PKBWL

Państwowa Komisja Badania Wypadków Lotniczych

PRELIMINARY REPORT

2023-0046

OCCURRENCE NUMBER

ACCIDENT

LOC_I: LOSS OF CONTROL - INFLIGHT
CTOL: COLLISION WITH OBSTACLE(S) DURING TAKE-OFF AND LANDING

The sole objective of safety investigations is the prevention of future accidents and incidents.

The Commission does not apportion blame or liability.

The investigation is independent and separate from any judicial or administrative proceedings.

Any use of the Report for purposes other than prevention of accidents and incidents may lead to wrong conclusions and interpretations.

Aeroklub Warszawski, training flight Cessna Aircraft Company, Cessna Grand Caravan 208B, SP-WAW Chrcynno airfield (EPNC), 17 July 2023

The Preliminary Report was issued by PKBWL based on information available on the date of its completion.

The Report presents only facts related to circumstances of the occurrence and ad hoc safety recommendations, when necessary.

The Report was drawn up in the Polish language.

Warszawa, 16th August 2023

Państwowa Komisja Badania Wypadków Lotniczych
ul. Chałubińskiego 4/6, 00-928 Warszawa

Kontakt@pkbwl.gov.pl

Occurrence reporting 24 h: +48 500 233 233

https://www.pkbwl.gov.pl

TABLE OF CONTENTS

GENERAL INFORMATION

LEGAL BASIS

Państwowa Komisja Badania Wypadków Lotniczych (State Commission on Aircraft Accidents Investigation) is a civil aviation safety investigation authority referred to in Art. 4 item 1 of the REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC (Official Journal of the European Union L295/35 of 12.11.2010, page 35, with further amendments.

The Commission conducts its investigations on the basis of the provisions of the Act - Aviation Law of the 3rd July 2002 (Journal of Laws 2002 No. 130 item 1112, with further amendments) and the European Union regulations related to accidents and incidents in civil aviation and takes into account the standards and recommended practices set out in Annex 13 to the Convention on international civil aviation concluded in Chicago on 7 December 1944 (Journal of Laws of 1959 item 212 with further amendments).

BASIC INFORMATION ABOUT THE OCCURRENCE

Operator (user), flight number or type of operation – Aeroklub Warszawski, training flight.

Manufacturer, type, model and registration marks of the aircraft – Cessna Aircraft Company, Cessna Grand Caravan 208B, SP-WAW.

Place and date of the occurrence – Chrcynno airfield (EPNC), 17 July 2023.

OCCURRENCE REPORTING

The occurrence was reported to PKBWL in accordance with the mandatory reporting system on 17 July 2023.

The occurrence was allocated the reference number – 2023-0046.

Based on the initial information, initial information, the occurrence was classified as accident.

During the investigation the classification of the occurrence was not changed.

NOTIFICATION ABOUT THE OCCURRENCE

PKBWL notified about the occurrence the following entities:

- State of Design and Manufacture of the aeroplane – USA via NTSB;
- State of Design and Manufacture of the engine – Canada via TSB Canada;
- ICAO;
- EASA;
- European Commission;
- ULC.

INVESTIGATION ORGANIZATION

Investigation is being conducted by – PKBWL.

Investigator-in-Charge – Andrzej Bartosiewicz.

PKBWL Investigation Team:

- Krzysztof Błasiak
- Ireneusz Boczkowski;
- Jacek Bogatko;
- Grzegorz Pietraszkiewicz;
- Tomasz Pietrzak.

Investigation groups – not established.

Accredited Representatives (ACCREPs) and their advisers – the following States designed their ACCREPs;

- State of Design and Manufacture of the aeroplane – USA;
- State of Design and Manufacture of the engine – Canada.

SAFETY RECOMMENDATIONS

Unless otherwise indicated, recommendations in this report are addressed to the regulatory authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those authorities to decide what action is taken.

TIME

All times in the Report are given in LMT. On the day of the occurrence LMT=UTC+2h.

DATE

If the Report contains a date in digital format (DD.MM.YYYY), the individual digits mean: DD is the day, MM is the month, and YYYY is the year.

FIGURES AND TABLES

Unless stated otherwise in the Report – source is PKBWL.

SYNOPSIS

On 17 July 2023, the Class Rating[1] Cessna SET[2] training was carried out on the Chrcynno airfield (EPNC[3]). The training was carried out on a Cessna Grand Caravan 208B, registration marks SP-WAW. Three pilots participated in the training: a flight instructor and two pilots in training[4].

The flights started at 14:05 hrs. The pilots performed flights along aerodrome traffic circuit and in a flight zone. Most take-off and landing operations were performed along the right (northern) traffic circuit to RWY 28. While flying along the circuit, among others, TAG (Touch&Go) maneuver was trained, consisting in touchdown and immediate take-off.

At 19:25 hrs the plane took off for the last series of circuits, after which the flights were to be terminated. At that time on board of the aircraft were: the flight instructor and both pilots in training. After completing the circuit, the pilot-in-training configured the aircraft for landing, then performed a touchdown and immediate take-off. After lift off from the surface of RWY 28, about 10 m AGL, the flight instructor took over the control of the plane.

After taking over the control, the instructor increased the engine power, made a turn to the left, gradually deepening bank angle. With a bank angle of about 60°, the plane began to slide on the left wing, losing height. At a bank angle of 70°, the left wing came into contact with the grassy surface of the airfield.

[1] Class rating – rating related to an aircraft.
[2] Cessna SET – a training to obtain rating to fly Cessna Caravan and Grand Caravan aircraft
[3] Airfield designation – AIP Poland.
[4] Further in the Report, the pilots are referred to as flight instructor, pilot-in-training and pilot-in-training (passenger) to indicate their functions on board during the accident.

Moments later, i.e. at 19:40 hrs, the plane collided with an all-terrain vehicle, and then, with a sheet metal building, where some persons were staying.

As a result of the collision, the flight instructor died on the spot. Both pilots in training suffered minor injuries and left the aircraft on their own.

Four persons, who stayed in front of and inside the building died on the spot. Eight other persons (including one child) were injured. One person died in hospital 2 days later as a result of injuries suffered during the accident.

A dog in the building also died as a result of the accident.

The plane and the building were destroyed.

