



AIR ACCIDENTS INVESTIGATION
INSTITUTE OF THE CZECH REPUBLIC
Beranových 130
199 01 PRAHA 99

CZ-12-360
Copy No.: 8

FINAL REPORT

**Air accident involving
Socata Rallye 150ST, registration mark OE-DII,
on 16 August 2012 at LKZA.**

August 2013

This investigation has been carried out in accordance with the Regulation EU No 996/2010, Act No 49/1997 Coll., on civil aviation and Annex 13 to the ICAO Convention on International Civil Aviation. The sole objective of the investigation of an accident or incident under these Regulations shall be the prevention of accidents and incidents. It shall not be the purpose of such an investigation to apportion blame or liability. The Final Report, findings and conclusions therein concerning air accidents and incidents, and possibly systemic shortcomings endangering operational safety, are only of an informative nature and cannot be used otherwise than as a recommendation for the implementation of measures in order to prevent further air accidents and incidents with similar causes. The creator of the Final Report explicitly states that the Final Report cannot be used to determine blame or responsibility in connection with determining the causes of an air accident or incident and cannot be used for enforcing claims in the event of an insurance claim.

This report has been translated and published by the Air Accidents Investigation Institute to make its reading easier for English-speaking people. As accurate as the translation may be, the original text in Czech is the work of reference.

Abbreviations used

AAll	Air accident investigation institute Czech Republic
ACCID	Air accident
ACFT	Aircraft
AFIS	Aerodrome flight information service
AGL	Above ground level
AK	Aeroclub
AMSL	Above mean sea level
ATZ	Aerodrome traffic zone
AW	Actual aircraft weight
CEST	Central European summer time
CHMU	Czech hydro-meteorological office
E	East
Ft	Feet (length unit 1 ft = 0.2048 m)
H	Height
hr	Hour (time unit)
HPa	Hectopascal (pressure unit)
HZS	Fire brigade
Km	Kilometer (length unit)
l	Litre (metric volume unit)
LKFR	Aerodrome in town of Frýdlant
LKMT	Aerodrome in town of Ostrava/Mošnov
LKZA	Aerodrome in town of Zábřeh
m	Meter (length unit)
min	Minute (time unit)
MTOW	Maximum take-off weight
n_y	g load factor
NNE	North-north east
PČR	Czech Republic Police
PIC	Pilot in command
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
QRS	Quick rescue service
R	Right
RCC	Rescue and co-ordination centre
S	South
sec	second (time unit)
SSR	Secondary surveillance radar
T	Temperature
THR	Runway threshold
TWY	Taxiway
UTC	Co-ordinated Universal Time
VFR	Visual flight rules
VÚSL	Military office of forensic medicine
WDI	Wind direction indicator
ZZZZ	Aerodrome without ICAO-assigned directional code

A) Introduction

Operator:	Privat
Aircraft manufacturer :	Morane-Saulnier à la SOCATA (EADS)
Model of Aircraft	RALLYE 150ST
Registration mark:	OE-DII
Call sign:	OEDII
Site of event:	Cca 300 m NNE THR RWY 10R LKZA
Date:	16 August, 2012
Time:	Cca 13:42 CEST (11:42 UTC, next times in UTC)

B) Information survey

On 16th August 2012 AAI was notified by RCC and PČR of an air accident involving an aircraft with a registration mark as given above. When on approach to landing on LKZA, over the aerodrome, the aircraft crashed into the ground. The aircraft was destroyed by the impact. There were two persons on board, both of them were killed.

