4a Format

STATE COMMISSION ON AIRCRAFT ACCIDENTS INVESTIGATION

FINAL REPORT

ACCIDENT

Occurrence No: 2970/16

Aircraft: Piper PA-31aeroplane, D-IFBU

24 November 2016, Przylep near Zielona Góra (EPZP)

This Report is a document presenting the position of the State Commission on Aircraft Accidents Investigation concerning circumstances of the air occurrence, its causes and safety recommendations. The Report was drawn up on the basis of information available on the date of its completion.

The air occurrence investigation process can not be considered as finally closed. The investigation may be reopened if new information becomes available or new investigation techniques are applied, which may affect the wording related to the causes, circumstances and safety recommendations contained in the Report.

Investigations into air occurrences are carried out in accordance with the applicable international, European Union and domestic legal provisions for prevention purposes only.

The investigation was carried out without the need of application of the legal evidential procedure, applicable for proceedings of other authorities required to take action in connection with an air occurrence.

The Commission does not apportion blame or liability.

In connection with Article 5 paragraph 5 of the Regulation (EU) No 996/2010 of the European Parliament and of the Council on the investigation and prevention of accidents and incidents in civil aviation […] and Article 134 of the Act – Aviation Law, the wording used in this Report may not be considered as an indication of the guilty or responsible for the occurrence.

For the above reasons, any form of use of this Report for any purpose other than air accidents and incidents prevention, can lead to wrong conclusions and interpretations.

This Report was drawn up in the Polish language. Other language versions may be drawn up for information purposes only.

Warsaw 2017

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GENERAL INFORMATION

Occurrence reference number:	***2970/16***			
Type of occurrence:	***ACCIDENT***			
Date of occurrence:	***24 November, 2016***			
Place of occurrence:	***Przylep near Zielona Góra - EPZP***			
Type and model of aircraft:	***aeroplane, Piper PA-31***			
Aircraft Registration Marks:	***D-IFBU***			
Aircraft User/Operator:	***GER-POL Air Taxi GmbH***			
Aircraft Commander:	***Commercial Pilot - Aeroplane***			
Number of victims/injuries:	***Fatal***	***Serious***	***Minor***	***None***
	1	***-***	***-***	***-***
Investigator-in-Charge:	***Ryszard Rutkowski***			
Investigating Authority:	***SCAAI***			
Composition of the Investigating Team:	***Jacek Bogatko***			
Document containing results:	***Final Report***			
Recommendations:	***NONE***			
Addressees of the recommendations:	***NOT APPLICABLE***			
Date of completion of the investigation:	***24 March, 2017***			

SYNOPSIS

On 24 November 2016, the pilot planned to perform a flight from Przylep (EPZP) to Nordhorn (EDWN). About 12:05 hrs the plane commenced the take-off run. After about 500 m of the take-off run, during rotation, the pilot started retracting the landing gear. After a while a nose down pitching moment occurred and the retracting nose landing gear and then the tips of the blades of both powerplants collided with the ground. Even then the pilot was continuing the take-off. After further several dozen meters of the take-off run the plane with the left bank lifted-off and from a height of over a dozen meters, rolling to the left, collided with the ground. Both engines were separated from the wings. The nose part of the fuselage and the cockpit were totally destroyed and the pilot was killed at the scene.

***Note**: The times in the Report, except GAMET, are expressed in LMT. Unless otherwise stated, the photos have been taken by SCAAI.*

Investigation into the occurrence has been conducted by the SCAAI Investigating Team in the following composition:

Ryszard Rutkowski, MSc (Eng.) instr. pilot - Investigator-in-Charge;
Jacek Bogatko, MSc (Eng.) instr. pilot - Team Member.

In the course of the investigation SCAAI determined that the causes of the accident were:

1. The pilot's error consisting in setting the landing gear control lever in the „retracted" position in the phase of rotation.
2. The pilot's failure to immediately abandon the take-off when the blades of both powerplants collided with the runway surface.

After conclusion of the investigation SCAAI has not proposed any safety recommendation.

1. FACTUAL INFORMATION

1.1. History of the flight.

In the morning of 24 November 2016 the pilot began preparation for the flight from Przylep (EPZP) to Nordhorn (EDWN). Due to weather conditions (mist and low cloud base) the take-off was delayed and only before noon, when the weather conditions improved, it was possible to perform a VFR flight. At about 12:00 hrs the pilot taxied the PA-31, D-IFBU airplane to the aerodrome and brought it to rest about 50 m short of the threshold of RWY 06 where he effected warming up and pre-flight run of the engines.