SYMBOLS AND ABBREVIATIONS

SYMBOLS

°	Degree, e.g. °C (temperature) and 1° (angle)
%	Percent
'	Minute
”	Second

ABBREVIATIONS

A

ACCREP	Accredited Representative
AD	Airworthiness Directive
AFM	Airplane Flight Manual
AGL	Above Ground Level
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
AOC	Air Operator Certificate)
APP	Approach
ARCC	Aeronautical Rescue Coordination Centre)
ARP	Aerodrome Reference Point
ASAR	Aeronautical Search and Rescue
ATO	Approved Training Organization
ATPL	Airline Transport Pilot Licence

C

C	Celsius degree
CAA	Civil Aviation Authority

CG	Centre of Gravity
CofA	Certificate of Airworthiness
CPL	Commercial Pilot Licence
CRE	Class Rating Examiner
CRI	Class Rating Instructor
CVR	Cockpit Voice Recorder
	D
FDR	Flight Data Recorder
	E
EASA	European Union Aviation Safety Agency
ELT	Emergency Locator Transmitter
	F
FDR	Flight Data Recorder
FI	Flight Instructor
FIS	Flight Information Service
FL	Flight Level
ft	foot / feet
ft/min	feet per minute
	G
GA	General Aviation
GND	Ground
GPR	Search & Rescue Group
	H
h/hrs	hour/hours
hPa	Hectopascal
	I
ICAO	International Civil Aviation Organization
IIC	Investigator-in-Charge

IMGW	Institute of Meteorology and Water Management
IR	Instrument Rating
	J
JRG	Fire and Rescue Unit
	K
kg	kilogram(s)
km	kilometer(s)
km/h	kilometers per hour
kt	knot/knots
	L
L	liter(s)
lbs	pounds
LDD	List of Deferred Defects
LPR	Polish Medical Air Rescue
	M
m	meter(s)
ME	Multi-Engine
MEP(L)	Multi Engine Piston(Land)
MHz	Megahertz
ME	Multi-Engine
min	minute(s)
MLW	Maximum Landing Weight
MTOW	Maximum Take-Off Weight
	N
N	North / Northern latitude / Newton
NTSB	National Transportation Safety Board
	O
OAT	Outside Air Temperature

OPC	Operator Proficiency Check
OSP	Voluntary Fire Service

P

PDC	Pre-Departure Check
PIC	Pilot-in-Command
PKBWL	State Commission on Aircraft Accidents Investigation
P/N	Part Number
POH	Pilot’s Operating Handbook
PSP	State Fire Service

R

RF	Radio Frequency
RWY	Runway

S

s	second(s)
S	South / Southern latitude
SB	Service Bulletin
SE	Single Engine
SEP(L)	Single Engine Piston (Land)
SET	Single Engine Turbine
SEW	Standard Empty Weight
SP	Single Pilot
S/N	Serial Number

T

TAG	Touch & Go
TBO	Time Between Overhaul
TDZ	Touchdown Zone
TMA	Terminal Maneuvering Area
TOW	Take-Off Weight

TRA	Temporary Reserved Airspace
TSB	Transportation Safety Board of Canada
	U
UTC	Coordinated Universal Time
	V
VDL	Distant Vision Limitation
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
	W
W	West
WBR	Weight and Balance Report
WGS	World Geodetic System – 1984

1. FACTUAL INFORMATION

1.1. History of flight

On 17 July 2023, on the Chrcynno airfield (EPNC), as part of the statutory activities of the Approved Training Organization (ATO), the Class Rating Cessna SET training was performed. The training was carried out on a Cessna Grand Caravan 208B aircraft with SP-WAW registration marks, belonging to the Aeroklub Warszawski. Three pilots participated in the training: a flight instructor and two pilots-in training for this type of aircraft.

Theoretical and practical training was carried out on the basis of the Cessna SET[5] class training program, introduced for official use in the Aeroklub Warszawski.

Prior to the flights, the pilots in training, under supervision of the flight instructor performed a PDC (Pre-departure Check) and refueled the aircraft, which was one of the elements of the training program. The pilots removed the left bench from the plane in the cargo compartment (serving as a seat for skydivers) and installed an additional (third) seat behind the original left seat.

Then the flight instructor conducted a pre-flight briefing with the pilots in training. During the briefing, the tasks that the pilots were to perform during the flights were discussed.

The flights started at 14:05 hrs and lasted for the rest of the day, with breaks for a meal and another refueling of the plane. The pilots flew using directions 28, 13 and 31 of both runways of the EPNC landing site. One flight was made up to FL 095 in TMA Warszawa airspace. Depending on the task, the pilots changed seats or deboarded the plane.

During the flights, the crew did not notice and did not report any technical faults of the aircraft.

At 19:23 hrs the plane took off for the last series of circuits, after which the flights were to be terminated. At that time on board of the aircraft were: the flight instructor, the pilot-in-training in the cockpit and the pilot-in-training (passenger) in the cargo compartment. After completing the circuit, on the final to RWY 28, the pilot-in-training configured the aircraft for landing. The wing flaps were extended to the 30° setting (full flaps). Next the pilot-in-training performed TAG. Prior to lift off from RWY, the flaps were set to the take-off attitude, i.e. at an angle of 20°. After lift off, about 10 m AGL, the flight instructor took over the control of the aircraft.

[5] The training program for the Cessna SET Class did not include TAG maneuver.

After taking over the control, the instructor increased the engine power to maximum, made a turn to the left, gradually deepening bank angle. With a bank angle of about 60°, the plane began to slide on the left wing, losing height (Fig. 1 and 2 - time-lapse recording from the camera installed on the "tower" of the airfield). At a bank angle of 70°, the left wing came into contact with the grassy surface of the airfield in the immediate vicinity of the "tower" of the airfield and the fence of the playground for children.

