Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit - (Belgium)
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Safety Investigation Report

ACCIDENT TO CESSNA P210N AT EBCI ON 9 FEBRUARY 2013

Ref. AAIU-2013-04
Issue date: 27 March 2014
Status: Final

FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation and EU Regulation 996/2010, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and define recommendations in order to prevent future accidents and incidents.

In particular, Article 17-3 of the EU regulation EU 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility in the accident.

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.

The investigation was conducted by Luc Blendeman, Henri Metillon and Sam Laureys.

The report was compiled by Henri Metillon and was published under the authority of the Chief Investigator.

NOTES:

1. For the purpose of this report, time will be indicated in UTC, unless otherwise specified.

2. ICAO document 9859 “Safety Management Manual” was used to identify the hazard and the consequences related to the accident.

SYMBOLS AND ABBREVIATIONS

’	Minute
°	Degree
°C	Degrees centigrade
‘	Feet
“	Inch
AFM	Airplane Flight manual
AFMS	Airplane Flight manual Supplement
AAIU(Be)	Air Accident Investigation Unit (Belgium)
AccRep	Accredited Representative of an Investigation Unit
AGL	Above Ground Level
A&P (AI)	Airframe and Powerplant technician holder of a mechanic certificate with Inspection Authorization
ASL	Above Sea Level
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
BCAA	Belgian Civil Aviation Authority
BEA	Bureau d’Enquêtes et d’Analyse (French authority responsible for safety investigations into accidents or incidents in civil aviation)
bhp	Brake horsepower
CA	Commercial Aviation
CCTV	Closed Circuit Television
CFR	Code of Federal Regulation (USA)
EASA	European Aviation Safety Agency
EBCI	Charleroi South Brussels Airport
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration
ft	Foot (Feet)
Flight Time	Time “block to block”
GA	General Aviation
hp	Horse power
HPSE	High Performance Single Engine (Cessna Airplane)
IMC	Instrument Meteorological Conditions
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
JAR-FCL	Joint Aviation Requirements Flight Crew License
KIAS	Knots Indicated Airspeed
KTAS	Knots True Airspeed
lbs	Pounds
L/H	Left hand
LVP	Low Visibility Procedure
m	Meter(s)
METAR	Meteorological Aerodrome Report
nm	Nautical mile(s)
O/H	Overhaul
PIC	Pilot in Command
POH	Pilot’s Operating Handbook
QFU	Magnetic bearing of the runway

QNH	Pressure setting to indicate elevation above mean sea level
R/H	Right hand
RPM	Revolutions per Minute
RWY	Runway
SEP	Single Engine Piston rating
SHP	Shaft Horse Power
SL	Sea Level
TIS	Time in Service (From take-off to landing)
US gal	US Gallon
UTC	Universal Time Coordinated
V	Volt
VMC	Visual Meteorological Conditions

SYNOPSIS

Date and hour of the accident:	9 February 2013 at 8:45 UTC
Aircraft:	Cessna P210N
Accident location:	EBCI Airport
Aircraft owner:	White Mountain Inc.
Type of flight:	Private
Persons on board:	5

Abstract:
As the airplane was climbing out after lift-off, witnesses saw it deviating to the left of the runway axis, at low speed in an unusual nose up attitude. The airplane began a climbing left turn where it seemed to circle back toward the airport. A few seconds later, the pilot declared the control tower "I have a problem, I'm trying to land". The airplane was given priority and continued to climb slowly, making a short left hand circuit at low speed. Around one minute after the lift-off, the airplane flew back to the airport unstable at low speed. After having turned left when crossing the runway the pilot lowered the landing gear when flying parallel on the right side of the runway 25. Shortly after, the airplane entered in a left hand spin and collided with the ground almost vertically, killing the 5 occupants.

Cause(s):
The pilot's failure to achieve the required best-angle-of-climb airspeed after lift-off resulting in a nose up flight at low speed, close to the stall speed. The airplane flew unstable on the back side of the power curve having as consequence a loss of control during an attempt to land and subsequent collision with terrain.

Hazard identified during the investigation[1]:
- Improper loading of the airplane
- Improper de-icing
- Lack of recent experience of the pilot
- Difficulty of the pilot to look inwards and to learn from previous events.
- Lack of survey of the concerned aviation authorities

Consequence[2]:
Loss of control – Inflight (LOC-I)

[1] Hazard – Condition or object with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.
[2] Consequence – Potential outcome(s) of the hazard

1 Factual information.

1.1 History of flight.

The day before the crash, the pilot made a 36 minute VFR flight to VOR AFI (Affligem) and flew back to EBCI. The last recorded flight before this test flight dates from 21 August 2012, five months earlier.

The pilot stopped the airplane on a parking place located 200m from the security control building in order to facilitate the transfer of his passengers the following day. At the end of the manoeuver on the parking area, the pilot had been asked by the ground controller to explain why he did an unusual left turn on the parking instead of following the markings on the parking area. The pilot answered the right hand brake had to be adjusted. Thereafter he requested the refuelling service of the airport to fill up to the brim all the five fuel tanks with JET A1. The fuel delivery ticket shows 378 litres were delivered.

The pilot intended to fly 4 members of his family to Lyon (France) on 9 February and to fly back to Belgium the same day.

A flight plan had been introduced for an IFR flight from EBCI to Lyon with an Estimated Time of Departure (ETD) at 8:15 (NB: A/C had to take-off within 30 minutes of the ETD). Estimated flight duration was 2 hours. Reportedly, the pilot had an appointment on the same day at its repair station for the performance of the 100h annual inspection.

The day of the accident, the pilot and his passengers (one adult female and 3 children) arrived at EBCI airport around 7:50 and passed the security control at 7:53 before rendering to the airplane around 8:04. They left the security control carrying 2 big luggage's, 2 shopping bags, a picnic basket, another basket containing cosmetics, 2 booster seats and an infant stroller.

When arriving at the airplane, the pilot loaded some of the luggage in the baggage area located in the rear side of the fuselage before starting to de-ice the airplane, while the other adult passenger installed the other luggage in the cabin.

The airplane was covered by a few millimetres frost (Estimated between 5 to 10mm) and probably also a thin layer of ice under the frost. The pilot requested an airport worker to provide him a ladder and started to de-ice manually the extrados of the wings at 8:08. As recorded by one of the security cameras of the airport, the pilot used the back of his arm to remove the frost.

De-icing of all the horizontal surfaces of the airplane was performed in the same way as well as the windows and the windshield. De-icing ended at 8:16, while all the passengers had boarded in the cabin.

Figure 1: Airplane after the de-icing

This picture of the airplane, taken by a security camera after the de-icing, shows white traces on the ground originating from the frost removed from the airplane.

The 6 years old male child took place at the front right seat, the adult female on the centre left seat, the 7 years old female child at the rear left seat and the 3 year old female child at the rear right seat.

From 8:17 to 8:25, the pilot transferred some objects previously installed in the cabin by the passengers to the rear baggage area.

The pilot performed a walk-around inspection from 8:25 to 8:28. Thereafter he got in the cabin before immediately getting off again to check something at the baggage compartment door.

Around 8:30 the crew of an Extra 500 passing near the Cessna, saw the occupants and the baggage through the airplane's windows. They had the impression the airplane was heavily loaded and the de-icing could be improved.

The engine was started at 8:32.

At 8:37:32, the pilot contacted "Charleroi Ground" to request a clearance for an IFR flight from Charleroi to Lyon.

The controller asked the pilot if he would be able to be airborne before 8:45 and if not, proposed to him to send a delay message. The pilot answered he was ready and the engine was already running.

A Ryanair B737 was cleared to take-off around 08:33.

The Cessna was cleared to taxi toward "Sierra 4" to join the intersection point with runway 25 at 8:38. During the taxi a witness saw the airplane braking and stopping before passing slowly near a marker installed along the taxiway for long term works of the concrete surface.

Charleroi Tower was radioed at the Sierra 4 intersection point at 08:42:45, authorizing the pilot to line up and wait on runway 25. A clearance for take-off was given at 08:43:42 when the airplane was aligned on runway.

A few witnesses, including the tower controller reported they saw the airplane accelerating normally on the runway for around 600 metres but as soon as the airplane was airborne they realized the airplane banked left (10° to 20°) in an excessive nose up attitude.

The airplane flew first parallel to and above the grass on the left side of the runway climbing slowly in an uncoordinated attitude (nose up and left wing lower

than right wing) before turning to the left and disappearing behind the control tower.

This approximate flight path has been reconstructed based on the witness declarations and on the radar records. Radar records show a part of the flight beginning when the airplane had reached sufficient altitude (800 ft) to be detected. The airplane was flying East when it appeared on the radar screen.

Altitude values sent by the transponder demonstrated the airplane climbed up to around 1100 ft which means more than 400 ft AGL.

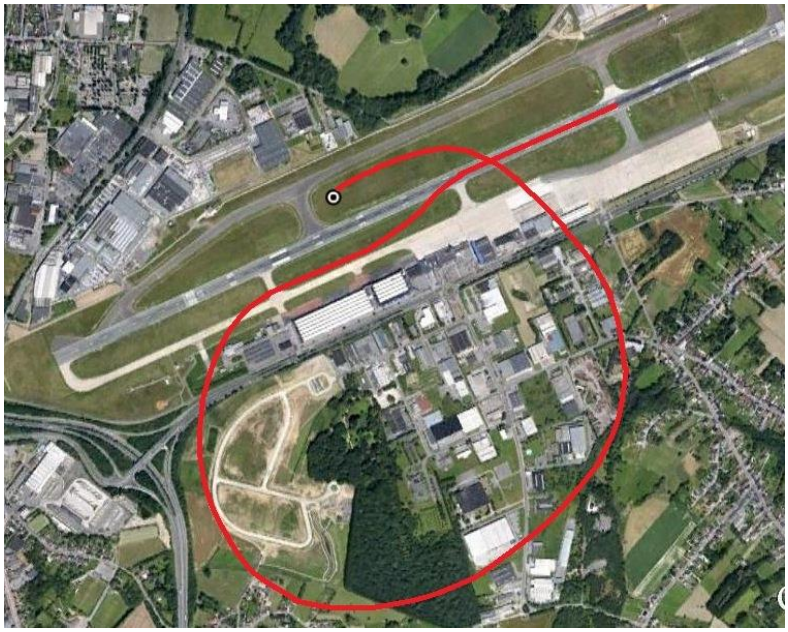


Figure 2: Approximate flight path.

At 08:44:44 the pilot announced Charleroi Tower: “N2****, I have a problem”. The controller asked what the problem was and immediately gave the pilot priority to land on runway 25. Then, the pilot repeated “I have a problem, I am trying to land now”.

Alert procedure for the rescue services was immediately initiated.

The airplane flew back to the airport, very unstable, banking from one wing to the other at an estimated height of 150m. Obviously the pilot was struggling to control the airplane. Witnesses reported the engine sound at full power.

The airplane crossed the runway and turned to the left, progressively losing altitude. The airplane flew parallel slightly on the right side of runway 25, probably trying to align with the runway.

Witnesses saw the landing gear was lowered when suddenly the airplane started to bank to the right, then to the left followed by a steep nose down attitude, entering in a left hand spin. One witness stated it was visible that the airspeed significantly decreased when the gear was lowered

The airplane collided with the ground almost vertically in the grass area located between taxiway north and the runway, around 100m East of N3 intersection point.
The crash area was located around 1000m far from the end of runway 25.

The 5 occupants died upon impact.

1.2 Injuries persons.

Injuries	Pilot	Passengers	Others	Total
Fatal	1	4	0	5
Serious	0	0	0	0
Minor	0	0	0	0
None	0	0	0	0
Total	1	4	0	5

1.3 Damage to aircraft.

The airplane was entirely destroyed due to the impact forces. An electrical fire started in the remains of the battery and the electrical wiring of the dashboard. This fire was rapidly extinguished by the airport's fire brigade.

1.4 Other damage.

Minor damage to grass area and ground contamination by Jet A1 fuel and engine oil.

1.5 Personnel information.

Pilot:
Sex: Male
Age: 68 years old
Nationality: Belgian
Licenses:
Belgian License:
Holder of a Belgian PPL(A) valid until 26 march 2013. Single Engine Piston (land) rating valid up to 30 June 2014 (Proficiency check performed on 25 June 2012 using a Cessna 172 airplane). First Issue of a PPL, limited to Belgian territory, on 23 September 1983
Medical certificate class 2 valid up to 10 December 2013.
English rating valid until 26 March 2013 ("Grand-father" right based on old "Restricted Radiotelephony certificate").
In January 2008, Belgian CAA found that the Private Pilot license (Aeroplane) (JAR-FCL) of the pilot was no more valid since 31 December 2006, which would have invalidated his FAA License. BCAA informed the FAA on 17 January 2008 about this anomaly and stressed also that the pilot regularly performed instrument flights as pilot in command while his Private Pilot license (Aeroplane) has always been restricted to VFR only. No feed-back was received by the BCAA.

FAA License:
Holder of a FAA Private Pilot License (Foreign Based) for Single Engine Propeller instrument airplane. Issued on 29 November 1995.
Limitations: English proficient. Instrument airplane U.S. test passed. License issued on basis and valid only when accompanied by Belgium pilot license. All limitations and restrictions on the Belgium pilot license apply.

Flight reviews: A flight review (FAR 61.56) and an Instrument Proficiency check (FAR 60.57(d)) were performed on 7 September 2011 using the airplane involved in the accident.
Experience:
The pilot learned to fly in 1982 on Cessna a 150 airplane and up to end 1995 flew on custom light SEP airplane such as MS887, C172 and PA28.
On 9 November 1995, the pilot started to fly with an FAA instructor on a standard Cessna 210, equipped with a reciprocating piston engine. On 28 November 1995, the instructor certified the pilot was found competent to perform as PIC in High Performance A/C and to perform flight operation as an Instrument Pilot.
Later, on 29 may 2001, the pilot obtained and started to fly on the Cessna P210N involved in the crash. This airplane had been altered by incorporating a gas turbine engine instead of the original piston engine.
The airplane stopped flying between 31 March 2003 and 2007 further to damage caused by a belly landing made in Bordeaux Mérignac airport, in France. The airplane was repaired in the USA in August 2007.
However the “Pilot’s Flight Log and Record” shows 16 flights performed in Europe in 2005/2006 with the same airplane, although no repair was logged in the airplane log book.
Actually, the pilot restarted to fly his Cessna P210N airplane with another pilot on 04 August 2007 at the place in the USA where it had been repaired. Thereafter he conducted a ferry flight from USA to Belgium, accompanied with another pilot.
When the fatal accident occurred the pilot had accumulated around 1017 hours flight experience on Single Engine Land Airplanes from which 865 hours were IFR flights and 460 hours were made using the Cessna P210N Turboprop engine airplane involved in the crash.
Most of the flights conducted on the Cessna 210 airplanes since end 1995 were instrument flights.
The flight records during the last 6 months before the crash show the pilot flew 9 flights in August 2012 and thereafter stopped flying for 5 months and a half. He restarted flying the day before the accident, making a short VFR 36 minutes local flight (1 take-off and landing).
From those 10 flights complied within the last 6 months, 7 were logged in the “Pilot’s Flight log and Records” as ending by an actual instrument approach.
The “Pilot’s Flight log and Records” found in the wreckage, beginning on 26 October 2011 shows most of the flights were logged as being Instrument flights with actual instrument approaches [3]. Not one instrument flight was logged as being “Simulated” instrument approach.
The pilot was known to have a strong personality and was successful in business, a master in his trade.

[3] Actual Instrument approach means an approach in actual IMC.

Known previous accidents, incidents or maintenance events involving the same airplane/pilot

AAIU(Be) tried to gather information regarding possible previous occurrences within the last 10 years.