At about 12:05 hrs the airplane started the take-off run. The course of the run was recorded from the aerodrome tower until the accident. A sketch of the take-off run is shown in Annex 1 to this Report. The first tracks of the main landing gear on the surface were found about 500 m from the threshold of RWY 06 (Figure 1, below).

Figure 1. First tracks of the main landing gear left on RWY 06 grass after the take-off run.

In the Commission opinion, after approximately 500 m of the take-off run, during the rotation and a momentary aircraft lift-off, the pilot moved the landing gear control lever to the "retracted" position. However, a while later the airplane touched down again. The main landing gear was braked in the soft wetland and produced a nose down pitching moment. The nose landing gear wheel in the retracting phase collided with the ground, leaving the tracks shown in Figure 2. Then the blades of both powerplants also collided with the ground (Figure 3). They left traces in the form of several dozen transverse cuts in the grass. Even then the pilot was continuing the take-off.

Figure 2. ***First track of the nose landing gear on RWY 06 grass.***

Figure 3. ***Traces of the main landing gear and both propellers. Visible traces of the propellers collision with RWY 06 surface, but lack of the nose wheel track indicates that the nose landing gear was in the final phase of retraction.***

Due to the fact that the left main landing gear was retracting faster than the right one, the airplane was rolling to the left and the left propeller went down earlier (visible deep prints in the grass) than the right one.

After several dozen metres of the take-off run the left wheel well door also touched the ground leaving a deep track on the grass (Figure 4). The right wing went up and only a disappearing track of the right wheel was left on the RWY surface. The right propeller lost contact with the RWY surface.

Figure 4. ***Traces on RWY 06 in the final phase of the take-off run. On the left visible a deep print of the inner door of the left wheel well and a trace of the left propeller. On the right only a disappearing track of the right wheel is visible.***

After several dozen meters of the take-off run the plane lifted-off with the left bank and from a height of over a dozen meters, rolling to the left, collided with the ground. The left wing tip and the left engine contacted the ground and later the nose part of the fuselage, the right engine and right wing also contacted the ground.

Figure 5. ***The airplane at the scene directly after the accident. The engines are on the right. The right engine is closer to the airplane the left one is farther***.[Photo Police]

Both engines were separated from the wings. After the roll the fuselage fell on the grass and came to rest in the direction of approximately 90 degrees as shown in Figure 5. The nose part of the fuselage and the cockpit were totally destroyed. Fuel was leaking from unsealed wing tanks.

An instructor of Lubuski Aero Club, who worked on a taxiway lights and witnessed the accident, arrived at the scene as the first. He broke the cockpit windshield and checked the pilot's pulse - it was impalpable. After a while a duty doctor of Air Medical Rescue arrived and stated the pilot's death.

At 12:17 hrs a fire brigade arrived at the scene and undertook rescue and security actions. The wreckage was protected against fire and about 350 litres of fuel was pumped out of the wing tanks and secured in the Aero Club warehouse to be available to SCAAI and Prosecutor's Office. Access was made to the pilot's body, which was removed from the cockpit and on a prosecutor request secured for further autopsy examinations.

SCAAI representatives arrived at the site at about 19:00 hrs. Due to the night time and mist visual examination of the wreckage and the accident site was postponed until the next morning. The accident site was secured by the police.

1.2. Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	1	-	-
Serious	-	-	-
None	-	-	-

1.3. Damage to aircraft

A dynamic contact of the rolling aircraft with the aerodrome surface resulted in extraction of both engines from their nacelles as shown in Figure 5. The nose part of the fuselage and both wings were completely destroyed. The tip of the left wing was clearly deformed and bent upward because that element of the airframe contacted with the ground first. The rest energy of the taking-off aircraft was lost during extraction of the left engine from its nacelle and destruction of the nose part of the fuselage, the right wing and the right engine.

The condition of the propellers is shown in Figure 6. All blades of the left propeller were bent backwards in the form of so called "tulip" because they had relatively long lasting

contact with RWY during the take-off run. The blades of the right propeller, except one, were much less deformed because they did not penetrate so deeply into RWY surface and when the right wing went up, they lost contact with the ground.