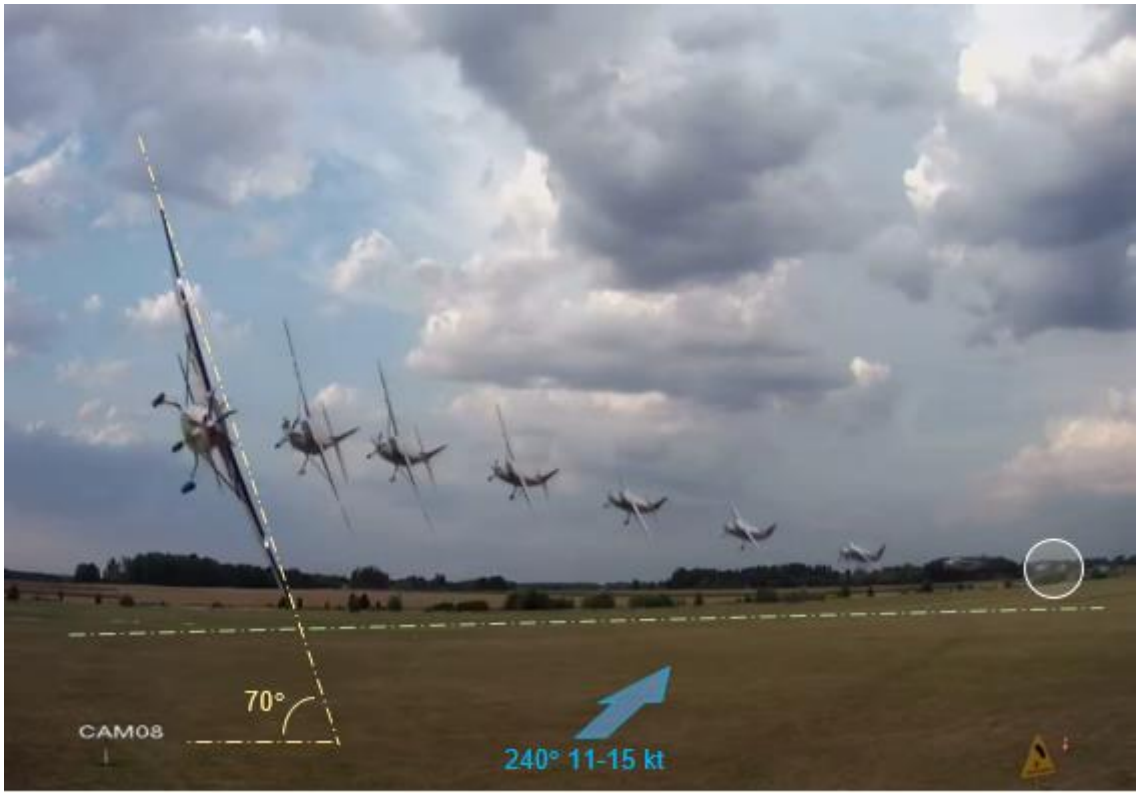

Fig. 1. Cessna 208B SP-WAW, in the flight after TAG, where: white circle – flight instructor takes control, yellow dashed line – bank angle, green dashed line – RWY centre line, blue arrow – approximate wind direction.

Moments later, i.e. at 19:40 hrs, reducing the bank angle, the plane collided with an all-terrain vehicle, and then, with a sheet metal building, where some persons were staying.

As a result of the collision of the aircraft with the building, the flight instructor died on the spot.

The pilot-in-training from the cargo compartment suffered minor injuries and was the first who left the plane on his own.

The pilot-in training from the cockpit also suffered minor injuries and left the plane on his own. Before leaving the cockpit, he shut down the engine by moving the

Fuel Condition Lever[6] to the CUT OFF position and pulled the Fuel Shutoff Control cable.

Fig. 2. Cessna 208B SP-WAW (next time-lapse photos - Fig. 1 continued), where: the right photo shows the moment of the left wing contact with the surface of the airfield, orange arrows show symmetrically extended wing flaps and green arrow shows the elevator deflected up.

The rescue operation was launched immediately after the accident. The first to react were the witnesses of the occurrence, who rushed to help the victims. Numerous personnel and resources were dispatched to the scene: the ambulance service, PSP, OSP, Police, LPR and GPR. After medical triage, all the injured were given first aid on the spot. Persons requiring specialist medical treatment were transported to hospitals.

Four persons in front of and inside the building died on the spot. Eight other persons (including one child) suffered injuries of varying degrees. The condition of two persons was described as serious and one of them died in hospital two days after the accident.

A dog in the building also died as a result of the accident.

The aircraft and building structure were destroyed.

[6] Terminology related to levers and switches in accordance with POH and AFM.

Fig. 1. Cessna Grand Caravan 208 B, SP-WAW, on the accident site.

1.2. Injuries to persons

Table 1. Numerical breakdown of the injured

Injuries	Crew	Passengers	Total on board	Others
Fatal	1	-	1	5
Serious	-	-	-	7
Minor	1	1	2	Not applicable
None	-	-	-	Not applicable
TOTAL	**2**	**1**	**3**	**12**

The victims were of Polish citizenship.

1.3. Damage to aircraft

The plane was destroyed. During the accident, the upper part of the cockpit was destroyed along with its glazing and part located in the center wing, as well as the right door, which was torn out. The left door remained connected to the wreckage of the fuselage.

The struts of each wing detached from the fuselage, and both wings broke where they were attached to the center wing.

The right wing moved forward during the accident, and remained in a position close to parallel to the fuselage rising above the engine of the aircraft. The wing sustained numerous deformations and structural tears, especially on the leading edge and in the wing tip area.

After the accident, the left wing remained in a position close to normal, however, due to the tearing of the strut, its end fell to the ground and the leading edge turned downwards. A fragment of the wing tip and the left aileron separated from the wing after the first contact with the ground.

In the nose part, the engine covers were damaged and separated from the aircraft. The engine bed was deformed, numerous mechanical damages were also caused to the electric harness and hydraulic lines mounted on the engine.

The propeller blades were torn into fragments, which after the accident were both inside and outside the damaged building.

The interior of the cockpit, except for the ceiling part, i.e. the instrument panel, yokes, foot controls and seats with belts, remained without major damage after the accident.

The main landing gear retained its integrity with the fuselage, and its condition after the wreckage was recovered from the destroyed building made it possible to tow the wreckage to the storage site. The leg of the nose landing gear was broken and together with the nose wheel was under the aircraft, pressed to the ground by the engine.

Most of the elements located on the center wing, wings and under the fuselage were destroyed, such as the weather radar (on the starboard wing), foldable ladders facilitating cabin entry, external lighting of the aircraft and antennas.

The fuselage of the aircraft in the part behind the wings, together with the empennage, retained its integrity. The interior of the fuselage in its rear part, containing a bench for jumpers and an additional seat mounted behind the left pilot's seat, was also preserved without damage.

