



FINAL REPORT

ACCIDENT 2020/3656

State Commission on Aircraft Accidents Investigation (PKBWL)

UL. CHAŁUBIŃSKIEGO 4/6, 00-928 WARSZAWA | DUTY PHONE (+48) 500 233 233

FINAL REPORT

ACCIDENT

OCCURRENCE NO – 2020/3656

AIRCRAFT – Airplane, Cessna C-150, SP-KHD

DATE AND PLACE OF OCCURENCE – 24 November 2020, Brzóza



The 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 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.

Investigation into air the occurrence was carried out in accordance with the applicable international, European Union and domestic legal provisions for prevention purposes only. The investigation was carried out without 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 accordance with Article 5 paragraph 6 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 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 2023

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Abbreviations

AGL	Above Ground Level
ARC	Airworthiness Review Certificate
COfA	Certificate of Airworthiness
CPL(A)	Commercial Pilot Licence (Airplanes)
EPDE	Dęblin aerodrome
ELT	Emergency Locator Transmitter
FI	Flight Instructor
FIS EPWA	Flight Information Service Warsaw
IMGW	Institute of Meteorology and Water Management
IR	Instrument rating
IUwL/FM	Flight Manual
LMT	Local Mean Time
MEP(L)	Multi Engine Piston (Land)
NTSB	National Transportation Safety Board [US]
PKBWL	State Commission on Aircraft Accidents Investigation [Poland]
PPL(A)	Private Pilot Licence (Airplanes)
RPM	Revolutions per minute
QNH	Atmospheric pressure at mean sea level (MSL)
SC	Stratocumulus
SEP(L)	Single Engine Piston (Land)
ULC	Civil Aviation Authority [Poland]
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

General Information

Occurrence reference number:	2020/3656			
Type of occurrence:	ACCIDENT			
Date of occurrence:	24 November 2020			
Place of occurrence:	Brzóza			
Type and model of aircraft:	Airplane, Cessna C-150			
Aircraft registration marks:	SP-KHD			
Aircraft user/operator:	Dęblin Aviation Training Centre (AOSL)			
Aircraft Commander:	Student-pilot			
Number of victims/injuries:	Fatal	Serious	Minor	None
	-	-	1	-
Domestic and international authorities informed about the occurrence:	ULC, NTSB			
Investigator-in-charge:	Krzysztof Miłkowski			
Investigating authority:	State Commission of Aircraft Accidents Investigation (PKBWL)			
Accredited Representatives and their advisers:	Not appointed			
Document containing results:	FINAL REPORT			
Safety recommendations:	In Preliminary Report			
Addressees of the recommendations:	Aviation Training Organisations			
Date of completion of the investigation:	31 march 2023			

Synopsis

On 24 November, the student-pilot (hereinafter – student) arrived at the aerodrome before 8:00 hrs LMT¹, filed the flight plan and at around 8:30 hrs performed a pre-flight check of the aircraft. At 8:57 hrs she took off.

Over Oscar waypoint the student established communication with FIS EPWA and was maintaining an altitude of about 1,500 ft. When she noticed that the cloud base was lowering, she turned on the carburetor heater and descended by 400 ft. Then she turned off the carburetor heater and continued the flight as planned.

About 20 minutes after take-off, at an altitude of 1,100 ft, the student noticed a difference in the engine sound. At the same time, she noticed a drop in RPM (from 2300 to 1950 RPM). She reported to FIS EPWA the engine problem and the intention to land in random area.

During emergency landing, the plane turned over. The student suffered minor injuries but managed to get out of the damaged aircraft on her own.

During the inspection of the aircraft at the accident site, it was found that the carburetor heater lever was in the "closed" position (no heating). The aircraft's engine was not running at the time of the collision.

The investigation was conducted by the PKBWL Investigation Team in the following composition:

Krzysztof Miłkowski	Investigator-in-charge (PKBWL);
Patrycja Pacak	Team Member (PKBWL).

Cause of the occurrence:

Loss of engine power due to carburetor icing with the carburetor heating system turned off, which led to an emergency, off-field landing, which resulted in the aircraft damage due to turnover.

Contributing factors:

- 1) Meteorological conditions conducive to carburetor icing.
- 2) Time deficit resulting from flying at an altitude lower than planned.
- 3) Little flight experience of the student.
- 4) Pilot error during off-field landing.

PKBWL proposed two safety recommendations in the Preliminary Report.