The accident was investigated by a UZPLN commission consisting of:

Chairman: Ing. Josef Procházka
Members: Ing. Lubomír Střihavka
MUDr. Miloš Sokol, Ph.D, VUSL

The final report was issued by:
Air Accident Investigation Institute
Beranových 130
199 01 PRAHA 99
7 August, 2013

C) Body of report

1. Factual information
2. Analysis
3. Conclusions
4. Safety recommendation

1. Factual information

1.1.1 Situation precedent to critical flight

The aircraft with two persons on board, the pilot and a passenger, landed on LKZA on 5 August 2012 at 10 hr 40 min. During the arrival the crew did not report to AFIS LKZA. The plane flew over the aerodrome surface at a height of ca 30 m, according to a witness statement. This low pass was made apparently in order to check the aerodrome surfaces and landing direction. After landing, the crew informed a member of AK LKZA about a failure of the plane's radio station due to which the crew had landed. Then they talked about its possible reparation. Subsequently the pilot asked to borrow a portable radio station with an air band suitable for a non specified travel to Scandinavia. The member of AK LKZA lent the pilot the radio station requested. At the same time they agreed the pilot would give the station back to LKZA after returning from Scandinavia.

The following details include data, times, takeoff and landing places and times of all flights, starting from the takeoff time from LKZA on 6 August 2012 till the critical flight of 16 August 2012.

6/8/2012, LKZA 06:40 - EYKS (Kaunas Lithuania) 10:35, 3 hr 55 min
7/8/2012, EYKS 13:51 - EETN (Talin, Estonia) 16:36, 2 hr 45 min
8/8/2012, EETN 09:31 - EFJY (Javaskala, Finland) 12:08, 2 hr 37 min
10/8/2012, ZZZZ 13:53 - ZZZZ (Finland, ACFT Cessna C185) 14:23, 3 flights, 0:30 hr
14/8/2012, EFJY 08:24 - EVPP (Riga, Latvia) 11:45, 3 hr 21 min
14/8/2012, EVPP 12:15 - EYPN (Panavezys, Lithuania) 12:55, 0 hr 40 min
15/8/2012, EYPN 09:45 - EYKS (Kaunas, Lithuania) 10:15, 0 hr 30 min

1.1.2 Course of critical flight

The pilot stated the route in his flight plan as follows: flight after takeoff from EYKS (Kaunas, Lithuania) BOKSU, OLILA, BAVOK, destination aerodrome LKZA, alternate aerodrome LKFR. In the box LEVEL of the flight plan he stated VFR. He took off on 16 August 2012 at 07:26. ACCID time was 11:17. The flight lasted 3 hrs 50 min. The distance flown 383.1 NM (ca 710 km). An analysis of the GPS record was used to evaluate the arrival course to LKZA. The flight data given in this report are those from that record. The speed is the cruise airspeed, heights were read from the pressure set on GPS 1013 HPa. A witness statement by an AK LKZA member was used.

At flyover to Poland at 11:09:20 (position town of Raciborz ca 23 km NE of LKZA, point 5, Fig 1) the plane turned to heading 180° and began to descend from a level of ca 3,300 ft with a vertical rate of descent 1-2 m.s⁻¹. On the level of the town of Bienkovice (ca 15 km NE LKZA, point 4, Fig 1) at 11:12:23 the pilot turned to heading 200°. The flight speed was 190 km.hr⁻¹. The plane crossed the border of FIR LKAA (ca 12 km NE from LKZA, point 3, Fig 1) at 11:13:48, flight level 3,100 ft descending ca 3 m.s⁻¹ at speed of 180 km. hr⁻¹. At this descent at 11:15:56 it reached a level of 2,000 ft (ca 3 km NE of LKZA, point 2, Fig 1.). From this position the plane increased its rate of descent to ca 5 m/s while simultaneously decreasing flight speed to 136 km.hr⁻¹. At 11:16:41 on heading 214° in descending 5 m.s⁻¹ it reached a level of 1,267 ft, point 1, Fig 1. From this position the pilot began to take a right turn into the direction of RWY 28R LKZA. In turning he continued reducing the level down to 1,000 ft (ca 60m AGL) and at the same time slowing the speed to 110 km.hr⁻¹. These values were reached just ahead of THR RWY 28R LKZA. Then he flew over RWY 28R, keeping descending ca 3 m.s⁻¹ and lowering the height and speed. At a distance of ca 500 m