During the removal of the wreckage from the destroyed building, the fuselage skin in the tail part was deformed. When the wreckage was excavated, the fuselage, due to extensive damage, broke in a plane transverse to its axis, just behind the pilots' seats.

Fig. 2. Cessna 208B, SP-WAW – the wreckage before separating from the structure of the building (the photo shows a table supporting provisionally the tail of the aircraft to prevent its accidental movement).

Fig. 3. Cessna 208B, SP-WAW – the wreckage after separation from the structure of the building.

1.4. Other damage

As a result of the accident, the ground infrastructure of the airfield was significantly damaged, which mostly concerned the building (which served as a cafeteria), its surroundings and equipment.

Fig. 4. The building on the airfield partially destroyed during the accident of the SP-WAW aircraft. The destroyed part of the building is marked with a red frame. [source: https://www.google.pl/maps].

The destroyed building was constructed of steel profiles constituting its skeleton, which was covered with corrugated sheet. The collision of the plane with the building caused the detachment of the sheet metal covering its front part, as well as the disintegration and deformation of the skeleton elements. The side and rear walls of the building did not collapse, but they were crooked. The roof of the building was torn apart by the plane and fell on its fuselage.

Since the building served as a cafeteria, benches, tables, umbrellas, plastic toys and slides for children were placed in front of it. This infrastructure was partially destroyed during the accident and the subsequent rescue operation.

Inside the building, all equipment and goods, i.e. furniture, refrigerators, kitchen infrastructure, bar equipment, dishes, etc., were damaged or contaminated with fuel and extinguishing agents.

During the rescue operation, the building was cut off from electrical power to reduce the risk of a fire caused by spilled jet fuel. Therefore, food stocks stored in refrigerators and freezers were destroyed.

Fig. 5. Destroyed building located on the EPNC landing site. Umbrellas, benches, tables and elements of a playground for children are visible in front of the building.

Around the building, as a result of the rescue operation and then the operation of removing the wreck, the building's fence and the decorative lighting of the area in front of the building were destroyed.

A Jeep was parked to the right of the building's front. The right wheel of the main landing gear hit the roof of the car during the accident, as a result of which the flexible roof covering of the vehicle was destroyed and the frame on which it was stretched was deformed. A number of personal belongings of the injured persons located in front of and inside the building were also damaged, such as mobile phones, children's bicycles, etc.

Fig. 6. The Jeep car damaged during the accident.

1.5. Personnel information

1.5.1. Pilot-in-Command

Flight Instructor, male, aged 47.

Licence: ATPL(A)

Ratings entered into the licence:

- SEP(L) valid until 30 June 2024, SP;
- Cessna SET valid until 31 August 2025, SP;
- IR valid until 31 May 2024, SP,SE,ME;
- MEP(L) valid until 31 May 2024, SP;
- EMB170/IR valid until 30 November 2023; CRI
- CRI valid until 31 May 2023, SE;
- FI Restricted valid until 31 August 2025;
- Language – ICAO level 4 valid until 1 April 2026;

Additionally holder of CRE Cessna SET authorization valid until 31 August 2024.

Total Flight Time:

- 5500 h AOC: 4355 h (EMB170[7], C-208);

Flight Time on type:

- C-208: about 1145 h;

Flight time prior to the occurrence:

- over the last 24 hours: 1 hour 56 min on C-208;
- over the last 7 days: 19 h 42 min on EMB170;
- over the last 90 days: 214 h 44 min on EMB170, 26 h 27 min on C-208.

OPC passed on C-208 carried out on 20 May, 2023.

Aero-medical certificate - Class 1 with VDL limitation, valid until 6 September, 2023.

Rest over the last 48 hours – over a dozen hours of rest at home.

Familiarity with the airfield - the pilot knew the EPNC very well, he flew there many times.

Place in the cockpit and activities performed - right seat, flight instructor, pilot flying (at the time of the accident).

1.5.2. Pilot-in-training

Male, aged 43.

Licence: CPL(A)

Ratings entered into the licence:

- SEP(L) valid until 31 December 2023, SP;
- MEP(L) valid until 28 February 2023;
- IR valid until 31 July 2024;
- Language – ICAO level 4 valid until 1 April 2026;

Total flight time: 303 h 51 min (total on: C-150, C-152, C-182, P2006T), including as PIC: 171 h 51 min.

Flight time prior to the occurrence:

- over the last 24 hours: 0 h;

[7] The flight time on type EMB170 includes : EMB 170, 175, 190 and 195.

- over the last 7 days: 0 h;
- over the last 90 days: 2 h 44 min on C-182, 2 h 53 min on P2006T.

OPC passed on C-152, carried out on 8 February, 2023.

Aero-medical certificate - Class 1 without limitation, valid until 21 September, 2023

Rest over the last 48 hours – rest at home.

Familiarity with the airfield – on the day of the accident the pilot made ten flights under instructor supervision.

Place in the cockpit and activities performed – occupant of the left seat.

1.6. Aircraft information

1.6.1. Airworthiness and maintenance

a) General information:

- single-engine, all-metal high-wing monoplane, tricycle fixed landing gear, certified in the normal category, cargo version modified for parachute drop;
- manufacturer - Cessna Aircraft Company;
- owner of the type certificate - Textron Aviation Inc.
- factory designation (model) - 208B;
- serial number - 0854;
- year of manufacture - 2000;
- registration marks - SP-WAW;
- owner - Aeroklub Warszawski;
- user - Aeroklub Warszawski;
- certificate of registration - date of entry 23 April, 2010, register number 4426 - valid on the day of the occurrence;
- CofA - issued on 23 April, 2010, without restrictions - valid on the day of the occurrence.

b) History of the aircraft:

- Time Since New - 10931:43 h;
- Time Since Overhaul - not applicable;