¹ All Times in the Report are given in LMT (LMT = UTC + 1h)

1. FACTUAL INFORMATION

1.1. History of the flight

On 24 November 2020, in the morning, the student-pilot arrived at EPDE aerodrome with the intention of making her first solo enroute flight. Around 7:50 hrs, she met her flight instructor, checked the weather, and the instructor verified her preparation for the flight (map, flight plan, navigation log). The instructor drew the student's attention to the possibility of local cloud bases on the route at an altitude lower than those over EPDE at the time of take-off. According to the plan, the flight was to be performed at an altitude of 1500 ft, but the student was instructed to lower the flight altitude to avoid flying in the clouds.

At the request of the student, the scenario of maintaining radio communication was also practiced during the briefing. Then, under the supervision of the instructor, she performed the daily and pre-flight inspection of the aircraft.

At 8:40 hrs, she reported on the EPDE TWR frequency and received clearance for take-off. At 08:44 hrs she started taxiing to runway 30. After a short wait, at 08:54 hrs, she was cleared to enter the runway, then take off and climb.

At 09:06 hrs the student was approximately 1,500 ft above Oscar waypoint, reported the position and transition to FIS EPWA frequency. The establishment of communication was appropriate.

Due to the observation of uneven, lowering cloud bases towards Warsaw, the student decided to reduce the flight altitude, turned on the carburetor heating, and at an altitude of about 1100 ft turned off the heating, continuing the flight towards Kozenice town.

After passing Kozenice, the student headed towards Białobrzegi. About 20 minutes after take-off, she noticed a change in the sound of the engine. At the same time, she noticed a drop in RPM (from 2300 to 1950 RPM). She tried to increase the engine power by pressing the throttle lever, but it had no effect, so she reported the engine problem to FIS EPWA. She checked the indications of the fuel gauges and other engine instruments, the position of the mixture lever was in the "rich" setting.

Due to a further, unidentified RPM decrease, the student decided to land off-field, which was also reported to FIS EPWA.

In the final phase of the approach, she observed a big stone in the direction of the planned landing, which she tried to avoid. Probably at this point she brought the aircraft to stall and uncontrolled collision with the ground, followed by a turnover.

The student left the cockpit unaided.

Due to the fact that magnetos and the main power switch were left on, the student wanted to return to the cockpit, but the first witnesses noticed her injuries and advised her to wait for the ambulance to arrive.

1.2. Injuries to persons

Injuries	Crew	Passengers	Others	Total
Fatal	0	-	-	0
Serious	0	-	-	0
Minor	1	-	-	1
None	0	-	-	0

1.3. Damage to aircraft

As a result of the occurrence the aircraft was destroyed.

1.4. Other damage

None.

1.5. Personnel information (crew data)

1.5.1. Student-pilot – female, aged 24 in PPL(A) training. She had a valid class II aero-medical certificate.

Flight time data:

- total (from training start until 25 June 2020) – 47:50 FH
- in the last 90 days (entirely on Cessna 150) – 04:48 FH

In June 2020 the student began practical training for the PPL(A). From August 2020 she had a break in the training until 20 - 23 November 2020, when she made test flights. In accordance with the renewal program, the student completed several flights with a newly assigned instructor on Cessna 150, SP-KHD, which included aerodrome traffic circuit, flight zone and cross-country flight.

The student-pilot was tested for alcohol with a negative result.

1.5.2. The supervising instructor – male, aged 28, holder of valid CPL(A) with SEP(L), MEP(L), IR and FI ratings. He was also licensed to fly the EMB 170 type.

The instructor began work at the Dęblin Aeroclub in mid-November 2020, where he completed training for the Cessna 150 type.

1.6. Aircraft information

1.6.1. Cessna 150K - a two-seat training and tourist aircraft with a MTOM of 725 kg. High wing with struts metal construction, fixed tricycle landing gear with a nose wheel. Equipped with a Continental O-200 A engine (piston, in-line, 4-cylinder, carburetor, air-cooled).

Table 1. General Information

Date of manufacturing	Manufacturer	Serial number	Registration marks	Register number	Registration date
1977	Cessna Aircraft Company	15071909	SP-KHD	4310	13.03.2009

Table 2. Engine

Date of manufacturing	Manufacturer	Type certificate number	Serial number
No data	Continental	E-252	231292R

Certificate of airworthiness issue date: 10 February 2009
 Airworthiness review certificate valid until: 9 February 2021
 Radio license valid until: 20 December 2022
 Total Flight time: 10508:04 FH, 22910 cycles
 Last maintenance: airframe 200 FH, powerplant 100 4 November 2020 after
 FH: 10468 FH

Valid insurance

The aircraft was fit for flight, and had the required documents.

