed to take-off because the aircraft was too heavy.

### 1.18.4 Testimony of the Pilot of Cessna 172M

The pilot of Cessna 172M aircraft said that on 11 May 2013 he expected performance of air training and other flights. The weather was rainy since morning and it was raining heavily for several preceding days. There were puddles at some places on RWY and the RWY was rather soft. At 06:30 the flight was sold and the pilot flew with the passengers from RWY 29 at 06:50. The start on the soft terrain required a long take-off run. After take-off the pilot told himself he would not conduct any other flights. After a 45 minute flight he landed at 07:35 and advised the cashier not to sell any other flights because of water-logged runway.

In his testimony he also mentioned that during his flight the pilot of TB 10 aircraft also wanted to take-off. He personally did not see his attempted take-offs. He only saw him standing at wash where the mechanic was assisting him with dismantling wheel covers and washed mud away from the covers.

Afterwards he went home for lunch and was notified by phone of an air accident. He immediately went to the place of accident where the rescue work has already been under way.

The pilot of Cessna 172M aircraft also said that he had flown with a similar type of an aircraft (P-28) and knows that take-offs always required much longer take-off run than Cessna. He also assumed that after two unsuccessful attempted take-offs the pilot of TB 10 would give up any further take-offs. In his opinion, in such soft terrain throttling down the engine would make the aircraft stop quickly.

#### **1.19 Useful or Effective Investigation Techniques**

Air accident investigation was carried out in compliance with Rule L13.

## 2 Analysis

The analysis is based on acquired evidence, description by witnesses, the nature of tracks and the state of the place of air accident because there was no device in the aircraft the record of which the commission could use.

### 2.1 Analysis of Movement during Take-off Run

The aircraft take-off run was principally affected by the condition of the operating area of the Vrchlabí airport and the state of grassland in immediate surroundings of the runway. The pilot was able to evaluate the current condition of the runway after landing on LKVR on 8 May 2013. For both following days he was staying in the proximity of the airport and according to the testimony of another person on board, he even partially adjusted the schedule of their stay with regards to persistent rainfall. Given his pilot experience he was very likely to understand the information provided in English by the AFIS Controller through another witness regarding the bad condition of the runway due to preceding persistent rainfall. Nevertheless, his decision might have been influenced by the fact that he saw another aircraft (Cessna 172M) departing from the airport, the MTOW of which does not substantially differ from the MTOW of TB 10.

The take-off run from the place at the northern edge of RWY 29 was interrupted by the pilot who was considering the best starting point for another attempt. Afterwards he attempted a take-off from the same place on RWY 29. After taxiing some 300 – 400 m, he stopped on the runway because the wheels sank into the water-logged surface and the aerodynamic wheel covers were silted with mud and grass. In such a situation it was beyond dispute that the runway was not suitable for take-off of TB 10 Tobago aircraft.

Although another person on board in her testimony did not mention how the pilot had assessed the situation, the witnesses' testimonies and the tracks on the runway show that after towing of the aircraft to a paved area where the undercarriage was cleansed, the pilot decided to repeat a take-off from the airport, this time from RWY 11. The wheel tracks from the situation concerned prove that during taxiing to the stand at the place of take-off the aircraft did not sink in the water-logged terrain and therefore the pilot probably considered the selected section of operating area more acceptable. The pilot started the take-off run from the point before the RWY 11 threshold, at its left edge and was moving slightly across the runway in the direction of the right edge of RWY 11 in order to perform the take-off run at the place where he had been taxiing and to have sufficiently long runway to gain speed for lift-off. The total distance of main landing gear wheel tracks equalled approx. 1 060 m, probably without the aircraft achieving a lift-off at speed secure for climbing. To a considerable degree, it was caused by low bearing capacity of the surface and in the second half of aircraft track when the aircraft left the mown tract of runway at LKVR, by high wet grass. At the distance of approx. 300 m where the terrain rises steadily before the end of the airport, there are tracks of the main wheels only. In this area the aircraft was going with a lifted nose wheel.

The witnesses were unable to clearly determine whether the aircraft had the flaps extended. As wreckage investigation showed that the electrical flap control mechanism was in the retracted position during the crash, the pilot either performed the take-off run with retracted flaps or retracted the flaps during take-off run.

The pilot incorrectly continued with the take-off run outside the mowed tract of RWY 11 in high grass on the operating area. When he was at the end of RWY 11, he did not interrupt the take-off run when crossing a dirt track at the end of the airport. There was only a gently dipping grass area without major obstacles, some 200 m long,



ended by a local road, high trees and municipal development, remaining for the pilot to resolve the occurred dangerous situation. The pilot probably did not try to stop the aircraft. The tracks show that he was moving in the direction slightly to the right. Meanwhile, he was heading to the right from the runway axis, towards the hotel building, which is located under a gentle slope, somewhat lower than the terrain of the airport edge. Given the engine control mode setting, the pilot probably continued attempting to lift off the aircraft and start climbing.

According to the tracks left by the main landing gear wheels, the left wheel and the right wheel were lifted approximately at the distance of 89 m and 65 m away from the hotel building, respectively. The subsequent tracks in grass at approx. 47 m from the building show that the aircraft in a roll started catching on high grass. It is possible to deduce that the aircraft shortly lifted off, continued in its movement forward, probably in a positive roll, but immediately afterwards lost speed. These tracks ended approximately 36 m away from the building.