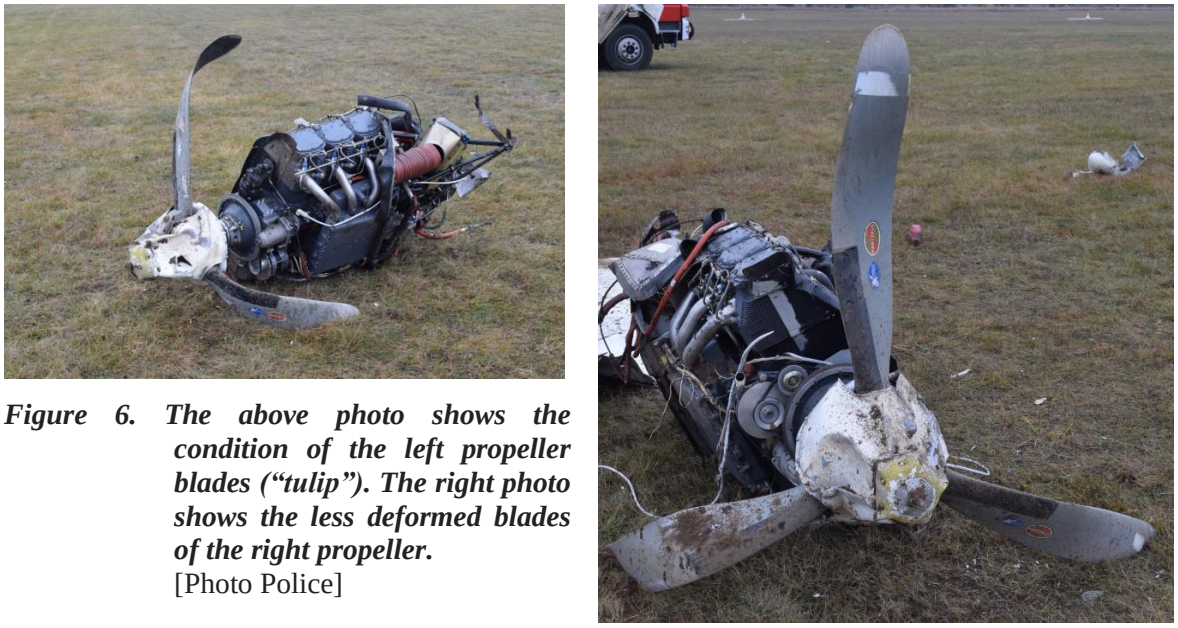

Figure 6. The above photo shows the condition of the left propeller blades ("tulip"). The right photo shows the less deformed blades of the right propeller.
[Photo Police]

Figure 7. Condition of the instrument panel after the accident.

The instrument panel was extracted from its mountings and displaced in the direction of the seats, but board instruments had no visual signs of damage (Figure 7). Visual inspection of the instrument panel showed among other things, that the landing gear control lever was in the up position ("gear retracted"), and the levers of throttles, propeller pitch and composition of the air-fuel mixture were in the forward position, as shown in the photo below (Figure 8).

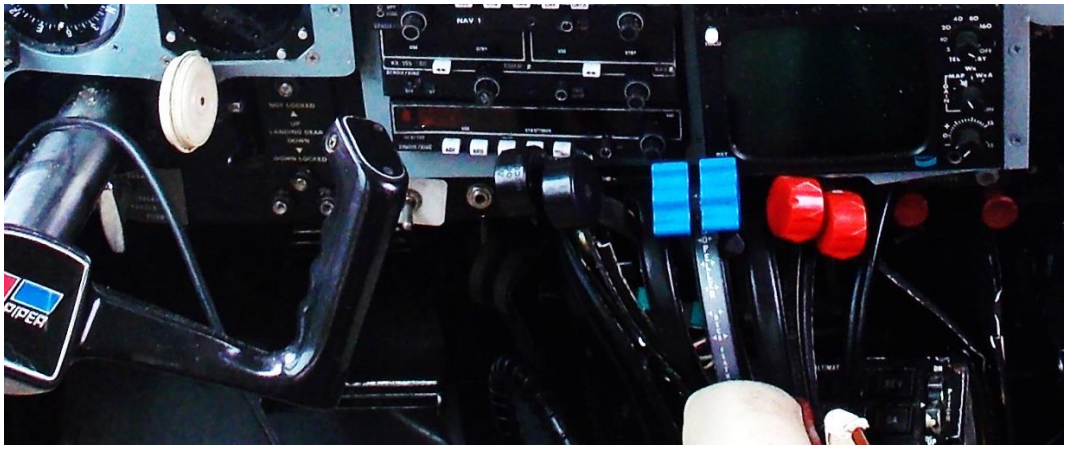

Figure 8. ***A section of the instrument panel. Visible: the landing gear control lever (white) in the up position ("gear retracted"), the levers of throttles (black), propellers pitch (blue) and composition of the air-fuel mixture (red) in the forward positions – full power.*** [photo: SCAAI]

The cabin and the aft part of the fuselage did not show signs of structural damage. The cabin interior did not show significant damage but only chaotic displacement of various items which were not correctly restrained prior to the take-off. It was a result of inertia forces acting on the plane during the rolling and then collision with the ground.