1.7. Meteorological information

Wind recorded on EPDE TWR: direction 260°, speed 10 kt.

Enroute conditions according to the Institute of Meteorology and Water Management (IMGW) data:

- visibility above 10 km;
- SC clouds with 7-8/8 coverage and bases of 300-1000 m (984-3280 ft) AGL, on the take-off aerodrome at 8:00 hrs cloud base was 510 m (approx. 1,673 ft);
- wind direction of 250-290° with 5-10 kt (2.5-5 m/s) speed with gusts up to 15 kt (7.5 m/s);
- 4-5°C temperature in the morning, around noon increasing to 5-6°C, temperature on the departure aerodrome at 8:00 was 5.6°C;
- air humidity recorded on the take-off aerodrome at 8:00 was 79%;
- QNH - 1017 hPa;
- no significant meteorological phenomena - no rainfall or fog was recorded.

1.8. Aids to navigation

Not used.

1.9. Communications

The student performed take-off and departure procedures on the Dęblin TWR frequency (122.750 MHz). Over EPDE Oscar waypoint she switched to FIS EPWA (128.575 MHz.).

The supervising instructor maintained communication with the student on EPDE TWR radio frequency.

1.10. Aerodrome information

The off-field landing was performed near Brzóza village.



Fig. 1. Landing site – the probable flight path during off-field landing approach marked with dashed line, 1:10000 scale map [source: geoportal]

1.11. Flight recorders

The airplane was not equipped with flight recorders (they were not required).

1.12. Wreckage and impact information

The aircraft collided with the ground with a significant rate of descent, "nose down" pitch and right roll. About 3.5 m from the aircraft's first contact with the ground, the nose landing gear was broken. The aircraft rolled to the left and continued movement on the left wheel, then the front part of the fuselage contacted the ground. The collision of the left wing tip with the ground initiated the turnover of the aircraft, which moved 6 m further and came to rest.

During the inspection of the aircraft at the site, it was found that the carburetor heating lever was in the "closed" position (no heating). The aircraft engine was not running at the time of the collision.

It was also determined that the fuel valve remained open, magnetos were on, MASTER electric switch was on. The ELT was operating and broadcast signals.

1.13. Medical and pathological information

The student suffered minor injuries during the occurrence.

1.14. Fire

Fire did not occur.

1.15. Survival aspects

The student had her seat belts fastened correctly, which minimized injuries she sustained during uncontrolled touchdown and turnover of the aircraft.

1.16. Tests and research

Standard investigation actions were performed.

1.17. Organizational and management information

The flights performed on the day of the accident were of training nature as part of the approved program of the Dęblin Aeroclub.

1.18. Additional information

Interested parties were informed about a possibility of getting acquainted with the draft final report².

1.19. Useful or effective investigation techniques

Standard investigation techniques were applied.

2. ANALYSIS

2.1. Pre-flight preparations

2.2.1. Training renewal

The student resumed flight training after a 3-month break. Due to the termination of the previous phase without solo enroute flight, it was necessary to repeat the exam, i.e. to perform a flight with an instructor with landings on at least two aerodromes. The student performed an enroute flight with an instructor two days after renewal flights and one day before the accident. The course of these flights did not raise any concerns of the instructor, but all of them were dual (according to the training program of the Dęblin Aeroclub).

During the renewal, no solo circuit flights were performed, and thus the student did not make solo landings since the end of training in August. A solo flight is associated with a change in the balance of the aircraft, and in case of little flight time, generates an additional stress.

² In accordance with §15 Regulation of the Minister of Transport of 18th of January 2007 on the accidents and incidents in civil aviation (OJ 2007. No. 35 item 225).

The first solo enroute flight, according to the training program, is a closed flight, i.e. the one in which the landing takes place at the take-off aerodrome, which theoretically gives the instructor a possibility of supervision.

In the opinion of the Commission, since it cannot be ruled out that a student will have to perform a preventive off-field or on another aerodrome landing, solo landings during renewal after a break should be included in the aerodrome traffic circuit exercises and should be performed under the supervision of an instructor.

2.2.2. Carburetor icing

During the briefing, the instructor drew the student's attention to the possibility of clouds at the altitude of the planned flight. On the day of the occurrence, the forecast cloud bases in the area were irregular and despite good conditions over the EPDE aerodrome, the entire flight at the planned level (1500 ft) could have been difficult. Due to the need to maintain VMC, a scenario of a possible temporary descent to a safe altitude (1000 ft), to avoid clouds, was discussed.