- last inspection (200 h/12 months) made on 23 June, 2023 after 10847:01 h flight time;
- flight time until next inspection - 65:18 h;
- modifications - several modifications were made to the aircraft to adapt it to the parachute drop operations, as well as numerous modifications involving the replacement of electronic devices. In 2019, the engine and propeller were also replaced;
- on-board technical log (pol. PDT) – maintained in hard copy and electronically archived. The PDT did not contain complete information on the flights on the day of the accident (it contained only information on refueling prior to the flights). The PDTs of the previous days did not contain any information on the plane failures;
- maintenance documentation - aircraft status[8] and maintenance documentation maintained electronically in Evionica system;
- LDD contained 2 defects that were removed during the annual inspection;
- Airworthiness Directives - according to the status of the aircraft, all applicable directives have been complied with;
- Service Bulletins - by aircraft status all applicable bulletins have been implemented.

c) Engine and propeller:

- engine - turboprop with a one-stage power turbine, one-stage compressor turbine, four-stage compressor (three axial and one centrifugal) and two-stage reduction gearbox. Model PT6A-140, P/N 3076226-01-BS1341, S/N PCE-VA0541, Manufacturer Pratt & Whitney Canada, Time Since New 1979.18 h, last inspection (150 H) at 1894.48 h, 65.30 hours remain until the next inspection (150 H);
- propeller - 5-blade, with hydraulically controlled pitch; operating modes: constant speed, windmilling and reverse. Hub made of aluminum alloy. Wooden blades covered with laminate. Model MTV-27-1, P/N MTV-27-1-E-C-FR(P), S/N 181555, manufacturer MT-Propeller Entwicklung GmbH, Time Since New 1979.18 h, last inspection (150 H) completed at 1894.48 h, 65.30 h remain until the next inspection (150 H);

[8] Detailed status of SP-WAW - a record maintained in electronic form in the Evionica system.

d) Fuel:
   - recommended - JET A, Jet A-1, JET B, JP-1, JP-4, JP-5, Jp-8;
   - used in flight - Jet A-1;
   - quantity on board[9] - 650 l;
   - distribution on the deck - evenly in both wing tanks.

e) Devices and components that failed during the flight - no failures were established to occur during the flight.

f) Defects - no defects were found. The aircraft documentation did not contain deferred defects.

g) Aircraft load
   - MTOW – 8750 lbs;
   - MLW – 8500 lbs;
   - SEW – 4071 lbs;
   - TOW – 5760 lbs;
   - CG – within prescribed limits.

1.6.2. Aircraft systems or parts contributing to the accident - no aircraft system, installation or component has been identified as contributing to the accident.

1.6.3. Efficiency and use of collision avoidance systems - not applicable.

1.7. Meteorological information

Information obtained from witnesses and pilots in training show that at the time of the accident there were no weather phenomena that could have affected the course of the accident

The table below shows the values of wind direction and speed recorded by the synoptic station located 18 km south of EPNC, i.e. in Legionowo.

[9] Estimated quantity based on the average fuel consumption and flight time after the last refueling.

Table 2 Wind direction and speed recorded in Legionowo [source: IMGW]

Time (UTC)	Wind Direction	Average speed m/s	Maximum speed m/s
	LEGIONOWO	LEGIONOWO	LEGIONOWO
2023-07-17 16:20	225	2,3	4,9
2023-07-17 16:30	234	1,9	4,5
2023-07-17 16:40	230	2,7	6,1
2023-07-17 16:50	240	3,3	5,8
2023-07-17 17:00	234	2,6	5,2
2023-07-17 17:10	234	2,6	4,9

Before entering the aerodrome traffic circuit, crews asked by radio for the conditions for landing. The records of this correspondence show that the south-west wind was blowing at the EPNC landing site, i.e. from the direction of 240° with a speed of 15 kt.

One of the witnesses checked the weather a few minutes before the accident. According to his testimony, the wind on EPNC was blowing from the direction of 240° at a speed of 11 knots.

1.8. Aids to navigation

On the day of the accident the crew of the SP-WAW performed VFR flights, during which the use of ground navigation aids is not required.

1.9. Communications

On 17 July, 2023, during flights in the area of the EPNC, the flight crews maintained communication on the Chrcynno Radio 122.205 MHz frequency.

The EPNC, without an active TRA 45 zone, was located in class G airspace, where the flight information service was provided by FIS Olsztyn.

During the flight in TMA Warszawa, the crew of the SP-WAW maintained radio contact with APP Warszawa on the frequency of 125.055 MHz.

The flight crews informed each other about the performed and planned maneuvers. Most of the correspondence was conducted in Polish. The crew of SP-WAW aircraft communicated in Polish and English.

The radio communication records were readable in both directions.

1.10. Aerodrome information

The Chrcynno airfield (EPNC) is managed by the Aeroklub Warszawski. The airfield is intended for parachute training, training and practice flights as well as take-off and landing operations performed in accordance with the VFR, day and night, for aircraft with MTOM up to 5700 kg.

Coordinates of the airfield ARP, according to WGS-84 are: 52°34'26″ N 020°52'18″ E.

Airfield elevation: 114.4 m (375 ft) AMSL.

The take-off area of the EPNC airfield has a trapezoidal shape with two runways (10/28 800x50 m and 13/31 900x50 m) without artificial surface.

Rules of use of the runways are specified in the EPNC operation manual[10]:

> *"3.2.5. RWY 13/31 shall not be used for training or practice flights.";*
>
> *"3.4.5. Take-off and landing operations may be performed simultaneously only with the use of one RWY.";*

and in the Operational Manual of the Aeroklub Warszawski[11]:

> *„C.6.9.1.e) RWY 13/31 is an auxiliary runway and shall not be used for training or practice flights."*

The EPNC airfield is located in uncontrolled class G airspace. The TRA 45[12] zone within the vertical boundaries of GND-2000 ft AMSL has been designated for the airfield use. Above 2000 ft AMSL, there is Segment A of TMA Warszawa with class C controlled airspace.

When TRA 45 is active, the crews of aircraft in this zone must maintain radio communication on the Chrcynno Radio 122.205 MHz frequency.

For the purpose of flights and parachute operations of Aeroklub Warszawski from EPNC, Chrcynno AREA (A, B and C zones) have been designated. Because Chrcynno AREA is located in Class C controlled airspace of TMA Warszawa, it is activated in consultation with APP Warszawa.

[10] Operation Manual of Chrcynno Airfield, Issue II of 2020, Amendment No. 0.
[11] Operation Manual of Aeroklub Warszawski, Issue 1 of 2014, Amendment 15 of 20.04.2020.
[12] TRA 45 - parachuting and flying zone of Aeroklub Warszawski, uncontrolled airspace class G.