## 2.2 Crash Analysis

Based on the aircraft wreckage and tracks in the terrain and traces on the building, it has been deduced that the aircraft had caught with its right wingtip arc on the terrain. Consequently, the wingtip arc broke due to the crash against a paved road at 12,7 m away from the building and the aircraft in a roll of 45 degrees crashed against the wooden roof structure of a penthouse apartment with its left side of the wing first. The fuselage axis was aimed downwards under a small angle and based on deformation of the propeller spinner aside the wall level. Destruction of the wooden roof structure of a penthouse apartment and the wing cushioned the initial crash of fuselage which then fell with its right side down to the ground from the height of approx. 3 m before the wall of the hotel building.

## 2.3 Effect of Meteorological Conditions

According to the AFIS Controller there was no wind at the airport and it was overcast. Precipitation stopped approximately at midnight from 10 to 11 May 2013 and it was not raining during the pilot's pre-flight preparation, decision-making and attempts to take off.

The persistent rainfall during the two preceding days affected the runway condition. With regards to the precipitation amounts the grass LKVR RWY was highly likely to be heavily water-logged at some places, i.e. the surface was soft and easy to sink in.

With regards to these circumstances there was a warning for aircraft crews provided by the AFIS Controller and by means of a signal at the signal area.

## 2.4 Human Factor

### 2.4.1 Pilot's Competency

The pilot had appropriate qualification and experience for VFR flights. From the medical point of view he was capable of conducting the flight and had enough time to rest.

### 2.4.2 Pilot's Decision to Continue in Attempts to Take off from LKVR

Undoubtedly, the pilot knew of the risks he was undergoing when attempting to take off regardless of the warning re the unsuitable runway condition due to persistent rainfall.

As the pilot could not be examined, it is not possible to clearly explain why he did not respect the information about limited operational availability of the runway although he ought to do so. According to the testimony of another person on board, he was under no pressure ensuing from his work duties and had information about improving meteorological conditions. It is likely he wanted to avoid further waiting, which would mean to stay on the spot and perform departure from LKVR no sooner than on the following day. The pilot's decision after dismantling the covers and washing the wheels to continue in further attempts to take off was erroneous.

The first and namely the second trial when the undercarriage sank in mud and the aircraft had to be towed away made the risk obvious. The conditions during take-off run on RWY 11 and on the operating area to the right from the runway, outside the mowed track, based on tracks and testimonies of the witnesses watching the manoeuvre from the ground, did not allow for safe take-off of the aircraft.

The pilot should have been aware of the excessive distance of take-off run and the fact that the terrain after the runway together with barriers may not allow for completion of lift-off due to insufficient speed. He could have stopped the aircraft safely and discontinued the take-off run at the end of RWY 11 at the latest albeit using the remaining grass area, approx. 200 m long.

#### 2.4.3 Survival Aspects

The force of the crash against the building and fall on the ground resulted in vast deformation of the cockpit structure on the left side. Given the condition of safety belts, the pilot and another person were fastened. Most probably due to very strong deceleration both of them were propelled forward and to the side.

### 3 Conclusions

3.1 The AAI Commission concludes the following:

#### 3.1.1 Pilot

- had valid qualification to conduct a flight with another person on board;
- had a medical certificate for the given type of air activity.

#### 3.1.2 Performance of Flight by the Pilot

- The pilot did not respect the information about limited operational availability of the runway and repeatedly attempted to take-off although he undoubtedly knew of the risk which he was undergoing when attempting a take-off from a runway water-logged due to persistent rainfall on the preceding day;
- High wet grass and water-logged runway surface negatively affected the course of take-off run;
- Part of the take-off run outside the mowed tract of grass, at part of the operating area of LKVR which rises steadily, was carried out with lifted nose wheel without achieving a lift-off of main wheels;

- When crossing a dirt track at the end of the operating area of LKVR, the aircraft probably lifted off for a little while, but started catching on grassland with its wing in a positive roll;
- The aircraft bumped against bushes with its right wingtip arc and subsequently against the terrain above a local road; such crash diverged the aircraft to the right;
- Damage to the wing, fuselage and vertical tail unit correspond to the crash against the building in a positive roll of 45 degrees with a nose slightly bent downwards;
- The aircraft was damaged by the effect of forces during the crash against the building and fall on the ground.

### 3.1.3 Aircraft

- The aircraft had a valid certificate of airworthiness inspection;
  - During take-off the aircraft weight did not exceed the approved MTOW;
  - The aircraft was refuelled and at the time of air accident there was sufficient amount of fuel in tanks;
  - Prior to the event flight the pilot did not report any defect or deficiency and there is also no evidence of aircraft defect before the aircraft crashed against the building;
- The aircraft configuration during the crash corresponded to retracted flaps and the choke set to maximum.

### 3.2 Causes

The cause was pilot's incorrect decision to conduct a flight under the given operating condition of the runway at LKVR.

## 4. Safety Recommendations

AAll issues no safety recommendation.

## 5) Appendices

Appendix No. 1 Photographic Documentation

Appendix No. 2 Meteorological Information

Appendix No. 1

Photographic Documentation



Tracks of aircraft wheels during take-off run



Tracks of landing gear wheels on muddy RWY



Aircraft wheel tracks after leaving RWY



Aircraft wheel tracks at the end of RWY



Aircraft wheel tracks when crossing the dirt track



Aircraft wheel tracks in high grass in the direction of the hotel



Tracks after the crash against the hotel building



View of the hotel building and aircraft wreckage



Flap power control



Location of the power plant in the aircraft fuselage

Meteorological Information