The Belgian and French databases were consulted, the following was found:

- 13 February 2003: Generator (or associated circuit) electrical failure near Bordeaux (France) during an IFR flight from EBCI to Salamanca airport (Spain). The pilot first asked the control authorization to divert and come back to EBCI (NB: distance from Bordeaux to Charleroi is around 700km/380NM). Realizing the battery remaining power was going down the pilot requested and obtained assistance of the control to land at Bordeaux Mérignac airport. The incident report stated the radio showed intermittent breaks. Heading was provided as well as signal rockets were fired by the control tower. The airplane landed successfully. No entry related to this electrical failure was found anywhere in the airplane documents, however a report was filed by the French BEA.
- 31 March 2003: After a take-off from Bordeaux Mérignac airport for an IFR flight to EBCI, the "GEN OUT" warning lighted up. The pilot decided to come back to the airport and forgot to extend the landing gear. The airplane made a gear up, flapless landing despite the fact the controller warned him in short final to go around due to the landing gear position. However the controller, at the time, failed to mention the call sign leading the pilot to believe the warning was not intended to him. No entry related to this accident was found anywhere in the pilot and A/C logbooks except the logbook showed performance of repairs resulting from the accident. The pilot stated to the BEA investigator the "Gear up warning system" had been deactivated during the last maintenance of the airplane because it was no more properly adjusted. He said also the electrical problems were recurrent.
- 13 March 2009: The pilot forgot to extend the landing gear at EBCI airport and decided in extremis to perform a go-around. After a new circuit, the airplane landed without problem. Post incident inspection made by the airport authority showed the underside of the fuselage and an antenna slightly hit the ground. The pilot stated to the airport inspection the damage were old and were resulting from another incident.
- 8 July 2010: The airplane crossed the EBBE CTR without calling EBBE APP/TWR and finally landed in EBZW. The registration was visually confirmed by an interception military airplane. Both the pilot and aircraft log books did not show any flight performed that day. A similar flight is recorded on 15 July 2010 in the "Pilot's Flight log and Records" and the record of the flight is not dated in the aircraft logbook.
- 13 October 2011: At the end of a flight from EBCI to EBGB the airplane did not comply with the published circuit pattern. This occurrence was not the first despite several remarks from the airfield authority. The pilot declared he was flying using his GPS.
- 2 February 2012: At the end of a flight from EBCI to EBGB, in order to perform the annual inspection, the airplane entered the CTR of EBBR via Merchtem to EBGB without clearance and thereafter reentered the CTR south of EBGB.

1.6 Aircraft information.

General information

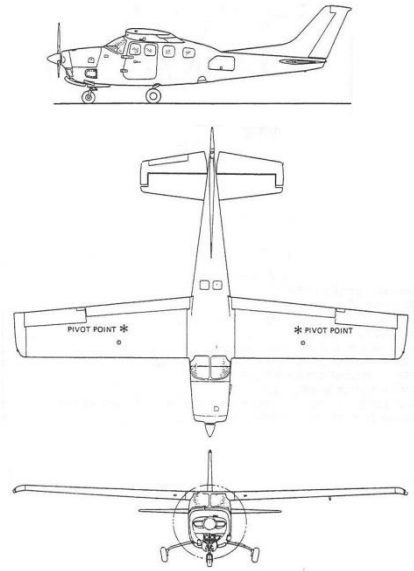


Figure 3: Drawing of the C210.

The Cessna 210 Centurion is a six-seat, high-performance, retractable-gear single-engine general aviation aircraft.

P210N, with pressurized cabin and four windows each side was produced between 1978 and 1983.

The airplane involved in the accident had been widely modified, amongst others, by replacement of its original reciprocating engine by an Allison gas turbine engine. The fuel capacity was also increased by installation of 2 wing tip tanks and one transfer fuel tank inside the baggage/cargo area located rear of the cabin.

Characteristics

Airframe:

Manufacturer:	Cessna Aircraft Company
Type:	P210N
Serial number:	P21000600
Built year:	1981
Registration:	N24xxx
Certificate of registration:	FAA Certificate of Aircraft Registration delivered on 29 January 2001 to the trust company[4] "White Mountain Inc", Deleware USA. The registration number of the airplane had been changed in 2006.
Certificate of airworthiness:	FAA Standard Airworthiness Certificate issued on 18 October 1994.
Airplane total time:	Around 3980h
Fuel capacity:	Main fuel tanks: 90 US gal (89 US gal usable) Wing tip tanks: 33 US gal (32,5 US gal usable) Transfer (rear) tank: 26,8 US gal (26,8 US gal usable) Total fuel capacity: 149,8 US gal (148,3 US gal usable)

[4] Under USA law only American citizens are permitted to own USA registered general aviation aircraft. To comply with this requirement and yet still facilitate a non-USA citizen owning such an aircraft there is a widespread practice whereby the aircraft is registered with the FAA in the name of a *Trustee*. The non-USA citizen, or *beneficial owner* then enters an agreement with that *Trustee*. The airplane was operated in Belgium by the beneficial owner.

Kind of operation:	Day VFR and/or night VFR and/or IFR operation as per FAR Part 91. Flight into known icing conditions is prohibited (See AFMS page 2.9)
Engine:	
Manufacturer:	Allison Turboprop Engine
Type:	250-B17F/2
Serial number:	CAE-881225
Total flight hours:	2294h
Propeller:	
Manufacturer:	Hartzell
Type:	HC-B3TF-7A
Serial number:	EXA1413
Total flight hours:	305h
Crew:	One
Capacity:	Five passengers
Length:	29 ft 5 in
Wingspan:	36 ft 35 in
Height:	9 ft 8 in
Empty weight:	2,587 lb
Max. takeoff weight:	4,000 lb
Power plant:	Allison 250-B17F/2 gas turbine engine with takeoff rating of 450 SHP for 5 minutes and max continuous rating of 380 SHP.

Aircraft history

The airplane was built in 1981 by Cessna Aircraft Company and was first operated and registered in Canada.

In November 1983 the airplane was modified by the installation of Flint Aero Wing Tip Tanks in accordance with STC SA4300WE, a Cessna weather radar installation and other changes to the avionics and instrument equipment.

In October 1994, the airplane was “N” registered and the original 310 hp Continental piston engine was replaced by a significantly more powerful 450 hp Allison Turboprop engine and a new Hartzell propeller. A 27,7 US gal auxiliary fuel tank was also installed under the baggage compartment. This alteration was performed in accordance with O&N Aircraft Modification, Inc. Supplemental Type Certificate nr SA1003NE.

On 12 December 2000, the airplane became property of the trust company “White Mountain Inc” – Delaware USA.
A new FAA certificate of Aircraft Registration was issued to the new owner on 29 January 2001 and the airplane was ferry flown to Belgium in May 2001.

From May 2001 to 9 February 2013 (date of the accident), the airplane was exclusively operated by the pilot in command. The insurance certificate was issued under the name of the pilot as well as the last fuel delivery ticket and the last flight plan. The pilot was known as being the actual owner the airplane.

On 19 July 2002, the airplane was further modified in accordance with STC SA3226NM by replacing the Flint Aero Wing Tip Tanks made for gasoline by kerosene tanks. A FAA Form 337 was issued and sent to Registration Branch at Oklahoma City, where a copy was retrieved by the investigators. This form required an amendment to the W&B computation of the aircraft, but no trace of this correction was found in the aircraft file.

As described in 1.5, the airplane experienced electrical breakdowns ending by a gear up landing in 2003. This caused significant structural damages, however no entry in the aircraft logbook was made. After the belly landing in Bordeaux, the airplane was dismantled and transported in container to the USA for repair.

During the repairs of the airplane in the USA, the airplane changed registration (April 2006).

Structural repair of the airframe was performed in the facility "Hampton Aviation, Inc.". The propeller and the engine were also inspected and repaired. The entire airframe was stripped, primed and repainted as well as the interior was refurbished. Comprehensive and detailed logbook entries and FAA Form 337 were filled and stored.

Finally, on 22 March 2007, after the above structural repair had been finished, the avionics equipment was also modernized by "Northwest Arkansas Avionics, Inc.". This company wrote a comprehensive and detailed logbook entry and Form 337.

At the end of the above repairs and alterations, the airplane had been inspected in accordance with an annual inspection.

There is no indication showing the airplane had been weighted after the structural repair, the new painting and new refurbishing. However, "Northwest Arkansas Avionics, Inc." produced a new W&B report by computation at the end of the avionics alteration. This report, which was not available to the investigator, was produced by "Northwest Arkansas Avionics, Inc." after the accident with the support of the NTSB.

No information regarding the actual weight and balance data was found either in the wreckage, in the POH supplement or in the airplane file.

Maintenance

A small bag containing A/C documents, including the maintenance records, was found in the baggage area. These maintenance records covered the period of time since the airplane's construction up to the accident.

The maintenance organization known to be in charge of the last maintenances and repairs of the airframe, engine and propeller was interviewed as well as the Airframe and Powerplant with Inspection Authorization[5] A&P (IA) who performed the last annual inspections. This was done in order to evaluate how the maintenance and the annual inspections were conducted.

The inspection of the maintenance records showed the following:

- The records of the maintenance performed in Belgium lacked the details shown during the operation of the aircraft prior to 2001(in the USA).
- During the operation of the aircraft in Belgium, all the maintenance was performed at a Belgian (non FAA approved/accepted) repair station, and accepted by the A&P (IA).
  As exception:
  - One maintenance and annual inspection performed on 15 November 2002 in another repair station incorporating qualified A&P (IA) was detailed and recorded.
  - The significant alterations and repairs performed in the USA in 2006 and 2007 after the belly landing was extensively recorded in the A/C log book and in different FAA Form 337.
- With the exception of the works performed on 15 November 2002, the owner requested every year the same non-FAA approved organization to make some maintenance and to prepare his airplane for the annual inspection. The owner ordered precisely the works to be done. No FAA approved licensed engineer was present in the maintenance organization during the airplane maintenance.
- The maintenance organization representative declared the owner of the airplane specified only verbally the maintenance to be done. No official work order was filled.
- Whenever the need of repair arose in the course of the year, the owner requested the same workshop to do the works in the same conditions (Verbal work order and almost no record). No FAA approved licensed engineer was present during the repair.
- It could not be established which type of document, if any (schedule of the TC or STC holder, defect report …) was used to support and/or to document the work done. The maintenance organization and the A&P (IA) with Inspection Authorization (IA) did not retain any copy of any document. As no detail was present in the maintenance records found in the baggage area, it is assumed no detailed document covering the maintenance done from May 2001 exists.

[5] A&P (AI) refers to technicians holder of a mechanic certificate "Airframe and Powerplant" with an additional rating added on to the individual's mechanic certificate. These individuals are allowed to perform annual inspections on aircraft and sign off for return to service on major repairs and alterations

- Based on the good reputation of the repair station and as permitted by US regulation, the log book entries from the A&P (IA) were mostly a rubber-stamping exercise including non-detailed AD compliance record entry and sometime some details.

Hereunder a summary of the aircraft maintenance history for the last 6 years.

Date	ACTT	Hobbs	
22 March 2007	3728h	0h00	Major alteration and structural repair + Annual performed in the USA. (Works extensively documented).
20 November 2007	3763h	34h6/10	Engine inspection
01 May 2008	3824h	96h7/10	Annual inspection
02 April 2009	?	?	Altimeter tested, static system tested and transponder tested
25 February 2009	3833h	105h8/10	Annual inspection + replaced R/H tire and tube
19 March 2010	3879h	151h0/10	Annual inspection + replaced nose wheel + replaced all tires and tubes + replaced battery + AD84-10-01 CW + AD86-19-11 CW (See note hereunder)
20 November 2010 (or 2011?)	?	?	Log book entry only for an annual inspection of the engine – Date is uncertain and hours of the engine are not consistent.
31 August 2011	?	207h6/10	Radio 1 and Garmin 430 and fuel pump n°1 unserviceable (Pilot logbook entry – No entry regarding the repairs)
25 April 2012	3916h	241h3/10	Annual inspection. Record regarding the replacement of engine inlet anti-ice system (actual date of the replacement unknown – no record of the alteration of the electrical anti-ice system by a new system ducted from the engine).
29 April 2012	3916h	241h7/10	Fuel pump n°1 unserviceable (Pilot logbook entry - No entry regarding the repair)
10 July 2012	?	?	Altimeter tested, static system tested and transponder tested.

Note: During annual inspection dated 19 March 2010, AD84-10-01 is mentioned as complied with (C/W) while this AD is not applicable by A/C SN and by type of (structural) fuel tank installed.

Although required every year, the logbook shows no entry for an annual inspection for the whole airplane for 2011. A limited log book entry mentions the

compliance of an annual inspection of the engine. Total time in service and time since overhaul mentioned are not consistent with the other log book entries. The logbook entry is only dated “2011”.

The maintenance organization representative stated the old electrical engine anti ice system was found to be unserviceable by his organization during the year 2011. No record of this discrepancy was found and the exact date of the finding is unknown. The engineer of the maintenance organization reported he verbally advised the owner to ground the airplane or at least urged him not to fly in icing condition.

After the replacement of the electrical engine inlet anti-ice system by a new system ducted from the engine no logbook entry and no Form 337 was filled. The alteration was performed by the usual maintenance organization on a date unknown and was later recorded by the A&P (IA) only in its “Report Annual Inspection” dated 25 April 2012.

No logbook entry was found for the repair of the radio 1, the Garmin 430 and the fuel pump n°1.

The only “AD compliance Report” listing found was filled end of year 2000.

On the whole, the quality of maintenance records of the airplane could be considered as substandard with respect to US practices.

The Pilot’s Operating handbook supplement chapter VIII “Airplane Handling, Service & Maintenance” recommends the following :

RECOMMENDED INSPECTION SCHEDULES

In addition to the FAA required inspections, refer to the following manufacturers' recommended inspection guides:

1. Cessna Recommended Inspection Guide.
2. Allison Recommended Inspection guide.
3. O & N Aircraft Modifications Recommended Inspection Guide.
4. See Overhaul or Replacement Schedule (page 8-13) for further inspection schedules.

OIL DRAIN PERIOD

It is recommended that the oil be changed every 200 hours or six months, whichever comes first.

With the exception of the maintenance performed on 15 November 2002, no trace was found that one of the above inspection schedules was used to service the airplane or to complete the annual inspection.
In the same way, no trace was found since 2001 of any oil change.

Pilot's Operating handbook

No original Cessna AFM or POH applicable to P210N airplane was found in the wreckage. By contrast a FAA approved Airplane Flight Manual Supplement (AFMS) for Cessna P210N with Allison Engine was retrieved around the wreckage.

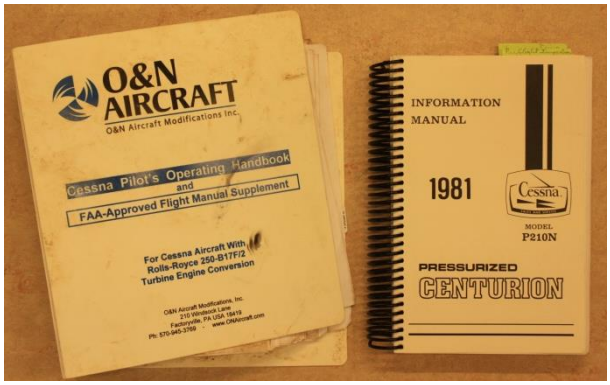


Figure 4: O&N AFMS and original Information Manual.

On the left side of the picture, the AFMS present in the wreckage and on the right an "Information Manual" provided by Cessna for the purpose of the investigation.

The AFMS found in the wreckage was current and identified as being Report 1020, FAA Approved on 27 January 2011.

Fuel tanks capacity

- Two 45,0 US gal tanks in wings at +43" from data (89 US gal usable)
- Two 16,5 US gal external tip tanks at +49,5" from data (32,5 US gal usable)
- One 26,8 US gal transfer tank at +131,3" from data (26,8 US gal usable)

Figure 5: Sticker found on the baggage compartment door.

This sticker, which is part of the engine alteration, was placed on the inside of the baggage compartment door.