The cockpit condition is shown in Figure 9. The photo was taken next day after the accident. Dislocations of some items in the cockpit are not excluded. They resulted from rescue and protective operations.

Figure 9. ***The cabin after the accident. Photo on the left was taken in the forward direction and shows lack of pilot's seatback which was removed during rescue operation. Photo on the right was taken in the backward direction.***

The horizontal empennage did not show any signs of damage but the upper part of rudder with aerodynamic balance was bent by about 90 degrees. This is shown in Figure 10.

Figure 10. Damage to the upper part of rudder. Visible the bent upper part of rudder with aerodynamic balance.

A visual inspection of the wreckage at the scene showed that both the main and the nose landing gears were retracted and the wheel well doors were closed.

Figure 11. The right main landing gear after the accident – "gear retracted", both doors of the wheel well "closed".

Figure 12. ***The left main landing gear after the accident – "gear retracted". The inner door of the wheel well deformed and not fully closed due to the collision with the aerodrome surface. The outer door closed.***

Figure13. The nose landing gear after the accident in the "retracted" position. Visible deformations of the doors resulted from the collision of the nose part of the fuselage with the ground in the final phase of the rolling.

1.4. Other damage.

Damage to the aerodrome surface on a total area of about 1 are and local pollution of the soil with petroleum products neutralized by the fire brigade during the rescue operation.

1.5. Personnel information (crew data)

Aircraft Commander: male, aged 66, holder of CPL(A) issued by the Civil Aviation Authority of the Federal Republic of Germany. The following entries are in the licence: SEP(L) valid until 31.03.2018, SEP(L)-IR valid until 31.03.2017, MEP(L) valid until 31.03.2017, MEP(L)-IR valid until 31.03.2017. Additionally, the pilot had in his licence endorsement of English Language Proficiency Level 4 and authorization to maintain radiotelephony communication in German and English languages, valid until 6.11.2017.

Flight experience as of 24.11.1016:

- total flight time on aeroplanes: 9418 hrs during 11304 flights, including 3167 hrs of flights according to IFR;
- flight time as FO: 623 hrs 31 min;
- flight time over the last 90 days: 14 hrs 19 min during 15 flights;
- flight time on the accident type: no data; however, it is highly probable that was a flight time of several thousand hours since the pilot was the owner of GER-POL Air Taxi company, which he established in Germany in 1999 and in the scope of its activity he was personally carrying out most of the service flights. Thus, he had a wide flight experience and most of the service flights he performed on the PA-31, D-IFBU airplane.

The pilot possessed Class 2 aero-medical certificate valid until 09.03.2017, and for LAPL it was valid until 09.03.2018 with VDL limitation.

1.6. Aircraft information

Airframe: Piper PA-31 Navajo – two-engine, low-wing, all-metal airplane with retractable tricycle landing gear with nose wheel. There are 7 seats in the airplane: 2 in the front for a crew (pilot and co-pilot) and 5 for passengers. A baggage compartment and closet are in the aft part of the cabin. The airplane is designed for non-scheduled flights or as an air taxi. It may be also used for training in multi-engine airplanes and IFR flights.

The photo below (Figure 14) shows D-IFBU airplane prior to the accident.

Figure 14. PA-31, D-IFBU airplane prior to the accident. [photo GER-POL]

Year of manufacture	Manufacturer	Airframe Serial No	Registration marks	Register Number	Register date
1980	Piper Lock Haven	31-8012050	D-IFBU	L/1512	15.11.2006

Airworthiness Review Certificate valid until: 28.02.2017

Airframe total flight time since new as of 27.05.2014: 7371 hrs

Total Cycles since new: 6641

Airframe flight time since the last overhaul or inspection: 2 hrs

Flight time until the next overhaul or inspection (100 h): 54 hrs

Last periodic operations (50 h): 25.10.2016

after total flight time: 7369 hrs

Aviation insurance: Insurance certificate No 0702-0032, valid until: 01.01.2017.

Engines: two piston 6-cylinder air-cooled, boxer engines with compressors, recommended fuel: aviation gasoline AVGAS 100LL.

Left engine:

Year of manufacture	Manufacturer	Model	Serial number
Lack of data	Lycoming, Williamsport	TIO-540-A2C	L-10943-61A

Date of the engine installation on the airframe: 15.04.2016

Maximum take-off power: 310 HP at 2575 rpm

Date of the engine installation on the airframe: 48 hrs

Date of the last periodic operations (50 h): 25.10.2016

after airframe flight time: 7369 hrs.