from THR RWY 28R (at level TWYs A and B) the plane's height was 928 ft (ca 35 m AGL) and speed 97 km.hr⁻¹. From this position it turned gradually to the right to a heading of 337° on level 909 ft (ca 30 m AGL), with the speed going down to 86 km.hr⁻¹. Then there was transition to a left turn to heading 311° and further with an increased angular speed up to the final heading of 263°, flight level 909 ft (30m AGL) and speed 87 km.hr⁻¹. In a short straight section the plane went down to level 865 ft (ca 20m AGL), its speed went up to 105 km.hr⁻¹, with vertical rate increasing to ca 9m.s⁻¹. At the same time the vertical rate of descent dropped 0 -1m.s⁻¹. Simultaneously the airspeed fell to 74 km.hr⁻¹.

The witness's observation stand was approximately 500 m W of THR RWY 28R, 100m N from the plane's flight trajectory over RWY 28.

The witness saw the plane arriving from the east 30 to 50 m AGL at a speed of approximately 110 to 120 km.hr⁻¹, presenting a high angle of attack and low engine power. The plane passed over RWY 28 past WDI, made a small right turn behind the hangars and trees to disappear from the witness's sight. All the time till the moment the plane hit the ground, which the witness heard, the engine's sound seemed to be in the same regime as when the plane was flying over the aerodrome surface. The witness along with other people and later with QRS members got the crew out the plane.