Weight and Balance data

No information regarding the actual weight and balance data was found either in the wreckage, in the POH supplement, in the airplane file and on any other support.

Additionally, no document was found in the wreckage showing the pilot made a computation of the Weight and Balance before the take-off.

For the purpose of this investigation, a copy of the last known "Weight and Balance" report computed on 22 March 2007 by "Northwest Arkansas Avionics, Inc." was forwarded to AAIU(Be) with the support of NTSB.
This report, prepared after the structural repair and the avionics alteration is supposed to be the most up to date "Weight and Balance" available. It shows the following data:

Empty weight:	2587,65 lbs
Empty weight arm:	41,91 inches
Empty weight moment:	108439,7 inches lbs
Max take-off weight:	4000 lbs
C of G limits (Fwd / Rwd):	38,4 / 49 inches from datum

Hereunder a copy of the center of gravity graph applicable to the crashed airplane, as found in the AFMS for the P210N / ALLISON.

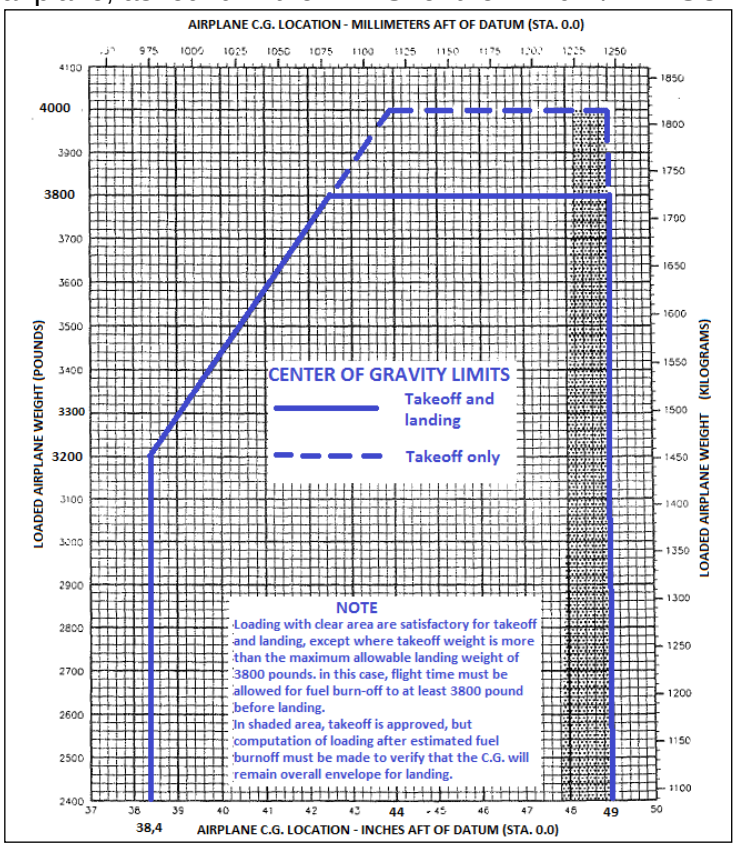


Figure 6: Centre of Gravity graph originating from the AFMS.

The following limitations covering the loading of the baggage compartment are provided on page 2.8 of AFMS dated 27 January 2011.

O&N AIRCRAFT MODIFICATIONS, INC. REPORT 1020
Seamans Airport, Factoryville, PA 18419 P210N/ALLISON

WEIGHT LIMITS

Maximum Ramp Weight ..... 4016 lbs.
Maximum Takeoff Weight ..... 4000 lbs.
Maximum Landing Weight ..... 3800 lbs.
Maximum Weight in Baggage Compartment:
Baggage Area "A" (Sta. 124 to 152) .....181.5 lbs.
(No fuel in transfer tank)
Baggage Area "A" (Sta. 124 to 152) ..... 0 lbs.
(With 26.5 gal. of fuel in transfer tank)
Baggage Area "B" (Sta. 152 to 166) ..... 80 lbs.
(No fuel in transfer tank)
Baggage Area "B" (Sta. 152 to 166) ..... 0 lbs.
(With 26.5 gal. of fuel in transfer tank)

NOTE

THE MAXIMUM ALLOWABLE COMBINED WEIGHT CAPACITY FOR BAGGAGE AREAS "A" AND "B" IS 181.5 POUNDS.

Figure 7: Extract of AFMS regarding the weight limits.

1.7 Meteorological conditions.

The full weather report of EBCI (Charleroi Airport), containing observation report, observation data, general forecast and aerodrome warning is enclosed at the end of this report.

Hereunder an extract of the METAR around the time of the accident.

METAR EBCI 090820Z 22004KT 1700 BR FEW002 M04/M05 Q1019 R25/090071 TEMPO 0500 FZFG BKN002=

METAR EBCI 090850Z 21003KT 1800 BR FEW002 M03/M04 Q1019 R25/090071 TEMPO 0600 FZFG BKN002=

METAR EBCI 090920Z 14002KT 2100 BR FEW002 M03/M04 Q1019 R25/090071 TEMPO 0600 FZFG BKN002=

Figure 8: Extract of the METAR of Brussels South Charleroi Airport.

As seen above, the wind speed was 3kt coming from 210° and the general horizontal visibility was 1800m while horizontal visibility on runway 25 was 900m. Temperature was -3°C and due point was -4°C. Temporary freezing fog broken at 200ft.

At the time of the accident the airport had activated the Low Visibility Procedure (LVP) while clear sky was present above the airport. LVP was decided by ATC regarding the possible rapid degradation of the visibility proved by the presence of significant fog in the surrounding neighbourhood of the airport.

1.8 Aids to navigation.

A flight plan had been introduced for an IMC flight starting from EBCI airport with an estimated departure between 8:15 and 8:45.

Around 8:38, the airplane had been cleared by “Charleroi Ground” to fly to Lyon with the following wording:

*Airplane *** is cleared to Lyon via flight planned route CIV 2Y departure, climb to 4000 feet, squawk 7114 airplane ***.*

However as the crash occurred very soon after the take-off no aid to navigation could have been provided to the pilot.

1.9 Communication.

Amongst others, the following ATS communication facilities are available at Charleroi Airport: Charleroi tower (121,300 MHz), Charleroi Ground (121,800 MHz), ATIS (115,700 MHz) and Charleroi Approach (133.125MHz).

All the communications established between the airplane and “Charleroi Ground” and “Charleroi Tower” have been recorded, both for the flight performed the day before the accident and the fatal flight.

The day before the accident, conversation between the pilot and the Charleroi control tower revealed the flaws pilot’s knowledge of some of the applicable

airport procedures and phraseology. Some parts of the conversation were done in the French language.
Before departure:

- The pilot requested to taxi to Sierra 5, while this holding point was closed since 15 August 2008.
- The pilot was not aware the name of the exit point of the CTR "Yankee" was changed into "November Whisky" since a few months (The latest updated chart of the VFR reporting points is of 05 April 2012).
- The pilot being at the "Sierra 4" intersection point announced on the Charleroi ground frequency he was ready for take-off instead of requesting first the authorization to leave Charleroi Ground and switch to Charleroi Tower

After landing:

- When arriving to the platform 2, the airplane turned in the wrong direction, did not follow the ground markings and deviated significantly before reaching the dedicated parking place. As a consequence of a remark of the controller the pilot answered: "*Apparently my right brake, I have to … It is easier to turn like that. However, I should adjust my right hand brake".*

1.10 Aerodrome information.

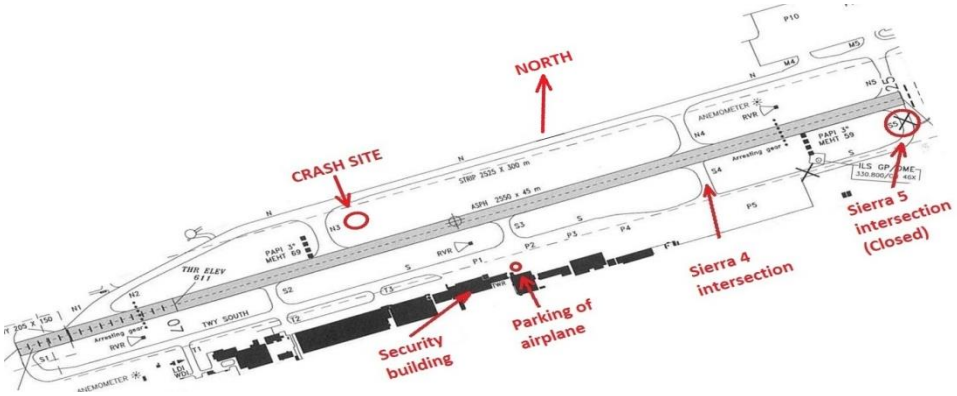


Figure 9: EBCI - Brussels South Charleroi Airport.

Brussels South Charleroi Airport (BSCA), also called Charleroi Airport, (IATA: CRL, ICAO: EBCI) is located 7 km north of Charleroi and 46 kilometers south of Brussels. Geographical coordinates are 502736N – 0042710E and elevation is 614ft.

A new terminal opened in 2008, located north of the runways, is only used for commercial air transport while the old infrastructures south of the airport are dedicated to general aviation.

The airport is provided with an asphalt 25/07 bi-directional runway. Dimensions of runway 07 are 2550m X 45m while runway 25 is 2450m X 45m.

Because the intersection "Sierra 5" is closed, the entire length of runway 25 is not available for the take-off for general aviation airplanes (unless in case of back track). When taking-off from Sierra 4 intersection, runway 25 length is reduced by 600m.

1.11 Flight recorders.

There was no flight recorder on board, nor was it required. However a passenger took pictures and made a short video footage when the airplane was taxiing between platform P2 and intersection “Sierra 4”.

Additionally, some of the Closed Circuit Television (CCTV) security cameras of the airport have recorded the airplane on the parking, during the taxi and also in flight. However the quality of the recording is poor.

1.12 Wreckage and impact information.

The front section of the fuselage, including the engine, was significantly crushed. The left wing was folded aft and was almost separated at approximately wing station 138.00.

The engine remained retained inside the engine mounting support and displayed heavy impact damage.

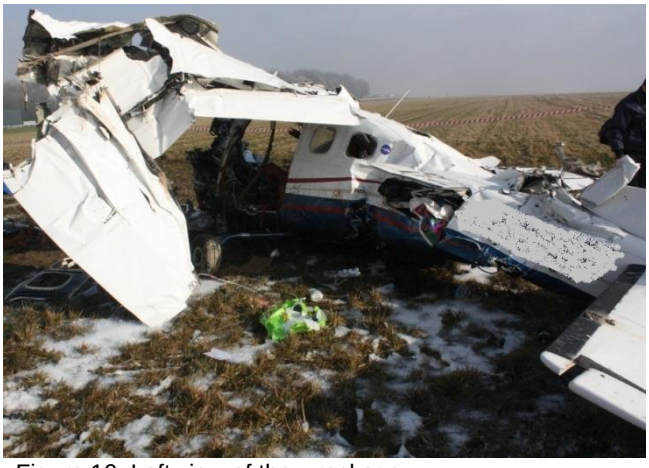


Figure 10: Left view of the wreckage.

The propeller was separated from the engine with the prop shaft having fractured just aft of the propeller hub.

Both wings sustained leading edge crush damage along their entire length. Orientation of the traces of impact of both wings leading edges in the ground showed the general flight direction of the airplane at impact was 95°.
The wreckage was found resting on the belly at a few meters from the impact traces of the wing leading edges and the nose section. The general heading of the fuselage was 340°.

Figure 11: General view of the impacted area.

The nose landing gear and the propeller separated respectively from the engine and from the airplane at impact and remained partially buried close from each other at the impact place.

Traces of impact of both main landing gear wheels were also present, but less deep in the ground for the R/H wheel.

The left main landing gear leg was extended while the right hand leg was found partially retracted.

The wing tip tanks had been separated from the wings at impact and were obviously broken open. The other fuel tanks were also broken open. No fuel was remaining in any fuel tank including the one installed under the baggage compartment.

A few personal objects belonging to the victims were found ejected at impact in the area around the propeller and the nose landing gear. A lot of other personal objects were found scattered inside the cabin.

The baggage/cargo door opened at impact, however the objects installed inside this area remained at their place during the accident.

The surface of the ground was frozen due to the freezing temperatures of the last few days causing Jet fuel to partially remain on the ground surface of the crash site Typical kerosene smell was also present.

The rescue services reported they had removed the pilot seat to gain access to the other victims. Firemen reported also the only occupant they found restrained by safety belts was the 6 years old male child installed on the right front seat.

First investigation on the crash site concluded that no part of the airframe structure and no control surface was missing. A lot of pictures were taken on site before the transportation of the wreckage to a secured hangar for further examination.

The tail section had been severed aft of the baggage compartment (FS152.00) during lift up of the wreckage for transportation.

<u>Detailed examination of the wreckage.</u>
A detailed examination of the wreckage was performed at the aircraft recovery location on 13-14 February 2013 with the support of both Cessna and Rolls

Royce Safety Investigators acting as advisors for the US NTSB Accredited Representative (AccRep) to assist the investigators. Other experts from the Belgian CAA also helped the investigators to examine carefully the wreckage.

Flight controls: All flight controls were checked and the remains have proved to be complete. No pre impact anomaly was found. Control cable continuity was established from the cockpit to all flight control surfaces.

Engine controls: The throttle and condition levers were destroyed. Their positions could not be determined as well as the position of the engine air inlet anti-ice system. However it was confirmed all engine control ends were properly attached at impact.

Flaps: The flap actuator was measured and found to be between 0º and 10º flaps down. The flap handle was observed in the full flap down position.

Elevator Trim: The elevator trim actuator position was measured and found to be 1.6", corresponding to a 0º tab neutral position (NB: A second actuator was present as part of the Turbine engine STC installation). The elevator trim position indicator located inside the instrument panel was damaged beyond exploitation as well as the electrical elevator trim switches. It could not be determined if the electrical elevator trim system was operative.

Fuel system: All fuel tanks were significantly broken open at impact.

The fuel selector handle was fractured in the off position. The fuel selector valve was inspected and found with the selector ring holes opening modified. Pre impact position could not be determined.

Safety Belts: Except the front right passenger safety belt that had been cut by the rescue services, no damage, no distortion, no elongation was found to any other belt or buckle.

Landing gear: The main landing gear selector handle was found in the down position. It was determined the nose gear was extended while the main gear legs were in intermediate position at impact.

Brakes: the system could not be tested as a consequence of the brake pedals and master cylinders were heavily damaged beyond. No visible pre-impact anomaly was found in the area of the main wheel (Cylinders, disks …).

Instruments: Most of the instruments were severely damaged, beyond possible exploitation, however the propeller (Np) RPM and Turbine Outlet Temperature (T.O.T.) needles were blocked around 2050 Prop RPM and 750°C.

Figure 12: Propeller RPM and Turbine Outlet temperature indicators.

Stand-by vacuum pump: The suction pump was disassembled. No pre-impact anomaly was found.
Propeller:
All three propeller blades remained attached to the hub with all three exhibiting leading edge impact damage and bending of the blades opposite the direction of rotation.

Figure 13: General view of the propeller and detailed view of one blade at tip.

Engine: The engine was partially disassembled in order to examine the compressor section, the accessory gearbox section, the combustion section, the turbine section, the oil and engine bearing, the fuel system, the engine shafting, the engine accessories and the propeller reduction gearbox.
The following is the facts and findings of the investigation (Extract of Rolls Royce Investigator report):

- No pre impact mechanical failure of the engine or engine accessories was discovered.
- Bending and tearing of stage 1 through stage 4 compressor blades opposite the direction of rotation and,
- Gouging and circumferential scoring of all four stages of compressor wheel knife seals into their track on the vane case internal rings and,
- Mud and dirt ingestion throughout the gas path are all consistent with engine operation at impact.
- Bending of the propeller blades opposite the direction of rotation and blade leading edge impact damage are consistent with being driven at impact.
- Additionally, the propeller gearbox sun gear was returned to Rolls-Royce and submitted to the materials lab for examination and determination of the fracture mechanics of the shaft. Materials lab results indicate the sun gear fractured in torsional overload. No evidence of cyclic progression was found. Results of the sun gear shaft examination indicate a torsional overload fracture consistent with the shaft being driven at impact.