Right engine:

Year of manufacture	Manufacturer	Model	Serial number
Lack of data	Lycoming, Williamsport	TIO-540-A2C	L-10944-61A

Date of the engine installation on the airframe: 15.04.2016
Maximum take-off power: 310 HP at 2575 rpm
Date of the engine installation on the airframe: 48 hrs
Date of the last periodic operations (50 h): 25.10.2016
after airframe flight time: 7369 hrs.

Propellers

Two 3-blade, controllable pitch, metal propellers.

Left propeller:

Year of manufacture	Manufacturer	Type/Model	Serial number
Lack of data	Hartzell Propeller Inc.	HC-E3YR-2ATF	DJ-11142A

Time since new: 48 hrs

Right propeller:

Year of manufacture	Manufacturer	Type/Model	Serial number
Lack of data	Hartzell Propeller Inc.	HC-E3YR-2ATF	DJ-8353A

Time since new: 48 hrs.

Fuel&Lubricants prior to the flight – according to Aircraft Technical Log as of 10.11.2016:
fuel: AVGAS 100LL 709,0 *l*
oil: W80 (12+12) 24,0 *l*
Aircraft Technical Log as of the accident day was not found.
Airplane load (mass data):

- empty airplane mass: 2121,0 kg
- fuel mass (709 *l*): 510,0 kg
- oil mass (24 *l*): 21,4 kg
- crew mass(according to statement): 78,0 kg
- baggage mass (assessed): 50,0 kg
- **Total:** **2780,4 kg**

Total mass:

- authorised: 2948,0 kg
- actual: 2780,4 kg

The airplane weight was within the limits specified in the Flight Manual.

1.7. Meteorological information

GAMET forecast

FAPL22 WROC 240900

EPWW GAMET VALID 241000/241600 EPWR-

EPWW WARSAW FIR/A2 BLW FL150

SECN I

SFC VIS: 10/16 1000-5000M BR

10/16 LCA 200-900M FG S OF N5230 MT OBSC: 10/16 PARTLY BTN 1200/4500FT AMSL SUDETY SIG CLD: 10/16 BKN/OVC 400-1100/1200-1600FT AMSL

11/16 BKN/OVC 1200-1800/2200-3300FT AMSL SUDETY

ICE: 10/16 MOD FL100/120

SIGMET APPLICABLE: AT TIME OF ISSUE NIL

SECN II

PSYS: 12 PERIPHERY OF H 1045 HPA OVER W KAZKHSTAN MOV ESE SLW WKN L 999 HPA OVER S FINLAND MOV ENE NC WITH WAVING COLD FRONT LINE UMMG-EPMO-EDDB MOV ESE SLW NC

AND H 1029 HPA OVER SCOTLAND STNR NC

SFC WIND: 10/16 310-010/06KT

WIND/T: 10/16

1000FT AMSL 330-030/06KT PS04

2000FT AMSL 030/15KT BUT VRB/05KT S OF N5100 E01500 - N5200 E01900 PS04

3300FT AMSL 030/10KT BUT VRB/05KT S OF N5100 E01500 - N5200 E01900 PS05

5000FT AMSL 360-030/10KT PS04 BUT 030/30KT PS06 SNIEZKA MT

10000FT AMSL 270/20KT BUT 360-030/10KT S OF N5200 0000

CLD: 10/16 BKN/OVC SC 1600-3300/4000-4500FT AMSL

10/16 BKN AC 9000/11000-12000FT AMSL

FZLVL: 10/16 ABT 10000FT AMSL

METAR as of 24.11.2016 from 09:00 hrs to 13:00 hrs UTC

METAR EPZG 240900Z 36006KT 310V040 1400 R24/1800N BR OVC002 04/04 Q1023 = METAR EPZG 240930Z 36004KT 290V040 3000 BR OVC002 05/05 Q1023 = METAR EPZG 241000Z 01005KT 340V040 4000 BR OVC003 05/05 Q1023 = METAR

EPZG 241030Z 35002KT 4000 BR OVC003 05/05 Q1024 = METAR EPZG 241100Z 35004KT 320V030 5000 BR OVC004 05/05 Q1024 = METAR EPZG 241130Z 36004KT 320V040 5000 BR OVC005 06/06 Q1024 = METAR EPZG 241200Z 36005KT 320V040 6000 BKN006 OVC007 06/06 Q1023 = METAR EPZG 241230Z 36006KT 310V030 8000 SCT006 BKN008 06/06 Q1023 = METAR EPZG 241300Z 36005KT 320V020 9000 FEW007 BKN009 06/06 Q1023

In the Commission opinion the weather conditions had no impact on the occurrence.

1.8. Aids to navigation.

Not applicable.