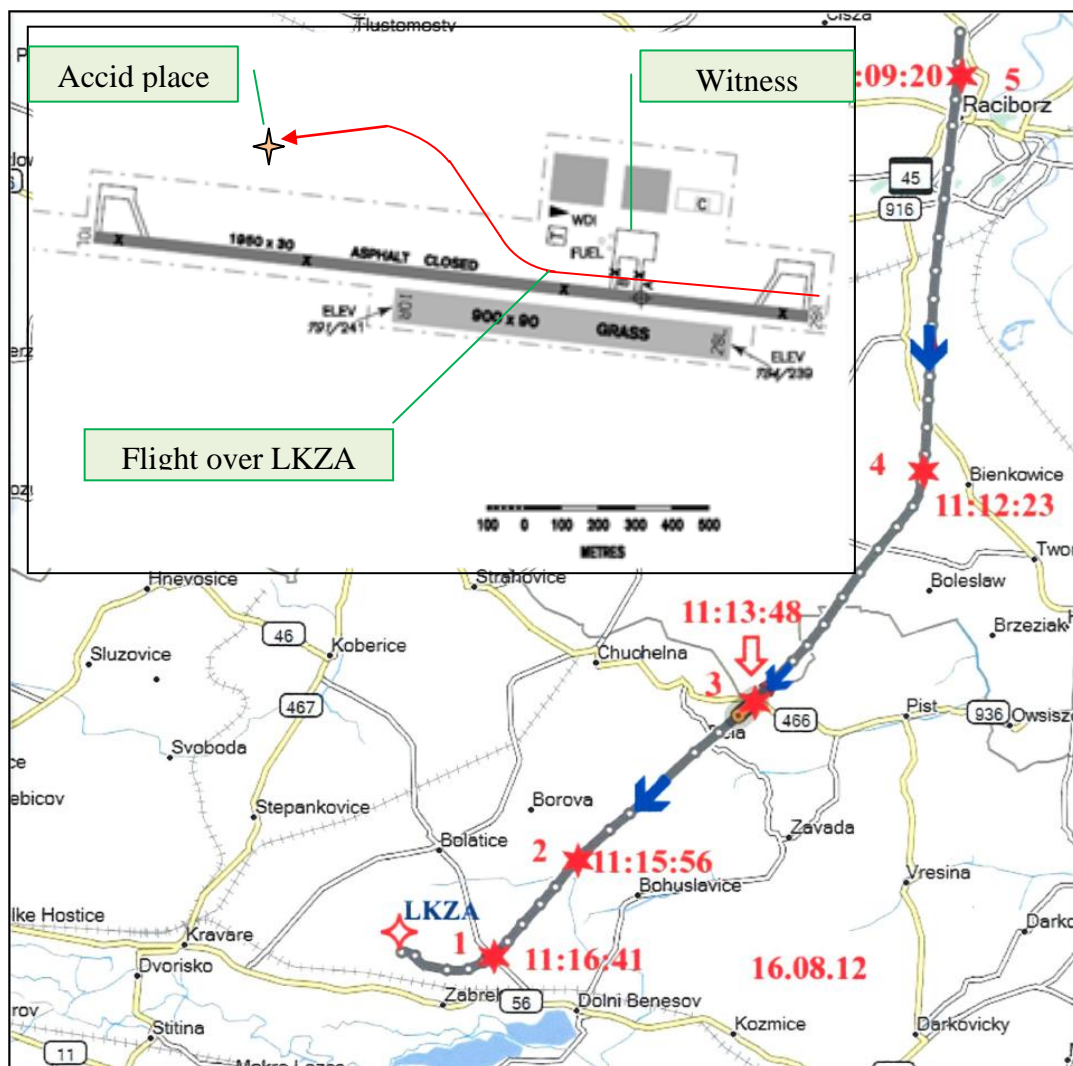


Fig 1: Final section of flight track

1.2 Injury to persons

Injury	Crew	Passengers	Other people
Fatal	1	1	0
Serious	0	0	0
Light / w/o injury	0/0	0/0	0/0

1.3 Damage to aircraft

The aircraft was destroyed as it crashed into the ground.

1.4 Other damage

No other damage was reported

1.5 Information about persons

1.5.1 Pilot

Man – age: 41
Pilot license: PPL(A), valid issued 18th October 2010
Qualification: Pilot

Flight experience, incl. flight on 16 August, 2012
Total flight hours: 214 hrs, 06 min
Flight hours as PIC: 156 hrs, 07 min
On the type total: 27 flights, 35 hrs 17 min since 26th August 2011
In the last 30 days: 9 flights, 19 hrs 44 min
Medical: Valid

1.5.2 Passenger

Man – age: 67 years, no air qualification

1.6 Information about aircraft

Socata-Rallye 150ST, a one-engine all metal low-wing monoplane with a fixed nose gear. The wing features extensible slats.

OE-DII data as given in its flight manual (speeds in km.hr⁻¹):

Crew:	4	V _{max} :	250
Length:	7.24 m (23.75 ft)	V _{cruise} :	200
Wing span:	9.74 m (31.95 ft)	V _{stall} (AW 870 kg, engine idling):	
Height:	2.80 m (9.18 ft)	Bank angle:	0° 30° 45°
Wing surface:	12.28 m ² (132.18 ft ²)	Flaps 0°:	91 98 108
Empty weight:	525 kg	Flaps 30°:	82 89 97
MTOW:	870 kg	n _y :	1 1.14 1.425



Fig 2: Rallye150ST, registration mark OE-DII
(photo publicized with the agreement of author)

1.6.1 Airframe

Type:	Rallye 150ST
Registration mark:	OE-DII
Manufacturer:	Morane-Saulnier Socata Tarbes Ossun
Operational from:	1977
Serial No:	2818
Total flight hours at the time of the accident:	3791 hrs 47 min incl flight on 6/8/2012
Log Book:	Updated
Last inspection:	18/11/2011
Insurance certificate:	Not found

The weight of wrecks aircraft 587,2 kg was verified by weighting.