ELT: An ELT, manufactured by ACK Technologies, Model E-01 was installed on board. The due date of the battery was passed since July 2012.

Airplane loading:
The objects found in the baggage compartment were removed and weighted separately. A total of 74,2 kg objects were computed. Detail as follow:

In the baggage compartment:

- One big luggage: 17,9 kg
- A small bag containing A/C documents: 4,4 kg
- Another small bag containing “cosmetics” 4,65 kg

- An external power unit and cables: 30,25 kg
- A buggy + 2 plastic bags: 14,10 kg
- A floor carpet: 2,9 kg

In the cabin, a total of 45,2 kg objects were weighted. Detail as follow:

- One big luggage 17,4 kg (Ejected from the cabin during the impact)
- Different objects belonging of the occupants (or previously installed in the airplane) found inside and outside of the cabin, including the picnic basket, for a total of 27,8 kg.

1.13 Medical and pathological information.

All the occupants died upon impact.

1.14 Fire.

An electrical fire started in the area of the battery located beyond the firewall and in the electrical wiring of the dash board. The firemen arrived rapidly on site and extinguished this fire without problem. There was no propagation of the fire to the airframe and to the fuel spread on the ground.

1.15 Survival aspects.

The impact forces were not survivable, even if the victims had worn their safety belts.

1.16 Tests and research.

Not applicable

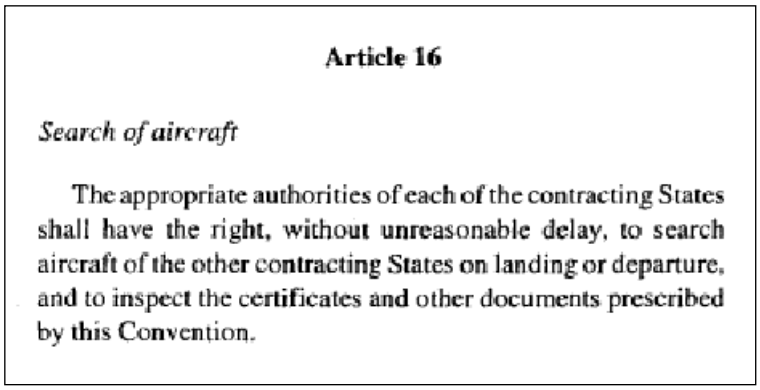
1.17 Organizational and management information.

In general, the survey of aircraft and pilots falls essentially within the competence of the authorities of the state of registration, in this case the FAA for the U.S.A.

However, during a conference meeting held in Brussels on 6 November 2013 with FAA representatives, it was made clear that FAA oversight of N registered aircraft outside the US was mainly performed remotely having as consequence it was below the level of oversight exercised domestically.

The FAA representative pointed out that the oversight of any aircraft flying in a given country would be best exercised by the Civil Aviation Authority of the concerned country in accordance with the prevailing rules (Rules of the air, ICAO …).

The Article 16 of ICAO “Convention on International Civil Aviation” (doc 7300/9) states the following:



Article 16

Search of aircraft

The appropriate authorities of each of the contracting States shall have the right, without unreasonable delay, to search aircraft of the other contracting States on landing or departure, and to inspect the certificates and other documents prescribed by this Convention.

Figure 14: Extract of the Convention on International Civil Aviation

In Belgium, inspectors of the BCAA are duly authorized by Article 38 of the law dated 27 June 1937[6] to inspect foreign registered aircraft taking-off or landing in Belgium.

Actually, quite logically BCAA inspectors focused on foreign registered commercial aircraft, under the application of the EC Safety Assessment of Foreign Aircraft (EC SAFA Programme). There are also inspections performed on Belgian-registered Commercial Aviation (CA) aircraft under the Safety Assessment of National Aircraft (SANA Programme) and General Aviation (GA) aircraft, but to a lesser extent.
The proportion of CA aircraft surveyed in 2013 (84%) compared to GA aircraft (16%) reflects the prime mission of the Inspection Directorate to survey the foreign CA fleet according to SAFA procedures.

With respect to foreign registered aircraft in particular, in 2013, 95 % of the aircraft inspected were CA aircraft and 5% were GA aircraft. Out of these 5%, 2 aircraft were N-registered.

According to the BCAA, the Belgian registered GA fleet that holds a valid Airworthiness Review Certificate (ARC or equivalent) on the date of the publication of this report consists of 946 aircraft, ultralights not included.

A reliable information source stated that at least 160 N-registered GA aircraft are permanently based in Belgium, which may be added to a few dozen of other foreign nationalities registered aircraft.

Additionally, it is common knowledge that:
- A not insignificant part of the ultralights permanently based in Belgium are registered in France.
- A not insignificant part of the sailplanes permanently based in Belgium are registered in Germany.
- A not insignificant part of the historical airplanes permanently based in Belgium are registered in the UK.

[6] Extract of article 38 of the law dated 27 June 1937 is enclosed at the end of this report.

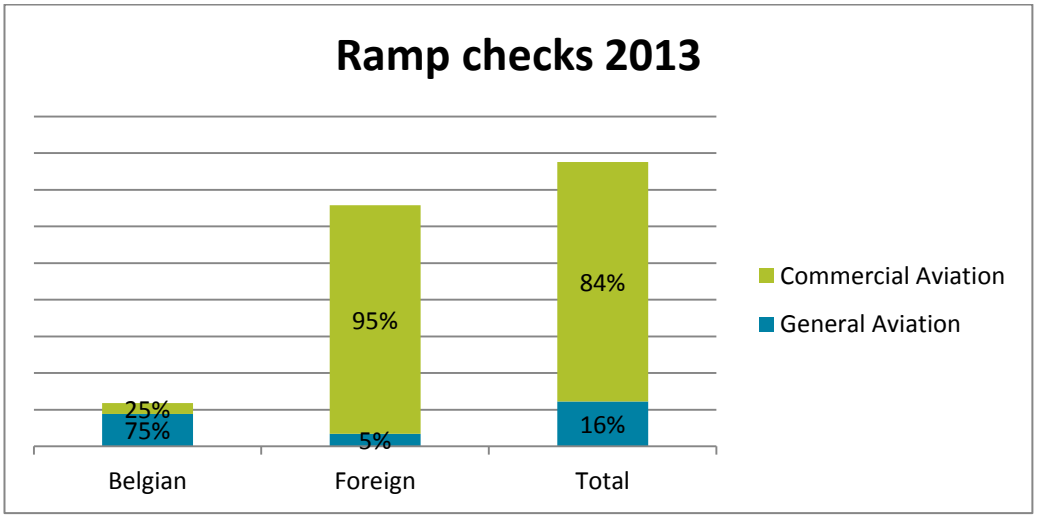


Figure 15: Ramp checks in 2013 by the Inspection Directorate

1.18 Additional information.

- Another general aviation Pilatus PC12 airplane was parked near the Cessna P210N during the night. This airplane was planned for a IFR departure at 9:00. In the morning, both airplanes were parked in the shadow of hangars. Around 8:00, the crew of the Pilatus had finished to manually de-ice the airplane. Thereafter, the pilot asked and obtained Charleroi Ground authorization to move the airplane somewhere exposed to the sun in order to remove the remaining layer of ice. After the crash, the crew of the Pilatus reported the layer of ice had rapidly disappeared and dried under the effect of the sun exposition.

- A similar aircraft Cessna P210N crashed after take-off on Wednesday, September 28, 2005 in Salmon, ID (USA). The investigation report NTSB Identification: SEA05FA201 is enclosed at the end of this report. This report provides the following statement about the airplane behavior:

> *A pilot, who had experience flying the accident airplane, stated the following with respect to its performance: "Weight and balance is very, very critical. With weight aft, you really need to hold the nose down and gain airspeed on take-off."*

Figure 16: Extract of NTSB report of another accident involving the same type of A/C.

1.19 Useful or effective investigation techniques.

Not applicable

2 Analysis.

2.1 The wreckage

From the evidences found at the crash site, and the further inspection of the airframe and the engine it may be concluded that the airframe did not suffer any pre-impact damage that would have influenced the controllability of the airplane. In particular, the following was noted:

- Continuity of all flight controls cables from the control column to the attachment fittings
- No sign of in-flight break-up could be found.

The engine showed evidence of rotation at impact demonstrating its capability of delivering power. In particular:

- Witnesses reported the engine sound at full power
- The general flight direction at impact was 95° while the fuselage was found oriented to 340°, meaning the airframe wreckage had turned 115° counter clockwise during the rebound, due to the brutal stop of the propeller.
- Internal damage inspection of the engine showed evidence of rupture under power.
- Instrument needles frozen by impact showed indication of high power being delivered by the engine.

The elevator trim actuator position was measured and found to be 1.6" corresponding to a 0º tab position. This position was confirmed to be appropriate for take-off, meaning that the pilot left the elevator trim in the take-off position during the entire flight.

The flap actuator was measured and found to be between 0º and 10º flaps down. The flap handle was observed in the full flap down position, meaning the pilot had selected flaps full down a few seconds before the crash and the flaps were moving down at impact. It also demonstrates electrical power was present to feed the electrical system of the airplane up to the crash time.

The nose landing gear was extended at impact while the main landing gear legs were in intermediate position. The landing gear selector valve was found extended which corresponds to the witness reports. All these observations prove the landing gear had been selected down a few seconds before the loss of control.

The remains of the brake system did not show any sign of malfunction, however it could not be tested. This, added to the fact the pilot was able to slow down the aircraft during the taxi tends to establish both brakes worked sufficiently. On the other hand, the brake pedal design makes it very unlikely that it interferes with other system as the rudder control. Moreover, the pilot declared the day before his right brake had to be adjusted but did not find necessary to take action before flying.

The safety belts were found undamaged (no distortion, no elongation …) except the one of the front right passenger. This observation supports the declaration of

firemen that no seat belt was fastened except the one of the child seated at the front right seat.

2.2 Flight preparation

The day of the accident, the pilot began to remove the frost first on the right wing followed by the left wing before defrosting all the other horizontal surfaces. The lateral windows and the windshield were cleaned last. The entire manual de-icing work lasted 8 minutes. During that period of time the adult passenger installed the remaining luggage and the children inside the cabin.

The crew of an Extra 500 passing near the Cessna before engine start up remembered they found the de-icing could be improved. The occupants and the baggage could be seen through the windows, proving the windows were transparent. However, the absence of ice on the windows is no demonstration that no ice was present on the horizontal surfaces.

It is thus demonstrated the pilot took action to de-ice. However, witnesses reported airplanes left outside during the night were covered with 5 to 10mm of frost easy to remove, under which a thin layer of ice was adhering to the surfaces. Manually de-icing with the back of the arm was likely to be sufficient to properly remove the 5 to 10mm frost but inadequate to properly eliminate the thin layer of ice. Decision of the Pilatus crew to move the airplane into the sun 50 minutes before take-off suggests a manual de-icing was not sufficient to remove ice.

However, the meteorological conditions as defined in chapter 1.7 were such that there was a potential risk of encountering of freezing condition shortly after the take-off. The pilot ignored this fact and that the aircraft was not certified to fly into known icing condition. Nevertheless there is no evidence additional icing occurred during the short flight.

Arrival at the airport around 7:55 is very late for a flight plan starting at 8:15, considering:

- The time necessary to pass the security control
- The time necessary to go to the airplane
- Children had to be installed in the airplane
- A lot of luggage's had to be installed
- The airframe had to be de-iced
- The time necessary to make the pre-flight inspection and the engine + systems test.

The fact the pilot and most of the passengers did not wear their safety belt is likely due to the precipitation of the flight preparation and the lack of safety information provided by the pilot. Moreover, the pilot should have made an example to his passengers.

2.3 Weight and balance

No Weight and Balance computation performed by the pilot was retrieved. Therefore, the following weight and balance computation was made during the investigation, based both on known and estimated weights and weight positions.

Known weights and weight positions:

- A/C empty weight
- One big luggage on Center seat
- Wing Main fuel tanks (89 US gal)
- Wing Tip Tanks 16.25 US gal
- Aft fuel tank 26,8 US gal

Positions known – Weights estimated: Occupants and occupant clothes. The weight of the passengers has been estimated based on their sex and corpulence (as seen on the security control video) and the age of the children.

Weights measured – Positions estimated: Objects (27,8 kg) coming from inside the cabin. The objects coming from inside the cabin have been simulated to be on position 54" and 71" (rear of front seat back and between the centre seats). No object has been considered to be installed rear of the aft passenger's seat back (position +/-115") which is a conservative hypothesis regarding a possible aft unbalance.

	WEIGHT (lbs.)	ARM (Inches)	MOMENT (lbs. Inches)
A/C empty weight	2587,65	41,91	108439,70
Front occupants (pilot 79 kg, kid 22 kg)	222,47	37,00	8231,28
Front occupant clothes (3,5 kg)	8,00	37,00	296,00
Center seats occupant (Female 60 kg)	132,16	71,00	9383,26
Center seat occupant clothes (2 kg)	4,41	71,00	312,78
One big luggage on Center seat: 17,4 kg	38,33	71,00	2721,15
Rear seats occupants (2 kids - 36 kg)	79,30	101,00	8008,81
Rear seats occupants clothes (3 kg)	6,61	101,00	667,40
Objects between Center seats (13,8 kg)	30,40	71,00	2158,15
Objects rear of front right seats back (14, kg)	30,84	54,00	1665,20
Baggage area (75,4 kg)	166,08	138,00	22918,94
Wing Main fuel tanks (89 US gal)	594,00	43,00	25542,00
Wing Tip Tanks 16.25 US gal - STC SA4300WE	220,00	49,50	10890,00
Rear fuel tank 26,8 US gal - STC SA1003NE	181,50	131,30	23830,95
	4301,72	**52,32**	**225065,61**

Figure 17: Estimated Weight and Balance.

As seen on the above computation, the airplane was around 300 lbs in overload for take-off and 500 lbs for landing.

More serious is the fact that despite no object has been simulated on position 115”; the CG position was 3.32” out of the most aft limit of the balance envelope.

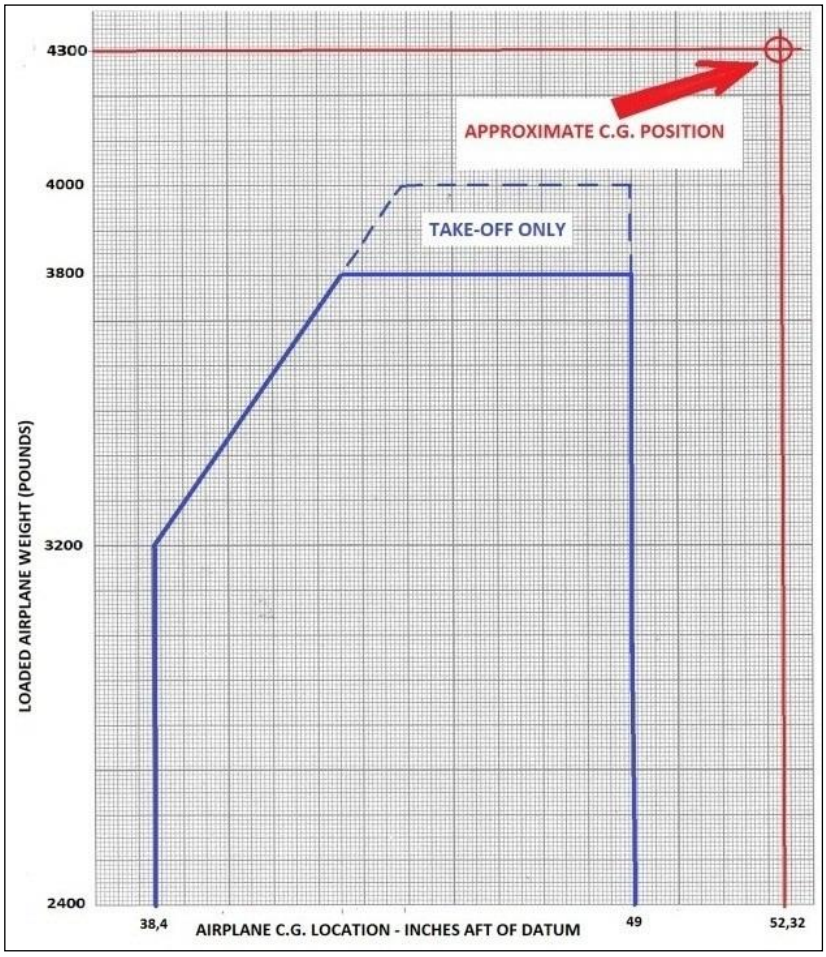


Figure 18: Estimated Weight and Balance position.