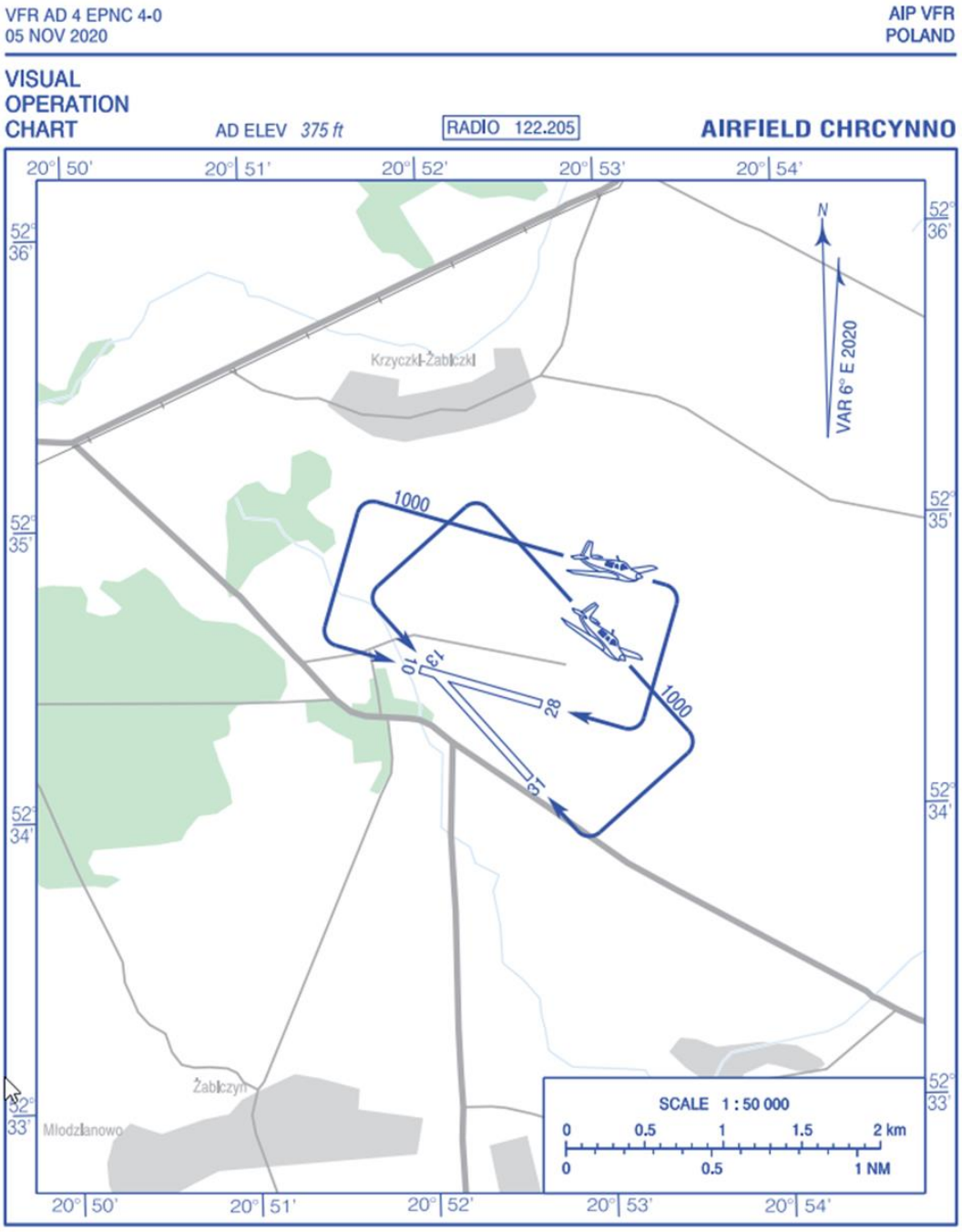

Fig. 9. Chrcynno airfield (EPNC) – Visual Operation Chart [source: AIP VFR Poland].