Crew weight:	210 kg (according to medical report)
Weight of fuel and oil:	Ca 24 kg
AW at time of accident:	Ca 821 kg

1.6.2 Power plant

Engine:	Textron Lycoming O-320-E2A
Serial No	RL-17447-27A
300-hour examination of airframe and engine:	On 28/7/2011 on accumulating 303 hours 33 minutes
Propeller:	WOODCOMP, three-bladed, electrically variable pitch
Inspection at manufacturer:	26/1/2011 after 231 hrs 37 min working time

There was 5 Qt of oil in the engine as measured after the accident.

1.7 Meteorological situation

Mostly clear to partly cloudy. Over the western half of Bohemia and gradually everywhere, cloudy and overcast. In Moravia and Silesia more clouds in the evening. Rain or showers in the western half of Bohemia, elsewhere only isolated showers. Highest temperatures 24–28°C, in the west around 20°C. Slight variable north-west wind 1 – 4 m.s⁻¹. Pressure tendency – steady state.

METAR LKMT 161130Z

09004KT 010V150 9999 FEW040 23/14 Q1017 NOSIG RMK REG QNH 1013

METAR LKTB 161130Z

23003KT 180V270 CAVOK 25/09 Q1016 NOSIG RMK REG QNH 1013

Weather LKZA: Visibility more than 10km, higher clouds, wind from 100° up to 5 m.s⁻¹.

1.8 Radio-navigation and visual aids

NIL

1.9 Communications

AFIS LKZA was out of service because of the aerodrome's operating hours.

1.8.1 Aerodrome information

LKZA is a public domestic aerodrome with a grass surface, 794 ft/242 m above sea level, serviceable VFR day. Flight altitude in the circuit 1810ft/550 m AMSL. The aerodrome had no effect on the accident.

1.11 Flight recorders and other recording aids

GPS GARMIN Aero 500, IQP000404 has been used for analyzing flight data.

Since the GPS manufacturer's pressure setting was 1,013 HPa and the reported LKMT and LKTB pressures were 1,013 HPa, the read height data may be considered as the AMSL actual flight level. The read speed data represent the enroute speed.

1.12 Wreckage and accident site information

The accident took place on the aerodrome surface. The surface was grassy and dry. Air accident coordinates – N49 55.882, E18 04.270. Altitude AMSL 792 ft.

Figs 3 and 4: The plane wreckage





The aircraft fell on the ground, heading ca 260°. It lay on the belly. Wreckage of the main structural parts, wing, fuselage, tail plane, and power plant were at one place, on the edge of a ditch about one meter deep. The left half wing was broken off, lying beside the fuselage behind the ditch. Taking into account the wreckage condition it seems very likely that the plane dropped banked slightly left at a relatively small vertical speed. The state and functionality of the plane's control surfaces before the accident could not be established at the accident site because they were damaged by impact with the ground.

The cockpit canopy and objects were scattered to a distance of about five meters.

Subsequent technical check showed that all the control elements were connected with control surfaces, which indicates that the plane controls were fully functional. The flaps were retracted. The leading edge slots were pulled out. Both the engine control rods in cockpit were set to the position low power or idling. The engine control rod in the middle of the dashboard was bent left ca 20° and down. HZS pumped about 30 l petrol off the tanks.

After the accident values as indicated on cockpit instruments were as follows:
Altimeter - indicated H - 440 ft. Pressure set to 1,018 hPa.

Airspeed indicator - position of indicator hand 0, or you like in basic position.

Combined instrument – compass/VOR – compass indicated ca 350° / VOR, set frequency 106.4 MHz.

Transponder control KT 78TSQ was at ON position.

Switchbox at OFF position, key removed.

Engine speed indicator was at value 0, engine hours indicator showed 3,852.52.

Flaps position indicator was in position extended to ca 1/3.

Elevator balance indicator was in position "heavier on tail" (ca 2 cm fore past neutral position).