Obviously, the great distance to the datum of both the baggage compartment and the rear fuel tank generate, when loaded, a significant moment causing the airplane C.G. to seriously move rearward.

A fast and simple weight addition of the fuel in the rear tank and the objects found in the baggage compartment demonstrates the total weight (around 345 lbs) was clearly above the limit of 181,5 lbs mentioned both on the sticker installed on the baggage compartment door and in the AFMS .

Actually, the maximum authorized weight of 181,5 lbs does exactly correspond to the fuel capacity of the rear tank, meaning that baggage compartment should be empty when the rear fuel tank is full.

A simulation of the Weight and Balance with the rear fuel tank full and the baggage compartment empty was made showing the airplane remaining in overload. However, the C.G. position was moving forwards, within the limits mentioned in the AFMS.
This simulation demonstrates also that adhering to the 181,5 lbs limit mostly prevents being exposed to an unacceptable rear position of the C.G.

Other simulations have also demonstrated the C.G. position moved easily out of the aft limit when loading passengers and/or luggage's on the rear seats.

Whatever it might be, loading of passenger and/or baggage on the rear seats, in the baggage compartment and filling full fuel in the rear fuel tank should be in any case subject to W&B verification.

Therefore the inadequate aft out-of-balance of the airplane can be considered as a pertinent explanation of the lift-off behaviour of the airplane and the immediate pitch up tendency of the airplane at take-off.

2.4 The take-off

Witnesses seeing the take-off described a normal acceleration on the runway followed, immediately after the lift-off, by a uncoordinated flight on the left side of the runway, in a nose up attitude.

The forward visibility of the pilot was dramatically reduced by the nose up attitude and by the extended engine cowling of the gas turbine engine. The ground was also less visible to the right due to the bank to the left and the relative position of the pilot with respect to the small right hand windows of the pressurized Cessna's.
It is thus likely the pilot's outside visibility and horizontal spatial reference was only possible through the small left window.

All single engine airplanes equipped with a clockwise rotating propeller have a natural tendency to turn left under the "propeller effect" (prop wash, torque effect and P-Factor).

This propeller effect would have been aggravated by the more powerful turbine engine, the low airspeed and the nose-up attitude having as consequence of this phenomenon to be significantly more critical.

No forward visibility combined with a significant left turn tendency of the airplane made that pilot did not succeed to fly the aircraft aligned above the runway immediately after take-off. This also prevented the pilot to land ahead.

As explained in the previous section 2.3, a spontaneous lift-off of the airplane could have been initiated by an inadequate rear out-of-balance loading of the airplane. It is likely the pilot was surprised and did not have the reflex to push immediately the control wheel forward to reduce the angle of attack and remain into the ground-effect.

The pilot did not achieve the required best-angle-of-climb speed after lift-off and the aircraft remained at low airspeed, on the back side of the power curve.

Hereunder, an explanation of the back side of the power curve phenomenon.

Normally, the faster you want to go in a plane, the more power you'll need. However, the opposite can occur when the airplane is flying at slow airspeed. You can actually get to a point that more power is needed the slower you go. This is because if you get slow enough, induced drag starts to increase... which is exactly opposite of normal.

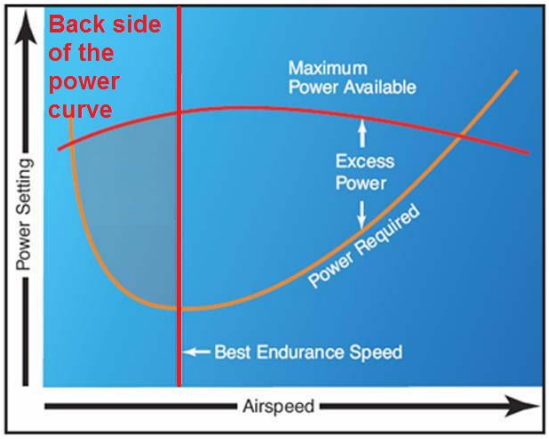


Figure 19: Power curve graph.

In particular, during the take-off, a high angle of attack significantly increases the induced drag, which requires a higher power setting.

When in this case, the difference between the power available and power required (excess power) is too small (at low airspeed and too high angle of attack), this will prevent the airplane to climb or accelerate at a proper rate.

The airplane is then flying on the back side of the power curve.

The only way to reduce the induced drag at take-off and increase the excess power is to lower the nose when the airplane is still in the ground effect, or eventually when it has reached a safe altitude.

After the take-off, the airplane climbed slowly up to more than 400 ft AGL. There was thus a theoretical possibility to transform the gained altitude into airspeed and escape the back side of the power curve phenomenon.

2.5 Flight path and loss of control

This approximate flight path has been reconstructed based on the witnesses' declarations and on the radar records.

Because of the high angle of attack, the pilot had only the ground visual references through the left lateral window. He was obviously struggling for control, being not able to properly coordinate the rudder and aileron controls.

However, proper coordination of the flight controls was possible using some instruments such as the artificial horizon, the turn coordinator and the directional gyro. It is likely the pilot was in a panic, trying to control the airplane using the poor external references available.

After flying on the left side of the runway the pilot turned to the left when no more buildings were present along the runway. He performed a kind of short left hand circuit, trying to hold the airport in sight through the left hand window.

The pilot's message to the controller *"I have a problem, I am trying to land now"* was sent when the airplane was flying South.

The airplane reappeared still unstable with a nose up attitude above the airport shortly (1 min) after the take-off. It was coming from the south, crossed the runway and performed a steep turn to the left above the runway in an attempt to align.

Few seconds later, the landing gear was extended causing the airspeed to decrease dramatically. It was also determined during the detailed examination of the wreckage that the flaps were moving down at impact.

Extending the landing gear and moving the flaps down significantly increase the drag implying that if no pitch down action on the elevator was taken the airspeed would decrease.

The control of the gear and the flap selectors require the pilot to remove his right hand from the control wheel. As the elevator trim remained set in neutral (take-off) position, the pilot had probably to push continuously forward on the control wheel to avoid the nose of the airplane raising more.

Theoretically, the pilot should have applied more forward pressure on the control wheel to maintain sufficient airspeed to compensate the additional drag. However, with only one hand he was probably unable to apply adequate pitch down force on the elevator.

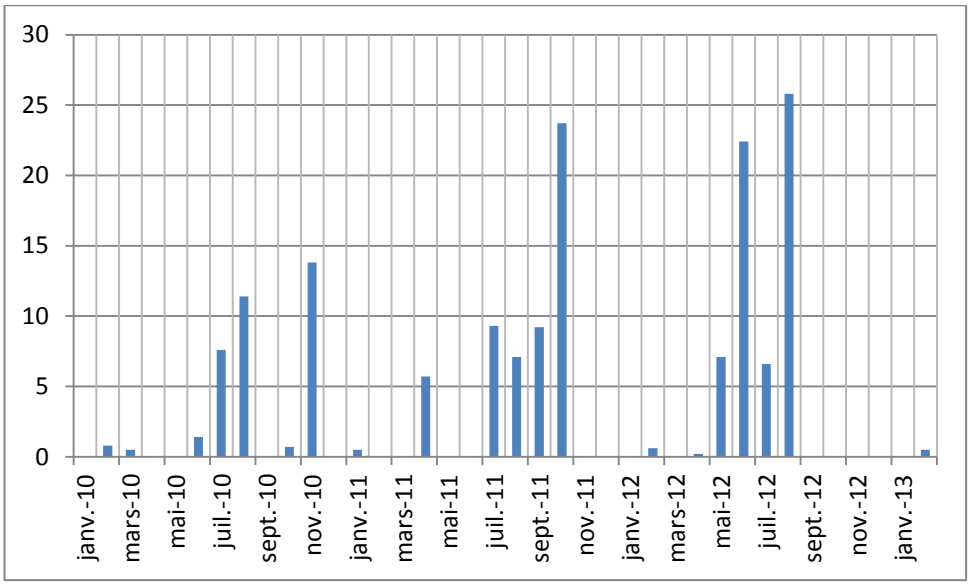
It is thus likely the slow airspeed decreased below the stall speed causing the airplane to stall and, due to the uncoordinated flight, to enter immediately into a spin.

2.6 Meteorological conditions

The meteorological conditions contributed to the accident:

- Temperature and humidity and wind speed were conducive to icing of the wing control surfaces.
- A deposit of a thin layer of ice will have a negative impact on the aerodynamic characteristics of the airplane (lift, controllability)
- The area surrounding the EBCI airport was foggy. This would have influenced the pilot to remain as close as possible to the airport and therefore avoiding to fly straight–ahead in an attempt to gain sufficient speed and altitude to recover full control of the airplane, as this would mean flying in actual IMC for which the pilot was qualified, but not experienced. Additionally, the airplane was not certified to fly into known icing conditions.

2.7 Pilot's recent experience



The above graph shows the pilot flight hours performed during the last three years. Total flight hours per year was in:

- 2010: 36,2 hours
- 2011: 55,5 hours
- 2012: 62,7 hours

At first sight, the pilot flew around 50 hours a year which is considered sufficient to maintain a proper proficiency.
However:

- The pilot flew essentialy in the summer period with an exception during each winter when a ferry flight was performed to and from EBGB airfield for the aircraft annual inspection. These ferry flights were performed in VMC non icing condition, without passenger and baggage, the airplane being almost empty.
- In the summer period, most of the flights were IFR flights performed in VMC at high altitude using widely the autopilot.
- Analysis of the Pilot logbook records shows very few flights with 5 persons on board were performed. These flights with the airplane heavily loaded were performed more than 10 years ago. The pilot was thus not accustomed to fly in overload and out of the rear C.G. limit.
- The pilot had no recent experience flying. After almost 6 months non flying he only performed 1 short 36 minutes flight the day before the accident totalizing only 1 take-off and 1 landing. The pilot did not comply with CFR § 61.57 "Recent Flight Experience" (a) which request a pilot had made at least three take-offs and three landings within the preceding 90 days before flying with passengers. It implies his pilot's skill level was likely to be reduced by this lack of recent experience (NB: Extract of CFR § 61.57 (a) is enclosed at the end of this report).
- The flight records within the last 6 months show 7 flights logged as ending by "Actual" instrument approaches. Actually these flights were made almost 6 months before the accident. The pilot was therefore complying with CFR § 61.57 c "Recent Flight Experience" making his experience adequate to act

as pilot in command under IFR or weather conditions (NB: Extract of CFR § 61.57 c "Instrument" is enclosed at the end of this report). However, close examination of weather conditions of the 3 last landings made at EBCI and logged as "Actual" instrument approaches shows that VMC (CAVOK) were present these days making it impossible to perform "Actual" instrument approaches. Other instrument approaches were logged as being "Actual" in Rhodes island and in the South of Italy in the summertime while it is very unlikely IMC conditions prevailed. Moreover, the 2 other conditions requested by regulation to maintain Instrument experience (*Holding procedures and tasks and Intercepting and tracking courses through the use of navigational electronic systems)* are not logged. Therefore, recent experience as per regulation CFR § 61.57 c to fly under IFR was not met. The oversight performed by FAA did not identify the anomalies described here above due to the fact the oversight is done mostly remotely.

- The airplane was unserviceable from 31 March 2003 to March 2007 as a consequence of a belly landing the pilot made in Bordeaux. However, the pilot Logbook entries show the pilot performed 9 flights using his airplane between 30 March 2005 and 29 May 2005 and also 7 flights between 8 July 2006 and 13 July 2006. Some of these flights were recorded with departure and/or arrival at EBGB, EBZW and EBCI airport / airfield. Review of EBGB, EBZW and EBCI airport logbook records shows the airplane did not perform any take-off or landing during these periods of time which is normal as it was unusable. The reason why the pilot recorded flights that were not performed could not be determined.

2.8 Known previous accident and incidents

Known previous incidents and accident beginning with the belly landing that occurred in 2003 were investigated to determine a possible relationship between the previous occurrences and the fatal crash.

From the first incident in Bordeaux in 2003 to the fatal crash, the pilot flew around 309 hours from which around 59 hours were test flights and the ferry flight USA to Belgium performed with another pilot. Actually, the pilot flew around 250 hours as single pilot.

During the last 10 years, 7 incidents and/or accidents, including the fatal accident have been identified which means around one known occurrence every 36 flight hours. Although, these figures don't take into account possible events that occurred outside Belgium and France.

We do not have enough data to sketch a psychological profile of the pilot, but we have evidence showing:

- A strong personality; the pilot was successful in business, a master in his trade.
- A correct performance during bi-annual flight testing.
- An overall limited flight experience in IMC.
- The pilot was not a member (to our knowledge) of a specific aero club or other association in Belgium. His contact with other pilots seemed to be very limited.

- The pilot had flown the airplane knowing vital systems were defective. This was conducive to the first accident in Bordeaux.
- Flaws in the knowledge of airspace procedure.
- Flaws in the compliance to US regulation.

We can conclude the pilot was in need of improving his airmanship skills. However this need had to be recognised by the pilot himself. Unfortunately, the reaction of the pilot, for all we know was limited to finding excuses to the incident, missing the opportunity to look inwards and seeking to improve his airmanship skills.

An indication of the pilot's response to incidents may be found in the 8 July 2010 event for which the pilot did not mention a flight for that day in both the aircraft and Pilot's log book, although the airplane was formally identified by an intercepting military aircraft after the airspace infringement.

On the other hand, incidents with N-registered airplanes make the intervention of local CAA rather difficult due to the extensive use of trust companies rendering the identification of the actual owner difficult.

2.9 Pilot's licenses

The pilot held two pilot's licenses: a Belgian and a U.S. (FAA) PPL licenses. Details are hereunder.

	Belgian License	**FAA License**
Conditions and /or Regulation	JAR-FCL	Issued on basis and valid only when accompanied by Belgium pilot license. All limitations and restrictions on the Belgian pilot license apply.
Type	PPL(A) Private Pilot license Aeroplane	Private Pilot (Foreign Based)
Issue date	04 June 2010	10 August 2011
License valid up to	26 March 2013	Unlimited provided foreign pilot license is effective.
Ratings:	- SEP(Land)	- Airplane Single Engine Land. - Instrument airplane (U.S. test passed) - HPSE and complex A/C valid since 28 Nov. 1995. - English proficient.
Last proficiency check	25 June 2012 (Cessna 172)	7 September 2011 (Cessna P210N)
SEP Rating valid up to	30 June 2014	/
Flight Review and Instrument Proficiency Check	Not applicable	30 September 2013 (FAR § 61.56 and 61.57(d))

valid to:		
English	26 March 2013 (based on the "Restricted Radio telephony certificate".	Based on Belgian license rating
Medical valid up to	10 December 2013	Based on Belgian Medical Certificate

However, differences exist between the rating SEP (Land), as mentioned on the Belgium pilot license and "Airplane Single Engine" as mentioned on the FAA license.