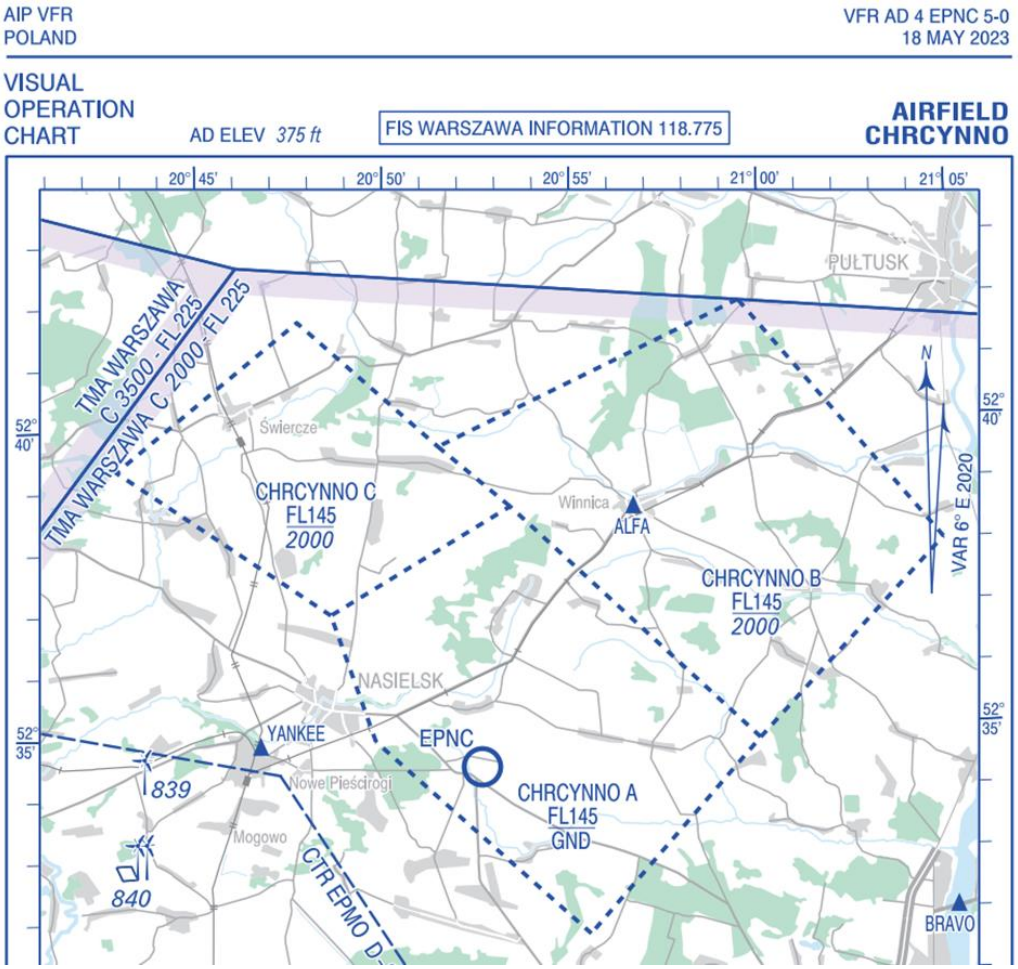

Fig. 10. Chrcynno airfield (EPNC) – Visual Operation Chart [source: AIP VFR Poland].

1.11. Flight recorders

The aircraft was not equipped with FDR or CVR. None of these recorders were required under applicable aviation regulations.

1.12. Wreckage and impact information

A general view of the accident site is shown in the figure below.

Fig. 7. Accident site. The following elements are marked in yellow: A – the place of the aircraft first contact with the ground (left wing tip); B – the place of the plane collision with the fence of the building; C – position of the wreckage. "Tower" of the airfield indicated by red arrow [source: https://mapy.geoportal.gov.pl].

The aircraft collided with the ground and then with the building having a high bank angle (70°) to the left wing. The first contact with the ground occurred in front of the building, next to the "Tower" of the landing site. After the accident, a trail of the left wing on the grass was visible in front of the building.

After about 10 meters, the left wing hit a low wooden fence in front of the building, as a result of which its tip and the left aileron separated from the wing. The wing tip remained on the fence post, while the aileron was found several meters further towards the building.

Behind the fence, the plane flew another dozen or so meters, leaving a trail of the left wing on the ground and then on the paved area located directly in front of the building.

Then, the right wheel of the main landing gear collided with the roof of a vehicle parked in front of the building, and then hit the benches and tables and the front façade of the building, destroying its structure, and then came to rest inside.

No other part of the aircraft was found to have separated from it in flight, apart from the left wing tip and the left aileron, which were detached after the aircraft collided with the fence.

Fig. 8. Accident site. The red frame marks the trail of the left wing tip left on the grass in front of the building. The yellow arrow marks the tip of the left wing, which was torn off as a result of the collision of the wing with the building fence.

The figure below shows the cockpit after the accident. After the impact, the right control wheel was clean unlike the left one, which contained human remains. This proves that at the time of the collision the flight instructor had his hands on the control wheel, i.e. he was a Pilot Flying.

Fig. 9. Cockpit of Cessna 208B, SP-WAW after the accident. It is visible, that the right control wheel is clean in the places of hands location.

1.13. Medical and pathological information

As a result of the accident, the flight instructor died on the spot. The other two pilots on board the aircraft survived the accident with only minor injuries.

By the date of the Preliminary Report, PKBWL had received the flight instructor autopsy report, which contained only a preliminary opinion (there were no toxicology results yet).

The pilot-in-training was not under the influence of alcohol or other substances impairing his performance.

1.14. Fire

No signs of in-flight fire were found. There was no fire after the accident.

As a result of damage to the aircraft wings, the fuel tanks were unsealed and fuel leaked inside the building. JET-A1 fuel spilled in the building did not ignite. Rescue and firefighting units of the PSP arrived at the scene and secured the accident site by applying fire extinguishing foam to the wreck and inside the

building. The persons present at the scene used powder extinguishers available on the airfield to prevent the fire.

1.15. Survival aspects

The flight instructor died on the spot as a result of the aircraft collision with the sheet metal building, whose steel structural elements stuck inside the cockpit, causing his head injuries.

The pilot-in-training suffered minor head injuries caused by the destruction of the cockpit, including the windshield.

The pilot-in-training (passenger) suffered minor bodily injuries (ribs and spine) caused by overloading at the time of the collision.

All pilots on board were wearing lap and shoulder seat belts, which saved the lives of the two survivors. During the accident the crew seats and the passenger seat remained fixed to the airframe structure and supported the bodies of the occupants.

The long nose part of the aircraft housing the engine and the firewall together with the instrument panel withstood the collision with the light structure of the sheet metal building and thus protected the pilots' bodies from possible injuries in the legs and chest area.

The truss structure of the building, covered with sheet metal, was deformed and disintegrated during the collision, which effectively absorbed the impact energy of the aircraft, thus reducing the overload acting on the people on board.

The injured people on the ground in front of and inside the building had no protection against the falling plane and the building structure.

The number of injured people on the ground and the degree of their injuries were determined by chance. In an accident with such a large number of victims, the course of the rescue operation played a significant role in their survival.

The rescue operation was launched immediately after the notification, i.e. 1 minute after the accident. The first rescue entity arrived at the scene after 16 minutes. In total, several dozen units took part in the rescue operation, including: 19 JRG PSP, 10 TSO units, 14 ambulances, 20 police cars, 7 specialized PSP units, 8 PSP operational vehicles, 4 LPR helicopters and 1 ASAR helicopter. In total, about 300 people took part in the rescue operation and recovery of the wreck.

After the accident, the ELT signal started automatically and was transmitted for about a day, until the wreck of the plane was extracted from the structure of the

destroyed building, which made it possible to enter the wreckage and turn off the transmitter.

1.16. Tests and research

After the accident, the PKBWL investigation team inspected the accident site and the wreckage of the aircraft.

On the day of the accident, to the extent possible, photographic documentation of the wreck immobilized inside the structure of the destroyed building was made.

On the following day, after the wreck was excavated, the PKBWL made another detailed examination of the wreckage and checked the continuity of the kinematics of the rudder and elevator control systems - the continuity was preserved. Due to the destruction of the wing structure, it was not possible to check the control systems of the ailerons and flaps.

A fuel sample was taken for possible tests.

A detailed analysis of the recordings from the cameras installed on the "tower" of the airfield was carried out, during which particular attention was paid to the symmetry and angle of deflection of the wing flaps and other flight control surfaces.