After passing EPDE Oscar waypoint, the student lowered the flight altitude by 400 ft due to lower cloud bases observed towards Warsaw. According to her statement, she activated the carburetor heating for the descent - that was the procedure she knew from the training - after reaching a new cruising altitude of 1100 ft, she continued the flight without heating.

At the altitude of 1100 ft, the air temperature was about 3.8°C (carburetor icing can occur in a wide temperature range, also at positive temperatures), and due to the proximity of the cloud base, the air was close to saturation. In addition, the throttle was not fully open (2300 RPM), which was another factor contributing to carburetor icing.

The decrease in RPM together with the sound of the engine roughness most likely indicated the initial symptoms of icing. At that stage, activation of the carburetor heater could have restored the full engine power.

The student response by increasing the throttle opening did not bring the intended effect of increasing the power, and the lack of identification of the phenomena resulted in excessive growth of the icing layer in the carburetor, leading to complete clogging of the nozzle and, consequently, engine stoppage.

Both during the preparation for the flight on the day of the occurrence and before the enroute flight performed the day before, the specificity of flights in autumn and winter conditions was not reminded. The possibility of carburetor icing, recognizing its symptoms and recovery actions were not discussed.

2.2. Landing course

When the engine problem occurred, the aircraft was at 1,100 ft AGL. The student made an attempt to identify the problem, but the engine RPM continued to decrease and horizontal flight was not possible. Therefore, the student decided to perform off-field landing. The time deficit, resulting from the decreasing altitude and the progressive decrease in RPM, significantly hindered the planning of the landing.

The student selected a field near the Brzóza village for landing, which she approached from a 180° turn. The landing was performed with tailwind. Just above the terrain, the student tried to deviate the flight path to the left to avoid a stone in front of her. Execution of a sudden manoeuvre at too low speed caused the aircraft to stall in the left turn, followed by uncontrolled touchdown and, consequently, a turnover. The marks left by the plane on the ground show, that the engine was not running at the time of the collision. The student could have adjusted the approach speed only by pitching the nose of the aircraft, but the attempt to avoid the obstacle led to an error in flying and the aircraft stalled during an emergency, off-field landing.

3. CONCLUSIONS

3.1. Findings

- 1) The student had the required, formal qualifications to perform the planned task.
- 2) The instructor had the required ratings to resume the student's training and supervise her flight.
- 3) The aircraft was fit for flight, and its airworthiness and maintenance was properly documented.
- 4) Meteorological conditions and flying just below cloud base could have contributed to the carburetor icing.
- 5) Radio communication did not raise any concerns was maintained.
- 6) During the flight, symptoms of the carburetor icing appeared, but were not identified, which resulted in the growth of the icing layer in the carburetor, which led to complete clogging of the nozzle and, consequently, engine stoppage.
- 7) After finding an unidentified, progressive loss of engine power, the student decided to perform off-field landing.
- 8) During the manoeuvre at a low altitude a loss of speed occurred which resulted in the aircraft stall in the left turn and uncontrolled touchdown, which ended in a turnover.
- 9) No part separated from the aircraft prior to impact with the ground.
- 10) The flight was performed in accordance with the training program of the Dęblin Aeroclub.

3.2. Cause of the accident

Loss of engine power due to carburetor icing with the carburetor heating system turned off, which led to an emergency, off-field landing, which resulted in the aircraft damage due to turnover.

3.3. Contributing factors

- 1) Meteorological conditions conducive to carburetor icing.
- 2) Time deficit resulting from flying at an altitude lower than planned.
- 3) Little flight experience of the student.
- 4) Pilot error during off-field landing.

4. SAFETY RECOMMENDATIONS

At the stage of a Preliminary Report, the State Commission on Aircraft Accidents Investigation issued safety recommendations addressed to aviation training organizations in the following wording:

- 1) Conduct additional theoretical training with flight personnel of aviation training organizations covering the specificity of flights in autumn and winter conditions, including the possibility of carburetor icing, recognizing the symptoms of icing and recovery actions.
- 2) Change the procedure for resuming flights – prior to continuation of the next phases of training by the student pilot who completed task no 1, it is necessary to perform solo aerodrome traffic circuits under supervision of an instructor. The decision on the number of the circuits is to be made by the Head of Training after consultation with a responsible instructor.

By the date of completion of this Draft Final Report, the recommendations have been fully implemented under the supervision of the Civil Aviation Authority.

The Commission recognizes the above safety recommendations closed and does not propose additional recommendations.

5. ANNEXES

None.

THE END

Investigator-in-Charge

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(Signature on original only)