- Belgian license SEP (Land) means Single Engine Piston land aeroplane group, thus not valid for turbine engine airplane.
- FAA license with rating "Airplane Single Engine Land" is valid for both piston and turbine engine airplane.
- FAA regulation §61.31 requires training for operating complex[7] airplane §61.31(e) and high-performance[8] airplane §61.31(f). However, this was not required if the person has logged flight time as pilot in command of a high-performance and complex airplane, prior to August 4, 1997 (NB: the pilot begun to fly a Cessna 210 in 1995).
- Following the JAR-FCL regulation applicable in Europe, a specific "Class Rating (Aeroplane) - Single pilot – Single-engine turboprop aeroplane (land)" would have been required to fly a Cessna 210 (Silver Eagle) registered in a European country.

From a regulatory standpoint[9], the pilot was duly qualified and had the appropriate FAA license to fly its (complex and high-performance) airplane in IMC conditions.

However, his FAA license is not very clear and consistent when stating "All limitations and restrictions on the Belgium pilot license apply" and granting at the same time additional privileges, i.e. "Instrument Airplane U.S. test passed".

Moreover, the chapter "Limitations" of the license is a mixture of (positive) privileges and (negative) limitations while the general interpretation of a chapter untitled "Limitations" would be to introduce a restrictive concept. This situation requires a thorough knowledge of the U.S. regulation and may not facilitate the survey by foreign aviation inspectors of N registered airplanes based outside the U.S.

[7] Complex airplane means an airplane that has a retractable landing gear, flaps, and a controllable pitch propeller …
[8] High-performance airplane means an airplane with an engine of more than 200 horsepower.
[9] Extract of Title 14 of CFR Part 61 - Certification: Pilots, Flight Instructors, and Ground Instructors are enclosed at the end of this report. Title 14 of CFR can also be found at http://www.ecfr.gov

2.10 Maintenance

The circumstances of the accident and the examination of the wreckage did not show any technical anomaly that could explain the accident.

However the maintenance history was investigated in order to evaluate how the pilot owner managed the maintenance of his airplane.

For N-registered aircraft, the owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition. This means that he is responsible to determine what maintenance actions to perform and that he makes sure that all discrepancies found in the aircraft are corrected. He shall also ensure that appropriate entries are made in the logbooks and the airplane had been approved for return to service by a person authorized.

The investigation of the maintenance history was performed based on the applicable CFR regulation (Title 14: Aeronautics and Space).

The following was found:

- No A/C logbook entry was filled for the installation of other Flint Aero Wing Tip Tanks in accordance with STC SA3226NM (19 July 2002) while a form 337 had been filled. This was not in compliance with FAR 43.9 (a) and FAR 91.405(b).
- No annual inspection was made (or at least was not recorded) in 2011 while the airplane regularly flew this year. This was not in compliance with FAR 91.405(a) and FAR 91.409(a)(1).
- Excepted one maintenance performed in Belgium on 15 November 2002 and the repairs performed in the USA, only a few A/C logbook entries were made since the year 2001, from the time the airplane was operated by the owner. This was not in compliance with FAR 91.405.
- No A/C logbook entry and Form 337 was found for the alteration of engine inlet anti-ice system mentioned on the “Annual Inspection report” dated 25 April 2012. This was not in compliance with FAR 43.9 (a) and FAR 91.409(a)(1).
- No A/C log book entry was found for the repair of radio 1 and Garmin 430 (discrepancy found in the pilot logbook dated 31 August 2011). It could not be determined if the repair was performed or not.
- No logbook entry was found for the repair of the fuel pump N°1 (discrepancies found in the pilot logbook dated 31 August 2011 and 29 April 2012). Again, It could not be determined if the repair was performed or not. In any case, this was not in compliance with FAR 91.405(a) and/or (b).
- Application of airworthiness directives was thoroughly examined. Both FAA AD’S 84-10-01R1 and 86-19-11 were recorded in the A/C logbook on 19 March 2010 as being complied with, however:
  - There was no detail, not even the title of the airworthiness directives available. Only the number of the AD’S and “CW” were recorded.
  - AD84-10-01R1 addressing possible wrinkles in the bladder fuel cells was not applicable both as per applicability list and by the original structural fuel tank installation.

  - AD86-19-11 addressing possible engine power reduction due to contaminated fuel was applicable by inserting Appendix of the AD to the airplane documents. The AD was recorded as "CW" while this "Appendix" couldn't be found anywhere.
  - No record was found for the application of AD87-20-03R2 "Inspection of the seat rails …" since 22 March 2007 at 3727,9 ACTT while this AD was recurrent every annual inspection (Note: this AD is now superseded by AD2011-10-09).
- No other records were found elsewhere other than those retrieved in the wreckage and no indication was found indicating that other records exist, or had existed and were destroyed.
- Both the maintenance organization and the A&P (IA) declared they did not retain any copy of the maintenance records.

Once a year, when the annual maintenance (and possible repairs) were ended, the A&P (IA) was requested by the owner to perform the annual inspection inside the organization where the airplane was parked. The A&P (IA) made his inspection after the maintenance, the one following the other. Therefore the A&P (IA) having direct contact with both the maintenance organization and the airplane owner could not ignore that the just finished maintenance tasks were not recorded. This is not in compliance with FAR 43.5(a) and 91.405(b).

The maintenance was performed by a workshop which was approved as being both EASA "Part M subpart F" and "Part M subpart G" approved organization. Their scope of work covered amongst other Cessna single engine piston aircraft. The maintenance organization was thus not allowed, as per EASA regulation, to maintain the same type of turbine powered aircraft registered in a European country. However, this is no proof that the maintenance organization did not have the skill base to do that.

In conclusion, the maintenance records of the works performed in Belgium were of poor quality. This fact raises a possible issue of the airworthiness management of other N-registered aircraft outside the US.

2.11 Flight Manual and Flight manual supplements

The AFMS found in the wreckage specifies clearly that the original Cessna AFM and the Airplane Flight Manual Supplement should be attached and be on board the aircraft. It is clearly mentioned that the information contained in the AFMS supplements or supersedes the Basic Pilot's Operating Handbook (or AFM) only in those areas defined in the supplement. It is also specified that the Basic Pilot's Operating Handbook (or AFM) should be consulted for the limitations, procedures and performance limitations not contained in the AFMS.

It is thus demonstrated the Basic Pilot's Operating Handbook (or AFM) should have been on board.

It has also to be noted the AFMS contained a Chapter VI for "Weight & Balance/Equipment list" that did not incorporate any W&B data regarding this particular airplane.

Additionally, no AFM supplement for any other applied alterations, as for example the “Flint Aero Tip tanks” or for the avionics equipment installed in 2007 was found on board.

Shortcomings regarding the Flight Manuals could be symptomatic of overconfidence of the pilot, considering the presence of the flight manuals as unnecessary, or a lack of rigor on the part of the pilot, or a lack of preparation of the flight …

2.12 Registration change

A new registration was granted on request of the trust company in April 2006, during the repairs of the airplane in the USA. The actual reason of this change could not be determined. It is likely this change was related to the belly landing performed in Bordeaux in 2003.

2.13 ATC

Listening to ATC records revealed the pilot made procedural and phraseological errors before the take-off and had a poor knowledge of the last changes in the EBCI airport. However, the Charleroi ground controller kept the situation under control and provided fair and adequate service to the pilot.

These errors could be considered as the result of a lack of recent experience flying and maybe also a lack of knowledge and/or skill capacities. Indeed the difficulties encountered with ATC the day before the accident could have made the pilot realize he was no more up to date.

No direct relationship could be established between the communication and procedure errors of the pilot and the accident.
However, it is likely the pilot did not feel comfortable before the take-off.

Analysis of the ATC records demonstrates that the airplane could not have been affected by turbulence generated by commercial aircrafts taking-off or landing immediately before the fatal take-off. The last aircraft taking-off or landing was a Boeing 737 around 08:33, which means more than 7 minutes before the take-off of the Cessna.

2.14 Rescue Services

The airport emergency services were alerted by the ATC very soon after the take-off involving the first fire truck was already running out the hangar before the crash and arrived on the crash site within the 2 minutes. The emergency system worked as well as possible.

2.15 Survey by different authorities

Amongst other, the Inspection Directorate of the BCAA does perform inspections, called ramp checks, on commercial aviation (CA) and General Aviation (GA) aircraft in Belgium, all origin combined (Belgian and foreign registered).

If we relate the figures in Chapter 1.17 to the size of GA aircraft fleets based in Belgium, we can conclude that less than 1,3% of the fleet of N-registered aircraft were inspected (ramp checks) compared to 3,5% for the Belgian-registered fleet.

As reflected in Chapter 1.17, the FAA oversight of N-registered aircraft outside the USA is below the level of oversight exercised domestically. Obviously, the low frequency of inspections (ramp checks) performed by BCAA on foreign based general aviation aircraft could not compensate for the low level of oversight exercised by the FAA.

This situation has as consequence that these pilots cannot benefit from the guidance provided by an Authority, which may cause them to ignore or misinterpret hazardous situations, leading to risk-taking behaviour.

3 Conclusions.

3.1 Findings.

About the pilot

- The pilot was holder of a valid Belgian PPL(A) license and a valid FAA Private Pilot License (Foreign Based) for Single Engine Propeller instrument airplane.
- When the accident occurred, the pilot had not flown for 5 months and a half, with the exception of a short 36 minutes solo flight performed the day before the accident.
- The pilot was not in compliance with FAA regulation CFR § 61.57 (a) requesting to make at least 3 take-off and landings within the last 90 days before carrying passengers.
- The pilot was not in compliance with FAA regulation CFR § 61.57 c to fly under IFR.
- The pilot had been involved in a series of incidents and one accident before the fatal crash. No authority was warned and/or reacted regarding these preliminary signals maybe because the difficulty to contact the actual pilot/owner of the airplane registered under the name of a trust company.
- There are signs of an attempt to cover-up the airspace infringement dated 8 July 2010.
- A few flights using the Cessna involved in the accident were recorded in the airframe and pilot logbook during years 2005 and 2006 while the aircraft was not airworthy. After verification, it appears these flights were not performed.
- The pilot had a poor knowledge of the last EBCI airport procedures and was not comfortable with the ATC phraseology and procedure.

About the pilot licenses

- Contradiction does exist between the statement of the FAA license regarding limitations and restrictions that should be identical to those of the Belgian license and the specific privileges actually granted by the FAA license (IFR, Turbine engine…). A letter dated 17 January 2008 was sent by BCAA to inform the Federal Aviation Administration of the above contradiction, but no feed-back was received by the BCAA.
- Belgian license SEP (Land) means Single Engine Piston land aeroplane group while FAA license with rating “Airplane Single Engine Land” is valid for both piston and turbine engine airplane. Both licenses are thus not equivalent.

About the meteorological condition

- The meteorological conditions during the night before the crash were such that the airplanes remained outside were covered of a thin layer of ice under a few millimetres of frost.
- The airport had activated the Low Visibility Procedure (LVP) while clear sky was present above the airport. By contrast the airport’s surroundings were affected by freezing fog.

- The meteorological conditions were conducive to icing especially when flying in the freezing fog present around the airport area. However, the airplane remained outside the freezing fog during its short flight.

About the airplane

- The airplane was registered in the USA under the name of a trust company since 2001 and was privately operated in Europe from and to Belgium by the same Belgian citizen. The pilot was known to be the actual owner of the airplane.
- The airplane was not certified to fly into known icing conditions.
- When the fatal accident occurred, a current O&N AIRCRAFT Airplane Flight Manual Supplement (AFMS) was present in the airplane. However, the CESSNA original Airplane Flight Manual was not on board as it should.
- As a consequence of the belly landing dated 31 March 2003, the airplane was dismantled and transferred to the USA where significant repairs and intensive maintenance were performed, ending on March 2007.
- There is an obvious drop in the quality of the maintenance and/or in the maintenance records when compared to those made when the airplane was operated in Canada or USA. Some maintenance operations made in France and Belgium were not recorded. Some non-compliance with FAR 43.9 and FAR 91.405 were found.
- No annual inspection of the aircraft was performed and/or recorded in 2011 while the airplane did not stop flying during this period. An annual inspection of the engine was recorded in 2011 without precise date entry. The only hours (of the engine) mentioned are not consistent.
- The last annual inspection of the aircraft was performed on 25 April 2012.
- The due date of the ELT battery was passed since July 2012.
- Examination of the airframe and engine revealed no evidence of any abnormalities that would have prevented normal operation.

About the Weight and Balance

- A “Ground Power Unit”, documents belonging to the airplane and a heavy floor carpet have been found in the baggage compartment for a total of more than 37 kg (81 lbs). Obviously, these objects remained permanently in the baggage compartment.
- In addition to the above objects, the baggage area was entirely filled with luggage. Total weight of all the objects found in the baggage area was 75 kg (166 lbs).
- All fuel tanks, including the rear tank were filled up to the brim. Full rear tank fuel capacity corresponds to 181,5 lbs.
- The AFMS and a sticker placed on the inside of the baggage compartment door mention clearly the maximum allowable combined weight capacity for fuel and luggage’s in the rear compartment is 181,5 lbs. Simulations of W&B by computation show this limit is mostly adequate to remain inside the envelope C of G position. Overload of the combined fuel tank and baggage area leads almost systematically to an out-of-envelope aft C of G position.
- No up to date “Weight & Balance Report” could be found in the wreckage or in the airplane’s documents.

- Computation of the weight and balance of the fatal flight demonstrates the airplane was significantly overloaded and more serious, out-of-envelope aft C of G position.

About the flight preparation

- A flight plan had been introduced for an IFR flight from EBCI airport to Lyon with an Estimated Time of Departure (ETD) at 8:15.
- The pilot and the passengers arrived at EBCI around 20 minutes before the ETD which is not sufficient to be comfortable regarding the amount of actions to do (Security control, walk to the airplane, boarding and installation of baggage, de-icing, pre-flight inspection, engine and system test, taxi...)
- No document was found showing the weight and balance was verified.
- The pilot de-iced himself the airplane manually, without using any de-icing product. During this process, the temperature was below 0°C and the airplane remained in the shadow of the hangar up to the taxi for the take-off. The de-icing was not perfectly performed.
- Only one occupant of the airplane, the front passenger, was wearing his safety belt.

About the survey of the different authorities

- FAA oversight of N registered airplane outside the US is below the level of oversight exercised domestically.
- FAA considers that the oversight of any airplane flying in a given country would be best exercised by the Civil Aviation Authority of the concerned country in accordance with the prevailing rules.
- The use of trust companies is actually masking the identification of the actual owner. This proved to be an obstacle of conducting an efficient prevention policy further to the occurrence of incidents.
- The survey exercised by the BCAA on general aviation aircraft registered in a third country and operated in Belgium is minimal.

3.2 Causes.

The probable cause of the accident is the pilot's failure to achieve the required best-angle-of-climb airspeed after lift-off resulting in a nose up flight at low speed, close to the stall speed. The airplane was unstable on the back side of the power curve having as consequence a loss of control during an attempt to land and subsequent collision with terrain.

Contributing factors:

- The airplane was significantly overloaded and out-of-envelope with an aft C of G position.
- The de-icing was not perfectly performed.
- The lack of recent experience of the pilot after almost 6 month of not flying.
- The late arrival of the pilot and its passenger at the airport implying the pilot felt likely under pressure to take-off before the ending time of its flight plan.
- The pilot's lack of airmanship skills, demonstrated by several non-compliance with the US regulation and 5 incidents and one accident during the last 250 hours, improperly addressed (learning from mistakes).
- The limited oversight of the US authority of general aviation "N" registered aircraft owners operating in Europe.
- The limited oversight of the BCAA on general aviation foreign registered aircraft owners operating in Belgium.
- The use of trust companies masking the identification of the actual owner combined with the limited oversight by authorities is an obstacle of conducting an efficient prevention policy further to the occurrence of incidents and may lead to a feeling of impunity.