1.9. Communications.

The airplane was equipped with two communication radio stations: COM 1 - Garmin GTR 225A, serial number 2A6010348 and COM 2 - King KX155, serial number 11035. Radio Permit No 06 45 0491 for the stations was valid until 14.05.2025. Due to the fact that the accident occurred during take-off and the pilot did not maintain communication with the departure aerodrome, the Commission was not able to assess the quality of communication. The airplane documentation from the previous time had not contained any entries concerning malfunction of the radio stations or communication problems.

1.10. Place of occurrence information.

The accident occurred during take-off from RWY06 on EPZP aerodrome, approximately 650 m from the threshold.

The active part of RWY 06/24 is a grassy surface of 950x180 m. The hardness of the RWY surface changes along its length, particularly in the middle, where the land is lower and after precipitation a local decrease in bearing strength of the surface may occur (Figure 15 below).

Figure 15. Wheel tracks and propeller traces in the middle part of RWY 06/24 after take-off run.

This results in increased rolling resistance on this section (track forming), which requires longer take-off run.

The place of the aircraft impact coordinates: N 51°58'48,04"; E 15°27'57,72.

1.11. Flight recorders.

The aeroplane was not equipped with on-board flight data recorders.

1.12. Wreckage and impact information.

The first small fragments of the structure separated from the aircraft during the autorotation phase, when the left wing tip contacted the aerodrome surface (Figure 16).

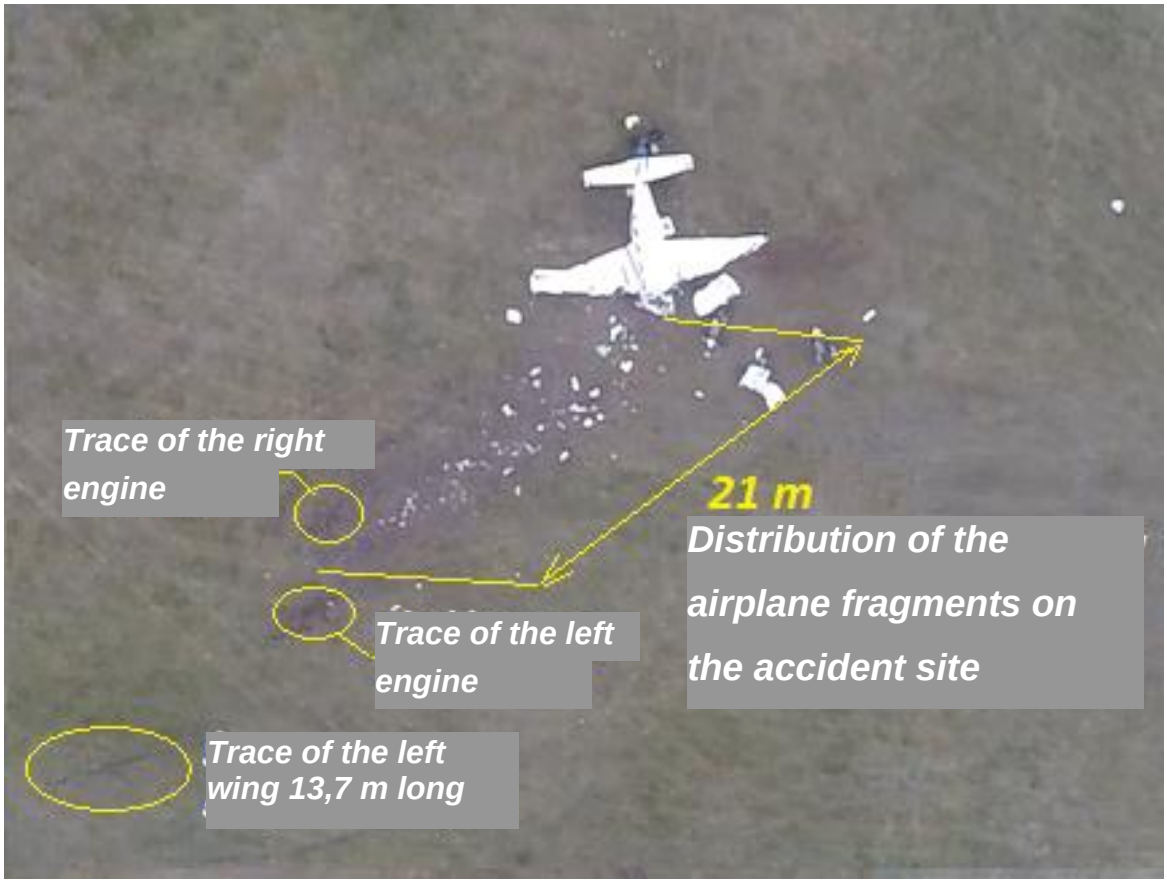

Figure 16. Distribution of the airplane fragments on the accident site. **[photo AZL]**

Then the left engine collided with the ground and separated from the wing leaving a deep trace on the grass. When the plane was in almost vertical attitude, the nose part of the fuselage collided with the ground, which caused its crushing. The plane tilted to the right wing during rotation in a vertical attitude.