In order to perform a comparative analysis, the mechanism of wing flap extension on another Cessna 208B aircraft was studied (see Figures 14 and 15).

The above comparison shows that during the accident, the wing flaps of the aircraft were extended to an angle of 20°.

Until the date of issuing the Preliminary Report, no specialist tests were carried out.

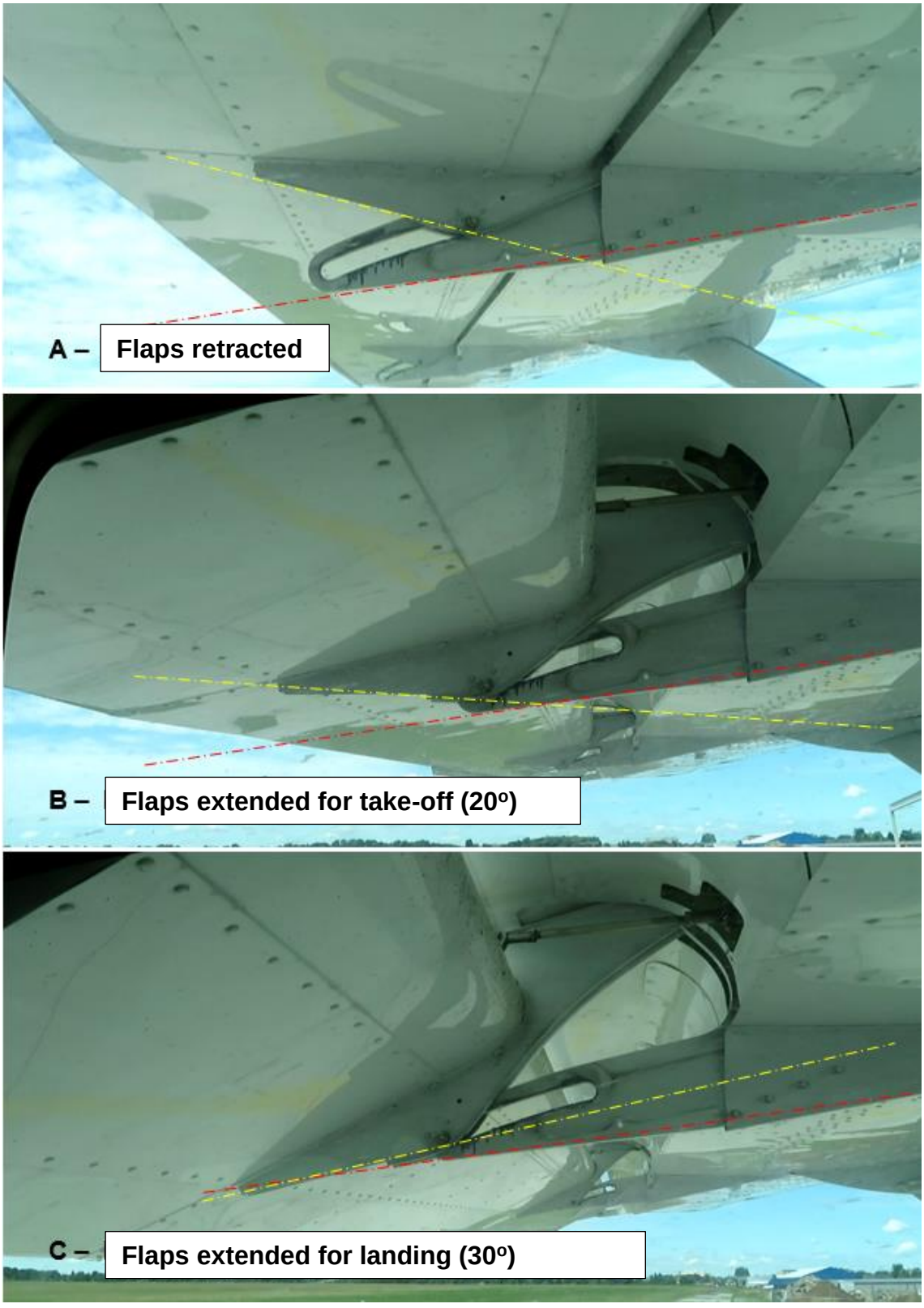

Fig. 14. Cessna 208B D-FLLY – mechanization of wing flaps. A - flaps retracted, B - flaps extended for take-off and C - flaps extended for landing. Auxiliary lines show: red line - extension of the edge of the flap track, yellow line - extension of the edge of the flap support assembly.

Fig. 15. Cessna 208B SP-WAW – enlargement of one of the frames from aerodrome camera, where: red line - extension of the edge of the flap track, yellow line - extension of the edge of the flap support assembly.

1.17. Organizational and management information

1.17.1. Training program for the Cessna SET class

Theoretical and practical training was carried out on the basis of the Cessna SET Class Training Program, implemented for official use by an order of the Responsible Manager of Aeroklub Warszawski, approved by the Head of the Certification and Supervision Inspectorate under the authority of the President of the Civil Aviation Authority. The above program did not include the TAG maneuver.

The training program (as part of exercise no. 3, i.e. aerodrome traffic circuit - emergency procedures) included a go-around from the minimum safe altitude.

1.18. Additional information

1.18.1. Airspace

At the time of the accident, SP-WAW was flying in class G uncontrolled airspace.

On the day of the accident, TRA 45, dedicated for air operations on the EPNC airfield, was activated for the period of 20:33-22:40 hrs LMT (18:33-20:40 hrs UTC), i.e. after the accident.

1.18.2. Operations of the SP-WAW aircraft

On the day of the accident, the SP-WAW aircraft made many flights in the area of the EPNC up to the altitude of 1600 ft AMSL. One flight was made in TMA Warszawa airspace up to FL 095.

1.19. Useful or effective investigation techniques

Standard investigation techniques were used, including interviewing participants and witnesses of the occurrence

A 3D scanning of the accident site was carried out (the state before removal of the wreck from the building), which allows for its repeated visual inspection and the exact location of the bodies and wreckage of the plane.

Records from several surveillance cameras were obtained, which helped to reconstruct the course of the occurrence.

2. SAFETY RECOMMENDATIONS

No safety recommendations have been made at this stage of the investigation.