4 Safety recommendations.

4.1 Recommendation 2013-P-4 to the Belgian Civil Aviation Authority regarding the survey of N-registered aircraft:

AAIU(Be) recommends that the Belgian Civil Aviation Authority improve (in depth and number) the inspections of Belgian based N-registered general aviation aircraft. This is because the FAA oversight of N-registered aircraft outside the US is mainly performed remotely and thus not at the same level of home based aircraft. These inspections are completely within the scope of both the Convention on International Civil Aviation (Article 16) and the Belgian Law.

4.2 Recommendation 2014-P-1 to the Federal Aviation Administration regarding the delivery of foreign based Private Pilot Licenses:

AAIU(be) recommends that the FAA, when issuing PPL pilot licenses based on a foreign-issued licenses, to avoid contradicting formulation of limitations and restrictions applying to the license; such as licenses bearing the text "All limitations and restrictions of the foreign license ref. xx applies", and further granting privileges outside the scope of the original foreign license. This is in order to reduce the risk that pilots are operating outside their legal qualifications without it being noticed by authorities.

5 Attachments

5.1 Full weather report of EBCI

Belgocontrol

9/02/2013 07:20:51,
WIND: 25 210 03KT
WIND: 07 180 02KT VRB BTN 150 AND 230
VIS: 1200M RVR: 25TDZ 1800M RVR: 25MID ABV RVR: 25END ABV WX: BR CLD: FEW 100FT T: MS05 DP: MS06 MET QFE: 997.1HPA QNH: 1019.6HPA TB: MS06
WS: RE: TREND: TEMPO VIS 100M FZFG BKN 100FT RH: 91 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.11INHG MET QFE2: 29.44INHG

9/02/2013 07:50:44,
WIND: 25 230 02KT
WIND: 07 210 02KT VRB BTN 190 AND 270
VIS: 1700M WX: BR CLD: FEW 200FT T: MS04 DP: MS06 MET QFE: 997.2HPA QNH: 1019.7HPA TB: MS05
WS: RE: TREND: TEMPO VIS 500M FZFG BKN 200FT RH: 91 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.11INHG MET QFE2: 29.45INHG

9/02/2013 08:20:22,
WIND: 25 220 03KT
WIND: 07 220 01KT VRB BTN 180 AND 260
VIS: 1700M RVR: 25TDZ ABV RVR: 25MID ABV RVR: 25END 1300M WX: BR CLD: FEW 200FT T: MS04 DP: MS05 MET QFE: 997.2HPA QNH: 1019.7HPA TB: MS04
WS: RE: TREND: TEMPO VIS 500M FZFG BKN 200FT RH: 91 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.11INHG MET QFE2: 29.45INHG

9/02/2013 08:50:32,
WIND: 25 190 02KT
WIND: 07 170 01KT VRB BTN 150 AND 230
VIS: 1800M WX: BR CLD: FEW 200FT T: MS03 DP: MS04 MET QFE: 997.3HPA QNH: 1019.8HPA TB: MS02
WS: RE: TREND: TEMPO VIS 600M FZFG BKN 200FT RH: 92 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.12INHG MET QFE2: 29.45INHG

9/02/2013 09:20:49,
WIND: 25 140 01KT
WIND: 07 130 03KT VRB BTN 100 AND 160
VIS: 2100M WX: BR CLD: FEW 200FT T: MS03 DP: MS04 MET QFE: 997.4HPA QNH: 1019.9HPA TB: MS01
WS: RE: TREND: TEMPO VIS 600M FZFG BKN 200FT RH: 91 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.12INHG MET QFE2: 29.45INHG

9/02/2013 09:21:16, CCA
WIND: 25 140 01KT
WIND: 07 130 03KT VRB BTN 100 AND 160
VIS: 2100M WX: BR CLD: FEW 200FT T: MS03 DP: MS04 MET QFE: 997.4HPA QNH: 1019.9HPA TB: MS01
WS: RE: TREND: NOSIG RH: 91 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.12INHG MET QFE2: 29.45INHG

9/02/2013 09:22:00,
WIND: 25 130 01KT
WIND: 07 140 02KT VRB BTN 100 AND 160
VIS: 2100M WX: BR CLD: FEW 200FT T: MS03 DP: MS04 MET QFE: 997.4HPA QNH: 1020.0HPA TB: MS01
WS: RE: TREND: NOSIG RH: 91 TXT: FL: 0 RISE: 0705 SET: 1648 QNH2: 30.12INHG MET QFE2: 29.45INHG

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Belgocontrol Tervuursesteenweg 303 B-1820 Steenokkerzeel

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Observations data

Air temperature – Dew Point - Relative humidity – Wind (2 and 10 min av. gusts)- Air pressure (09/02/2013 07h00 – 09h50 UTC)

Date Time (UTC)	Air temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind direction (2 min average) (deg)	Wind speed (2 min average) (KT)	Wind direction (10 min average) (deg)	Wind speed (10 min average) (KT)	Max Wind speed (last 10 min) (KT)	Air Pressure (MET_QFE) (hPa)	QNH (hPa)
9/02/2013 7:00	-5	-6,0	93	209	2,7	209	3	4,3	997,0	1019,5
9/02/2013 7:10	-4,7	-5,8	92	220	3,1	215	3	4,6	997,0	1019,6
9/02/2013 7:20	-5	-6,2	91	212	3,5	216	3,4	4	997,1	1019,6
9/02/2013 7:30	-4,9	-5,9	93	211	3,3	207	3,1	4,1	997,1	1019,6
9/02/2013 7:40	-4,7	-5,7	93	223	2,9	216	3,2	4,5	997,2	1019,7
9/02/2013 7:50	-4,5	-5,8	91	222	2,4	225	2,6	3	997,2	1019,7
9/02/2013 8:00	-4,8	-6,1	91	216	2,5	214	2,4	2,9	997,3	1019,8
9/02/2013 8:10	-4,8	-5,8	93	237	3,4	235	3,2	3,9	997,3	1019,8
9/02/2013 8:20	-4,2	-5,5	91	218	3,2	221	3,6	4,4	997,2	1019,8
9/02/2013 8:30	-3,4	-4,4	93	220	2,6	224	3,2	4,5	997,3	1019,8
9/02/2013 8:40	-3,2	-4,3	92	209	2,9	214	2,8	4,9	997,3	1019,9
9/02/2013 8:50	-3,1	-4,2	92	189	2,5	205	2,6	3,4	997,3	1019,8
9/02/2013 9:00	-2,8	-3,9	92	184	2,2	186	2	2,5	997,3	1019,8
9/02/2013 9:10	-2,5	-3,7	92	150	1,8	158	1,9	2,6	997,3	1019,8
9/02/2013 9:20	-2,6	-3,9	91	139	1,5	140	2,1	3,2	997,4	1019,9
9/02/2013 9:30	-2,5	-3,9	90	111	1,7	115	1,4	2,7	997,6	1020,1
9/02/2013 9:40	-2,1	-3,6	90	128	2,2	127	2,3	3,5	997,7	1020,2
9/02/2013 9:50	-1,5	-2,9	90	156	2,4	147	2,2	3,2	997,7	1020,2

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Weather phenomena (08/022013 18.00 UTC to 09/02/2013 10.00 UTC)

Date	BeginTime (UTC)	EndTime (UTC)	Descriptor	Intensity	Phenomena
8/02/2013	18h17	20h59	SH	FBL	SN
	20h59	21h17	SH	MOD	SN
	21h17	21h48	SH	FBL	SN
9/02/2013	01h50	02h51			BR
	02h51	03h50	FZ		FG
	03h51	04h36	MI		FG
	03h50	04h36			BR
	04h36	07h20	FZ		FG
	07h20	13h20			BR

Temperature evolution (08/022013 18.00 UTC to 09/02/2013 10.00 UTC)

Date Time (UTC)	Air temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)
8/02/2013 18:00	0,6	-4,3	70
8/02/2013 19:00	-0,1	-2,2	85
8/02/2013 20:00	-0,4	-2,2	88
8/02/2013 21:00	-0,5	-1,9	90
8/02/2013 22:00	-1,1	-2,4	91
8/02/2013 23:00	-1,8	-2,8	93
9/02/2013	-1,9	-2,5	95
9/02/2013 1:00	-2,2	-3,2	93
9/02/2013 2:00	-2,6	-3,3	95
9/02/2013 3:00	-3,9	-4,1	99
9/02/2013 4:00	-4,5	-5,0	96
9/02/2013 5:00	-4,7	-4,7	100
9/02/2013 6:00	-4,7	-5,0	97
9/02/2013 7:00	-5	-6,0	93
9/02/2013 8:00	-4,8	-6,1	91
9/02/2013 9:00	-2,8	-3,9	92
9/02/2013 10:00	-1,3	-2,9	89

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General forecast (issued 09/02/2013 at 03h56 UTC)

FABX56 EBBR 090530
GENERAL FORECAST
ISSUED: 09/02/13 AT 0356 UTC

VALID FOR PERIOD: 09/02/13 - 0600 UTC TO 09/02/13 - 1800 UTC

SUNRISE: 090705 UTC
SUNSET: 091647 UTC

1. SYNOPTIC SITUATION
COL SITUATION BETWEEN THE ANTICYCLONE OF THE AZORES AND AN ANTICYCLONE OVER NORWAY, DEPRESSIONS OVER CENTRAL EUROPE AND THE NORTH ATLANTIC.
DURING THE FORENOON THE COLD AIR MASS IS STILL SLIGHTLY UNSTABLE.
AN OCCLUSION ALMOST FRONTOLYSED IN A RIDGE ISSUED FROM THE ANTICYCLONE OF THE AZORES AND SITUATED OVER THE EAST OF ENGLAND WILL SLIGHTLY AFFECT THE NW OF BELGIUM THIS AFTERNOON AS A WEAK FEATURE.

2. WEATHER
LIGHT WINTRY PRECIPITATIONS THIS MORNING IN THE WEST AND THE EAST.
MISTY WITH LOCAL FREEZING FOG.
BECOMING PARTLY CLOUDY TO CLOUDY END FORENOON.
DURING THE AFTERNOON BECOMING IN THE WEST VERY CLOUDY TO OVERCAST WITH A FEW FLOCKS OR RAIN DROPS.

3. WINDS

SURFACE : 232 DEG 06KT
AT 1000FT / 300M : 010 DEG 10KT BECMG AFTERNOON 210 DEG 10KT
AT 2000FT / 600M : 010 DEG 10KT " 220 DEG 10KT
AT 3000FT / 1000M : 010 DEG 10KT " 240 DEG 10KT
AT 4000FT / 1300M : 010 DEG 15KT " 280 DEG 10KT
AT 5000FT / 1600M : 010 DEG 15KT " 290 DEG 10KT
AT 6000FT / 2000M : 010 DEG 20KT " 330 DEG 15KT
AT 10000FT / 3000M : 010 DEG 20KT " 340 DEG 15KT

4. VISIBILITY
3-7KM LOCALLY LESS THAN 1 KM DURING THE FORENOON
IMPROVING TO 5-10KM

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5. CLOUDINESS
IN EAST DURING THE FORENOON BKN ST SC 002/050 BREAKING DURING THE DAY
IN CENTER AND WEST DURING THE MORNING LOCALLY BKN ST 002/010 RELATED
TO LIFTING FOG.
SCT-BKN AC BANKS 070/120
IN THE WEST DURING THE MORNING FEW CU 030/080
AND DURING THE AFTERNOON BKN-OVC SC AS 045/120 SCT CI 180/260.

6. ISOTHERM
0°C: SURFACE BECOMING 400FT
-10°C: 5300FT

7. TEMPERATURE
MAX: MS02 IN ARDENNES
PS02 UN CENTER
PS04 AT COAST

8. MINIMUM QNH: 1016 HPA

9. WARNING
LIGHT WINTRY SHOWERS DURING THE MORNING IN WEST PART OF BELGIUM AND ALSO ALONG THE GERMAN BORDER.
OCCASIONAL FREEZING FOG DURING THE MORNING.
IMPORTANT FORMATION OF RIME.

10. SOARING CAPABILITIES
SOARING CAPABILITIES: FILLED IN ONLY BETWEEN 01 MARCH AND 31 OCTOBER FOR THE GENERAL FORECAST ISSUED AT 05.30 UTC.

11. OUTLOOK NEXT 24HRS
A DEEPENING DEPRESSION OVER IRELAND WILL SHIFT TOWARDS THE NW OF FRANCE.
THE NIGHT WILL START COLD AND CALM DRY WEATHER MINMUM FROM MS02 ATCOAST TO MS08 IN EAST. DURING THE SECOND PART INCREASING SSE'LY WIND;
SUNDAY THE ASSOCIATED OCCLUSION WILL PENETRATE BELGIUM FROM THE SW DURING THE AFTERNOON.
A SNOW FIELD WILL SPREAD OUT NORTH WARDS DURING THE EVENING AND MAYGIVE SEVERAL CM OF SNOW.

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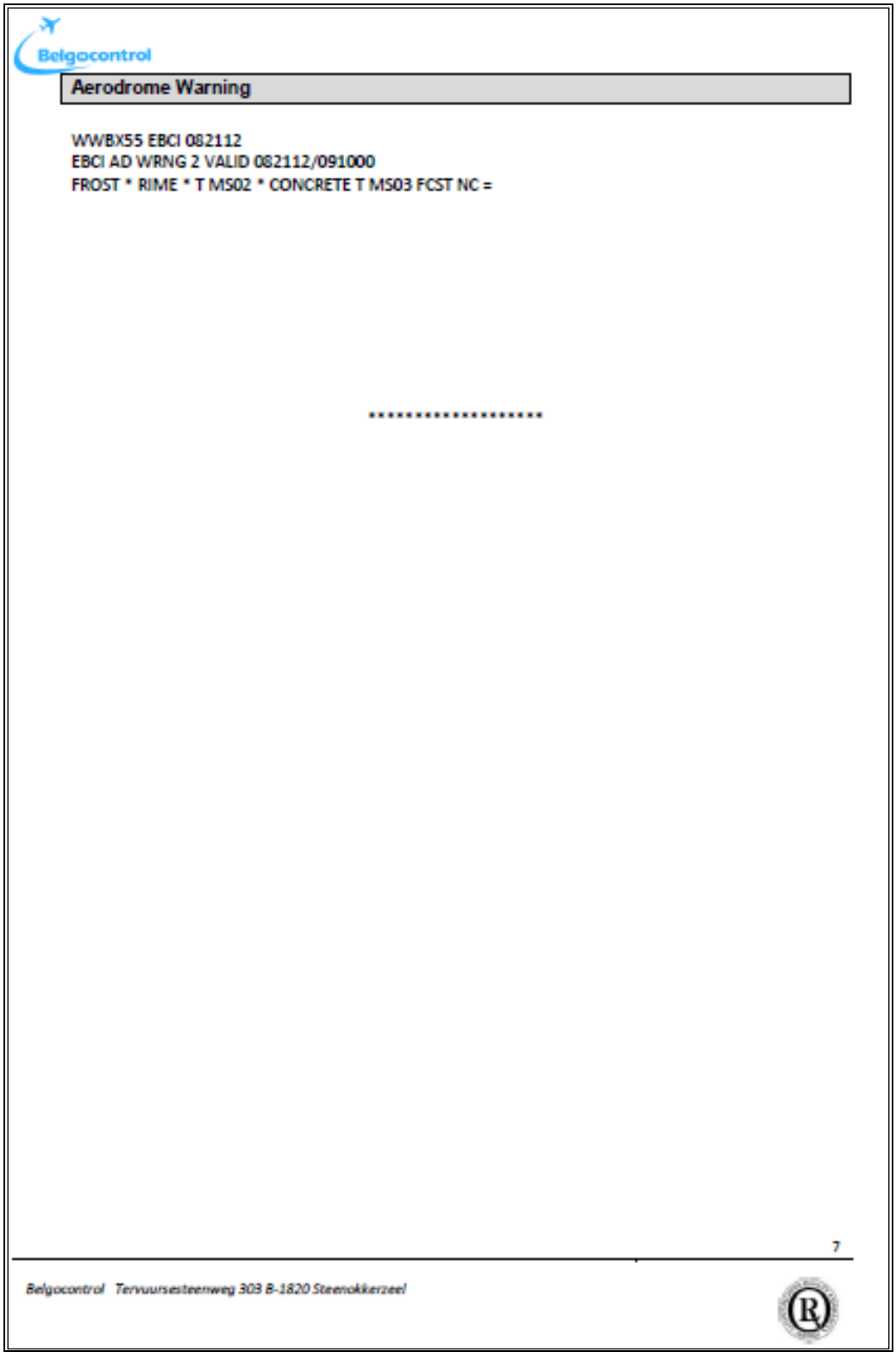

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Aerodrome Warning

WWBX55 EBCI 082112
EBCI AD WRNG 2 VALID 082112/091000
FROST * RIME * T MS02 * CONCRETE T MS03 FCST NC =

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Belgocontrol Tervuursesteenweg 303 B-1820 Steenokkerzeel

5.2 Extract of Title 14 of CFR Part 43

§ 43.5 Approval for return to service after maintenance, preventive maintenance, rebuilding, or alteration.
(a) No person may approve for return to service any aircraft, airframe, aircraft engine, propeller, or appliance, that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless the maintenance record entry required by § 43.9 or § 43.11, as appropriate, has been made;

FAR 43.9 - Content, Form, and Disposition of Maintenance Records
(a) Maintenance record entries. Except as provided in paragraphs (b) and (c) of this section, each person who maintains, performs preventive maintenance, rebuilds, or alters an aircraft, airframe, aircraft engine, propeller, appliance, or component part shall make an entry in the maintenance record of that equipment containing the following information:
(1) A description (or reference to data acceptable to the Administrator) of work performed.
(2) The date of completion of the work performed.
(3) The name of the person performing the work if other than the person specified in paragraph (a)(4) of this section.
(4) If the work performed on the aircraft, airframe, aircraft engine, propeller, appliance, or component part has been performed satisfactorily, the signature, certificate number, and kind of certificate held by the person approving the work. The signature constitutes the approval for return to service only for the work performed.
…..
(d) In addition to the entry required by paragraph (a) of this section, major repairs and major alterations shall be entered on a form, and the form disposed of, in the manner prescribed in appendix B, by the person performing the work.