After collision with the ground the right engine also separated from the wing and produced a deep trace. The plane moved about 21 m and fell on the ground.

1.13. Medical and pathological information.

The pilot was killed at the scene. The cause of a sudden and violent death was blunt chest trauma with multiorgan injuries. Toxicological examination did not show the presence of psychoactive, narcotic, psychotropic or pharmacological substances. The pilot's blood test did not show the presence of ethyl alcohol.

1.14. Fire.

At the time of the accident about 700 liters of AVGAS 100 LL fuel was in the airplane tanks. Approximately 350 litres of the fuel leaked into the ground from unsealed tanks and damaged fuel system. The remaining 350 litres of the fuel was pumped by the firefighters into barrels, which after sealing, were deposited in the Aero Club warehouse to be available to SCAAI and Prosecutor's Office.

The airplane fire did not occur because both engines were extracted from the nacelles and fell on the grass a few metres from the nose part of the fuselage. Their hot parts had no contact with the vapor of the fuel leaking from unsealed wing tanks and the damaged fuel system. The fire brigade, who arrived at the scene several minutes after the accident, protected the wreckage against fire, removed the remaining fuel from the tanks and neutralized the leakage.

1.15. Survival aspects.

In the Commission opinion, a dynamic contact of the nose part of the airplane with the aerodrome surface during the autorotation caused a complete destruction of the nose part of its fuselage. As a result, the pilot's body was subjected to a considerable overload and impact of the airplane structure, which caused an immediate death of the pilot at the scene.

1.16. Tests and research.

- A detailed inspection of the aircraft wreckage was carried out at the scene.
- Photos of the wreckage and surroundings of the scene were taken.
- The continuity of flight control systems was checked at the scene - the kinematic continuity was preserved. The elevator and rudder movements were checked – without jamming in full range. The ailerons movements were blocked due to extensive deformations and damage to the wings at the places where the ailerons were attached.
- The Commission and police interviewed the witnesses. A recording of the flight from the beginning of the take-off run until the collision with the ground was obtained.

- An analysis of the technical and operational documentation of the aircraft was carried out.
- The pilot's flight documentation was analysed.
- The Commission got acquainted with results of the autopsy, toxicological examination and examination on the presence of alcohol in the pilot's body.
- The Commission carried out an analysis of own photographic and video documentation and documentation obtained from other sources.

1.17. Organizational and management information.

The Lubuski Aero Club immediately notified (via PANSA) the State Commission on Aircraft Accidents Investigation (SCAAI) of the accident. SCAAI representatives arrived at the scene late in the evening on the accident day. Due to the night time the detailed inspection of the wreckage and the accident site was carried out the following day. Then the witnesses were also interviewed. The fire brigade and the police secured the occurrence site until the Commission completed its work at the scene. When examination of the wreckage and inspection of the scene were completed and the results were documented, the wreckage was released to the owner i.e. GER-POL Air Taxi GmbH and transported to the facility indicated by the company.

1.18. Additional information.

According to §15 of the Minister of Transport Regulation, dated 18 January 2007 (Journal of Laws 35, item 225), the flight organizer/the aircraft owner was informed about the opportunity to become acquainted with the Draft Final Report on the accident of the aeroplane PIPER PA-21, registration marks D-IFBU.

After getting acquainted with the content of the Draft Final Report representatives of the aircraft owner made two formal comments to the presented document and signed the applicable protocol that they had been acquainted with the Draft Final Report.

The Commission accepted the comments and entered the respective amendments to the Final Report.

1.19. Useful or effective investigation techniques.

Standard investigation techniques were applied.

2. ANALYSIS.

The airplane was fit for the flight and had current flight insurance. The pilot possessed CPL(A) licence and a valid aero-medical certificate to perform flight duties in the scope of ratings resulting from the licence.

The flight planning was correct. The pilot had been waiting for the weather improvement since the morning. When fog had cleared before noon and a VFR flight was possible the pilot started direct preparation for the flight.

After taking seat in the cockpit, the pilot started the engines, taxied and brought the airplane to rest on RWY 06 extension, but within the limits of the landing area. Then he effected warming up and pre-flight run of the engines. Then he turned on the landing light and commenced the take-off run.