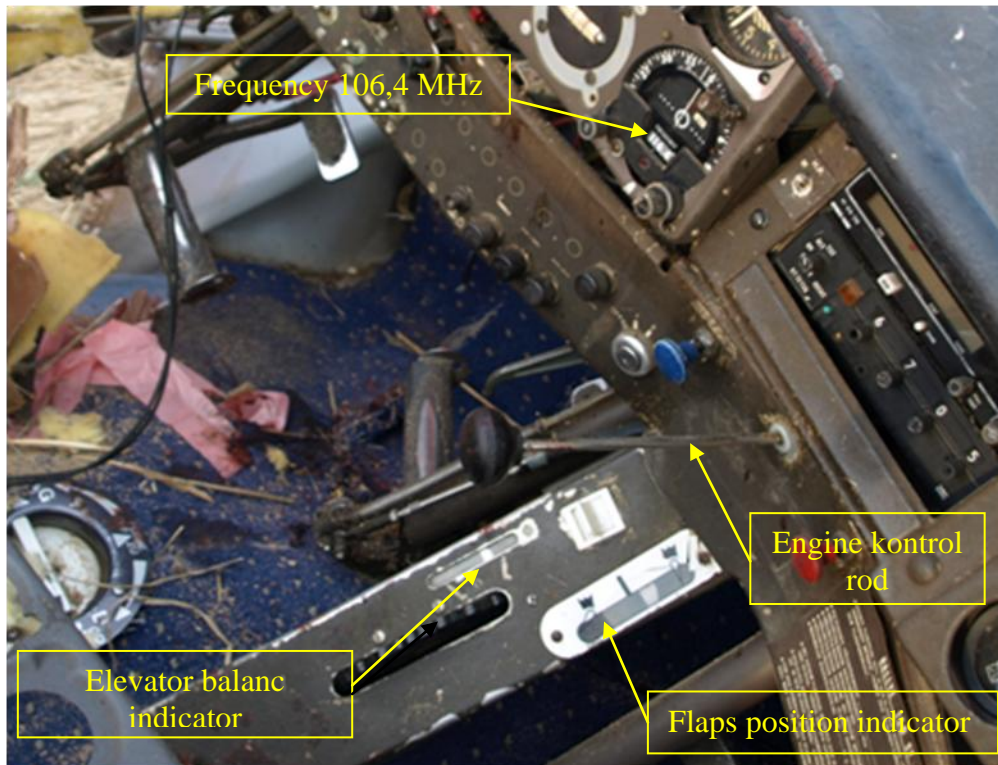


Fig 5: View into cockpit

1.13.1 Medical and pathological findings

The two persons died due to injuries. The passenger died immediately in the time of the accident. The pilot died ca 20 minutes after the accident despite the medical care provided. The bodies of both persons were exposed to rude violence, the vector of forces acting from front and below.

The injury can be well explained by mechanism of the accident as the plane fell and hit the ground. Both the persons on board had their safety belts fastened. No injury origins other than injury mechanism were detected, as for instance shooting or explosion on board.

No chronic pathological issues were detected in the pilot, which could have influenced the accident or which could have been related with the death.

No ethyl alcohol or narcotic drugs in persons' blood were detected by toxicological examination.

Biochemical examination of the pilot could not be conducted due to the presence and changes, however short, in his energy metabolism. Results could not have been evaluated correctly.

The passenger did not suffer from hypoxia (lack of inhaled oxygen). He was conscious till the moment of the accident. He was suffering an intense mental stress lasting tens of seconds or more than one minute as he perceived an emergency threatening his life.

A forensic medical expertise excluded with a very high probability that the accident could have been brought about by a medical cause. The total mass of the two persons on board was 210 kg.

1.14 Fire

NIL

1.15 Search and rescue

The accident was reported to PČR and RZS by witnesses.

1.16 Tests and research

Engine inspection.

A technical inspection of the engine was carried out to evaluate the technical state of the power plant. No failures were detected that could have restrained the engine work during the crucial flight. The functionality of ignition sparks was checked. The engine could be turned manually without much resistance, the oil being pushed into the engine properly. No metal impurities were detected in the oil cleaner, the cleaner was passable. The mechanical fuel pump worked properly, containing remnants of petrol, carburettor was knocked off.