5.3 Extract of Title 14 of CFR Part 61

§61.31 Type rating requirements, additional training, and authorization requirements.
(a) Type ratings required.
A person who acts as a pilot in command of any of the following aircraft must hold a type rating for that aircraft:
(1) Large aircraft (except lighter-than-air).
(2) Turbojet-powered airplanes.
(3) Other aircraft specified by the Administrator through aircraft type certificate procedures.
(b) Authorization in lieu of a type rating.
A person may be authorized to operate without a type rating for up to 60 days an aircraft requiring a type rating, provided—
(1) The Administrator has authorized the flight or series of flights;
(2) The Administrator has determined that an equivalent level of safety can be achieved through the operating limitations on the authorization;
(3) The person shows that compliance with paragraph (a) of this section is impracticable for the flight or series of flights; and
(4) The flight—
(i) Involves only a ferry flight, training flight, test flight, or practical test for a pilot certificate or rating;
(ii) Is within the United States;
(iii) Does not involve operations for compensation or hire unless the compensation or hire involves payment for the use of the aircraft for training or taking a practical test; and
(iv) Involves only the carriage of flight crewmembers considered essential for the flight.
(5) If the flight or series of flights cannot be accomplished within the time limit of the authorization, the Administrator may authorize an additional period of up to 60 days to accomplish the flight or series of flights.
(c) Aircraft category, class, and type ratings:
Limitations on the carriage of persons, or operating for compensation or hire. Unless a person holds a category, class, and type rating (if a class and type rating is required) that applies to the aircraft, that person may not act as pilot in command of an aircraft that is carrying another person, or is operated for compensation or hire. That person also may not act as pilot in command of that aircraft for compensation or hire.
(d) Aircraft category, class, and type ratings:
Limitations on operating an aircraft as the pilot in command. To serve as the pilot in command of an aircraft, a person must—
(1) Hold the appropriate category, class, and type rating (if a class or type rating is required) for the aircraft to be flown; or
(2) Have received training required by this part that is appropriate to the pilot certification level, aircraft category, class, and type rating (if a class or type rating is required) for the aircraft to be flown, and have received an endorsement for solo flight in that aircraft from an authorized instructor.
(e) Additional training required for operating complex airplanes.
(1) Except as provided in paragraph (e)(2) of this section, no person may act as pilot in command of a complex airplane, unless the person has—
(i) Received and logged ground and flight training from an authorized instructor in a complex airplane, or in a flight simulator or flight training device that is representative of a complex airplane, and has been found proficient in the operation and systems of the airplane; and
(ii) Received a one-time endorsement in the pilot's logbook from an authorized instructor who certifies the person is proficient to operate a complex airplane.
(2) The training and endorsement required by paragraph (e)(1) of this section is not required if the person has logged flight time as pilot in command of a complex airplane, or in a flight simulator or flight training device that is representative of a complex airplane prior to August 4, 1997.

(f) Additional training required for operating high-performance airplanes.
(1) Except as provided in paragraph (f)(2) of this section, no person may act as pilot in command of a high-performance airplane (an airplane with an engine of more than 200 horsepower), unless the person has—
(i) Received and logged ground and flight training from an authorized instructor in a high-performance airplane, or in a flight simulator or flight training device that is representative of a high-performance airplane, and has been found proficient in the operation and systems of the airplane; and
(ii) Received a one-time endorsement in the pilot's logbook from an authorized instructor who certifies the person is proficient to operate a high-performance airplane.
(2) The training and endorsement required by paragraph (f)(1) of this section is not required if the person has logged flight time as pilot in command of a high-performance airplane, or in a flight simulator or flight training device that is representative of a high-performance airplane prior to August 4, 1997.

§ 61.57 Recent flight experience: Pilot in command.
(a) General experience.
(1) Except as provided in paragraph (e) of this section, no person may act as a pilot in command of an aircraft carrying passengers or of an aircraft certificated for more than one pilot flight crewmember unless that person has made at least three take-offs and three landings within the preceding 90 days, and—
(i) The person acted as the sole manipulator of the flight controls; and
(ii) The required take-offs and landings were performed in an aircraft of the same category, class, and type (if a type rating is required), and, if the aircraft to be flown is an airplane with a tail wheel, the take-offs and landings must have been made to a full stop in an airplane with a tail wheel.
(2) For the purpose of meeting the requirements of paragraph (a)(1) of this section, a person may act as a pilot in command of an aircraft under day VFR or day IFR, provided no persons or property are carried on board the aircraft, other than those necessary for the conduct of the flight.
(3) The take-offs and landings required by paragraph (a)(1) of this section may be accomplished in a flight simulator or flight training device that is—
(i) Approved by the Administrator for landings; and
(ii) Used in accordance with an approved course conducted by a training center certificated under part 142 of this chapter.
….
(c) Instrument experience
Except as provided in paragraph (e) of this section, a person may act as pilot in command under IFR or weather conditions less than the minimums prescribed for VFR only if:
(1) Use of an airplane, powered-lift, helicopter, or airship for maintaining instrument experience. Within the 6 calendar months preceding the month of the flight, that person performed and logged at least the following tasks and iterations in an airplane, powered-lift, helicopter, or airship, as appropriate, for the instrument rating privileges to be maintained in actual weather conditions, or under simulated conditions using a view-limiting device that involves having performed the following—
(i) Six instrument approaches.
(ii) Holding procedures and tasks.
(iii) Intercepting and tracking courses through the use of navigational electronic systems.

§61.75 Private pilot certificate issued on the basis of a foreign pilot license.
(a) General.
A person who holds a foreign pilot license at the private pilot level or higher that was issued by a contracting State to the Convention on International Civil Aviation may apply for and be issued a U.S. private pilot certificate with the appropriate ratings if the foreign pilot license meets the requirements of this section.
(b) Certificate issued.
A U.S. private pilot certificate issued under this section must specify the person's foreign license number and country of issuance. A person who holds a foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may be issued a U.S. private pilot certificate based on the foreign pilot license without any further showing of proficiency, provided the applicant:
(1) Meets the requirements of this section;
(2) Holds a foreign pilot license, at the private pilot license level or higher, that does not contain a limitation stating that the applicant has not met all of the standards of ICAO for that license;
(3) Does not hold a U.S. pilot certificate other than a U.S. student pilot certificate;
(4) Holds a medical certificate issued under part 67 of this chapter or a medical license issued by the country that issued the person's foreign pilot license; and
(5) Is able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.
(c) Aircraft ratings issued.
Aircraft ratings listed on a person's foreign pilot license, in addition to any issued after testing under the provisions of this part, may be placed on that person's U.S. pilot certificate for private pilot privileges only.
(d) Instrument ratings issued.
A person who holds an instrument rating on the foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may be issued an instrument rating on a U.S. pilot certificate provided:
(1) The person's foreign pilot license authorizes instrument privileges;
(2) Within 24 months preceding the month in which the person applies for the instrument rating, the person passes the appropriate knowledge test; and
(3) The person is able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.
(e) Operating privileges and limitations.
A person who receives a U.S. private pilot certificate that has been issued under the provisions of this section:
(1) May act as pilot in command of a civil aircraft of the United States in accordance with the pilot privileges authorized by this part and the limitations placed on that U.S. pilot certificate;
(2) Is limited to the privileges placed on the certificate by the Administrator;
(3) Is subject to the limitations and restrictions on the person's U.S. certificate and foreign pilot license when exercising the privileges of that U.S. pilot certificate in an aircraft of U.S. registry operating within or outside the United States; and
(f) Limitation on licenses used as the basis for a U.S. certificate.
A person may use only one foreign pilot license as a basis for the issuance of a U.S. pilot certificate. The foreign pilot license and medical certification used as a basis for issuing a U.S. pilot certificate under this section must be written in English or accompanied by an English transcription that has been signed by an official or representative of the foreign aviation authority that issued the foreign pilot license.
(g) Limitation placed on a U.S. pilot certificate.
A U.S. pilot certificate issued under this section can only be exercised when the pilot has the foreign pilot license, upon which the issuance of the U.S. pilot certificate was based, in the holder's possession or readily accessible in the aircraft.

5.4 Extract of Title 14 of CFR Part 91

§ 91.405 Maintenance required.
Each owner or operator of an aircraft—
(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;
(b) Shall ensure that maintenance personnel make appropriate entries in the aircraft maintenance records indicating the aircraft has been approved for return to service;

§ 91.409 Inspections.
(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—
(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by § 43.7 of this chapter; or …

5.5 Extract of the law dated 27 June 1937

Art. 38. <L 1999-05-03/30, art. 4, 006; En vigueur : 01-03-1999> § 1er. Sans préjudice des compétences des membres du personnel des services de police, les fonctionnaires de l'administration de l'aéronautique désignés par le Roi et assermentés à cette fin, veillent au respect des conventions aériennes, des accords internationaux aériens et accords internationaux de sûreté aéronautique, des plans de sûreté aéronautique, de la présente loi et des arrêtés d'exécution de cette loi, (les règlements visés à l'article 176bis de la loi du 21 mars 1991 portant réforme de certaines entreprises publiques économiques et les conditions d'utilisation des installations aéroportuaires visées à l'article 30, 3°, de l'arrêté royal du 27 mai 2004 relatif à la transformation de B.I.A.C. en société anonyme de droit privé et aux installations aéroportuaires) et, à l'exécution par des membres des inspections aéroportuaires des contrôles de sûreté et d'accès, sur le territoire de la Belgique et à bord des aéronefs immatriculés en Belgique. <AR 2004-05-27/44, art. 53, 010; En vigueur : 29-12-2004>

§ 2. Les fonctionnaires visés au § 1er constatent par des procès-verbaux faisant foi jusqu'à preuve du contraire, les infractions aux lois et arrêtés d'exécution concernant la navigation aérienne ainsi que les infractions aux règlements visés au § 1er, qu'ils constatent sur le territoire de la Belgique et à bord des aéronefs immatriculés en Belgique.

Art. 38. <W 1999-05-03/30, art. 4, 006; Inwerkingtreding : 01-03-1999> § 1. Onverminderd de bevoegdheden van de personeelsleden van de politiediensten, zien de door de Koning aangewezen en te dien einde beëdigde ambtenaren van het bestuur van de luchtvaart toe op de naleving van de internationale luchtvaartverdragen, de internationale luchtvaartakkoorden en luchtvaartbeveiligingsakkoorden, de luchtvaartbeveiligingsplannen, deze wet en de uitvoeringsbesluiten van deze wet (de reglementen bedoeld in artikel 176bis van de wet van 21 maart 1991 betreffende de hervorming van sommige economische overheidsbedrijven en de gebruiksvoorwaarden van de luchthaven-installaties bedoeld in artikel 30, 3°, van het koninklijk besluit van 27 mei 2004 betreffende de omzetting van B.I.A.C. in een naamloze vennootschap van privaatrecht en betreffende de luchthaveninstallaties), en op de uitvoering van de toegangs- en veiligheidscontroles door de leden van de luchthaveninspecties, op het grondgebied van België en aan boord van in België ingeschreven luchtvaartuigen.

§ 2. De in § 1 bedoelde ambtenaren stellen bij processen-verbaal die gelden tot het bewijs van het tegendeel, de inbreuken op de wetten en de uitvoeringsbesluiten betreffende de luchtvaart vast, alsmede de inbreuken op de in § 1 bedoelde reglementen, op het grondgebied van België en aan boord van in België ingeschreven luchtvaartuigen.

5.6 Investigation report Cessna P210N registered N45SE

NTSB Identification: ***SEA05FA201****.*
The docket is stored in the Docket Management System (DMS). Please contact Records Management Division
Accident occurred Wednesday, September 28, 2005 in Salmon, ID
Probable Cause Approval Date: 08/29/2006
Aircraft: Cessna P210N, registration: N45SE
Injuries: 2 Fatal.
NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this aircraft accident report.

The pilot and passenger were returning home after spending several days on an elk hunting trip in the Idaho backcountry. One of them had shot an elk, and they loaded the airplane with the four elk quarters and their personal gear. A witness heard the airplane taking off and it "didn't sound right." He looked towards the 2,000-foot-long grass airstrip and saw the airplane "barely off the ground" heading south. The witness stated that the airplane was "wallowing back and forth, trying to stall out." He further stated that the "motor sounded like a boat cavitating" and "the nose of the airplane was pointed up." The witness watched the airplane as it veered left and impacted the ground tail first. The airplane's nose then "slammed into the ground," and the airplane nosed over and came to rest inverted. A fire erupted, which destroyed the fuselage and the inboard sections of the wings. The accident site was about 1/4 mile from the end of the runway, offset to the left of the runway centerline, and approximately the same elevation as the runway. The site was located on level grass covered terrain. Examination of the airframe and engine revealed no evidence of any abnormalities that would have prevented normal operation. The pilot began flying the airplane, which had been modified by replacement of its original reciprocating engine with a gas turbine engine, about 4 months before the accident and according to his logbook, had accumulated about 22 hours flight time in it. He had about 1,167 hours in other non-modified airplanes of the same make and model. An estimated weight and balance placed the airplane's takeoff weight at 3,729.4 pounds, which was below the maximum gross weight of 4,000 pounds. The estimated center of gravity was 48.57 inches, which was within, but near, the aft limit of 49 inches. A short field landing performance chart indicated that for the approximate accident conditions, the takeoff ground roll would be 1,581 feet and the total distance to clear a 50 foot obstacle would be 2,461 feet. A pilot, who had experience flying the accident airplane, stated the following with respect to its performance: "Weight and balance is very, very critical. With weight aft, you really need to hold the nose down and gain airspeed on takeoff."

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to obtain airspeed during the initial takeoff climb, which resulted in a stall/mush and subsequent collision with terrain.

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