Annex 2 to this Report shows the sequence of time-lapse photos obtained from a recording which shows the flight from the beginning of the take-off run until the airplane impact with the ground (the film in the accident documentation). This 27s film showing the take-off course was recorded with a mobile phone.

The initial phase of the take-off run went correctly. The film material collected in the accident records and in Annex 2, showing the course of the take-off we can see that the aircraft was accelerating dynamically. When abeam of a taxiway (third silhouette), the pilot started a rotation and after a while the airplane lifted off, what was stated by a witness working on lights (next to the car), and then the airplane again touched the ground splashing mud.

In the Commission opinion, when the airplane was airborne, the pilot moved the landing gear control lever to the "retracted" position. That action was in contrary to the Flight Manual of PA-31, serial number 31-8012050, which provided for landing gear retraction as the next action after rotation (Normal Procedures, Section 4, p. 8). That action was also premature because after a while the airplane touched down again.

After the next touchdown on a soft surface the main landing gear was braked and a nose down pitching moment was produced. The progressing retraction of the landing gear and progressing pitching down caused that after several dozen metres of the take-off run the propellers of both engines came into contact with RWY surface.

Traces of the left propeller and the left landing gear were deeper and more distinct due to the fact that the left main landing gear was retracting faster than the right one, the airplane was rolling to the left and the ground in this part of the RWYB was damper - see Figure 3 and Figure 15.

That was the moment when the pilot should have set the engines to idle and should have abandoned the take-off. Unfortunately the pilot did not take such a decision and was continuing the take-off. At the final phase of the take-off run there is no trace of the right propeller or the nose landing gear wheel on the grass and the track of the right landing gear wheel was disappearing chassis wheel (Figure 4). The left main landing gear was retracting faster and the airplane was rolling to the left and the left propeller blades contacted with the ground and bent backwards in a form of so called “tulip”.

The inner door of the left wheel well touched the ground leaving a deep track on the grass. Due to the propeller damage the left powerplant had no thrust. The right powerplant produced thrust because deformation of its propeller was less significant and as a result the right wing went up.

According to a statement of the witness mentioned above *“the airplane was forcefully torn into the air”*, lost direction turning to the left about 30 degrees. While in the autorotation,

after about 129 m the left wing and the left engine hit the ground and later the nose part of the fuselage, the right wing and right engine also hit the ground. Both engines were extracted from their nacelles and the wreck, rotating in a vertical attitude fell on the ground after several dozen metres.

3. CONCLUSIONS.

3.1. Commission findings.

- The pilot/aircraft commander possessed a valid CPL(A) licence with valid MEP(L) rating and a valid aero-medical certificate, which authorised him to perform the planned flight.
- The airplane was fit for flight and its technical and operational documentation was maintained properly. Besides, the airplane had an aviation insurance valid until 01.01.2017.
- The flight was performed within the framework of activities of GER-POL Air Taxi company, which was owed by the pilot.
- The airplane was serviced by Porta Air Service GmbH& Co. KG. The last periodic works (50 h) were effected 25.10.2016. After those works the pilot transferred the airplane by air (2 h) to Przylep (EPZP) and did not report any failures or malfunctions in operation of the engines or other components. It was the last flight before the accident on 24.11.2016.
- The flight was performed according to VFR and before the take-off the pilot had not filed a flight plan with air traffic services.
- According to the statement of the witness, who recorded the take-off, prior to the take-off run the pilot effected warming up and pre-flight run of the engines.
- Analysis of the take-off documented by the video recording did not show any irregularities in the engines operation.
- At the time of the accident about 700 liters of AVGAS 100 LL fuel was in the airplane tanks. Approximately 350 litres of the fuel leaked into the ground from unsealed tanks. The remaining 350 litres of fuel was pumped by firefighters into barrels which were deposited in the Aero Club warehouse.
- The weather conditions had no impact on the occurrence.
- The pilot’s blood test did not show the presence of ethyl alcohol.
- The pilot died at the scene as a result of the injuries.

3.2. Causes of the accident.

The causes of the accident were:

1. The pilot’s error consisting in setting the landing gear control lever in the „retracted” position in the phase of rotation.

2. The pilot's failure to immediately abandon the take-off when the blades of both powerplants collided with the runway surface.

4. SAFETY RECOMMENDATIONS.

After reviewing the evidence collected during the investigation the State Commision on Aircraft Accidents Investigation has not proposed any safety recommendations.

5. ANNEXES

1. Sketch of the take-off course.
2. Time-lapse extract from recording.

THE END

Investigator-in-Charge		Member of the Investigating Team	
Ryszard Rutkowski		Jacek Bogatko	