1.17 Organizational and management information

The aircraft was operated by a private person.

1.18 Additional information

NIL

1.19 Investigation techniques

Investigation techniques were in accordance with L13 Regulation.

2. Analysis

When establishing causes of the accident, the Commission drew on the analysis of GP GARMIN, witnesses' information, information on professional skill and medical fitness of the persons on board, and on documentation of the aircraft and its power plant.

➤ Pilot

- Had a valid license of crew member with accordant qualification and valid his medical certificate.
- Was not under influence of alcohol or other forbidden drugs.

➤ Aircraft

- It was manufactured in 1977
- Its Log Book was updated.
- Its insurance certificate has not been found.
- During the plane inspection at the accident site and the following inspection of the wreckage the Commission did not get evidence to confirm or exclude a controls failure.
- The engine worked on low power during the approach till the impact on the ground.
- Before the accident the engine was serviced and operated in accordance with the requirements of the manufacturer.

2.3 Critical flight

- The crew did not communicate with AFIS LKZA in ATZ LKZA.

- The nearest VOR/DME with frequency 106.4 MHz set on the combined instrument - compass/VOR/DME was that of JABLONKA VOR/DME (N49, 28; E19, 40; ca 125 km east south east of LKZA).
- The crew had a secondary radar transponder in an identification code (6705) that is not assigned by ATS of the Czech Republic or Poland. It is very likely that the crew obtained this code at departure from LYKS. The transponder control has been found in position ON, so in this position the transponder would not display the aircraft altitude on SSR during flight.
- The final flight phase, ca 7 min before the accident, was analyzed using the GPS record. It follows from this analysis that the aircraft speed was decreasing during the approach in descending. This speed just closely above the ground as measured by GPS may be considered, with regard to surface wind, as a speed very close to the actual airspeed.
- When flying over LKZA the plane descended to ca 35 m AGL at a speed close to the stall speed. The pilot accomplished the approach with reduced engine power. During the turns over LKZA the airspeed decreased below the stall speed and the aeroplane passed over into fall. The pilot could not successfully solve this situation due to the low height and low engine power setting.
- The passenger's mental stress corresponds to the plane position, when in descending at $5\text{m}\cdot\text{s}^{-1}$ from heading 214° it reached a level of 1267 ft and began to take a right turn into direction of RWY 28R LKZA. In the turn the pilot kept lowering the height to 1,000 ft (60m AGL) while always reducing the airspeed to $110\text{ km}\cdot\text{hr}^{-1}$.
- The witness statement confirms the plane flew in direction RWY 28, at 30 to 50 m AGL, at high angle of attack and low engine power, gradually changing the flight direction.
- Position of the wreckage on the ground and its investigation indicated that the plane fell at a small angle of impact.

2.4 Weather

The weather had no effect on the accident.

3. Conclusions

3.1 Conclusions made by Commission

- The pilot had a valid license of crew member with accordant qualification and his medical certificate.
- Airworthiness certificate of airplane was valid.
- Weather condition agree for approach and landing on LKZA.
- On 16 August, 2012 the pilot made a similar type of approach to LKZA as on 5 August, 2012.
- AFIS was not serviceable.
- Findings of technical inspection of the aircraft after accident did not show anything that could have contributed to the accident.
- Pilot approached to LKZA in a non-standard way. In the course of approach the airplane fell from ca 30 m AGL, its engine working on low power, nearly idling.
- Pilot tried to solve the situation by pulling the steering column.
- Setting a different pressure by 5 HPa on the altimeter scale had most likely no effect on the situation.

3.2 Accident cause

The accident was caused by the aircraft stalling, when flying at a low speed, on the turning, at a low engine power and in a height that prevented the pilot successfully solve the situation.