

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A-028/CENIPA/2014

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PT-OMX
MODEL:	210N
DATE:	09FEB2014



NOTICE

According to the Law nº 7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination and execution of the activities of investigation and prevention of aeronautical accidents.

The elaboration of this Final Report was conducted taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document which reflects the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.

The document does not focus on quantifying the degree of contribution of the different factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.

The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.

This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with item 3.1, Annex 13 to the 1944 Chicago Convention, which was incorporated in the Brazilian legal system by virtue of the Decree nº 21713, dated 27 August 1946.

Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.

Consequently, the use of this report for any purpose other than that of preventing future accidents, may induce to erroneous interpretations and conclusions.

N.B.: This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Taking into account the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.

SYNOPSIS

This is the final report of the 09 February 2014 accident with the 210N aircraft, registration PT-OMX. The accident was classified as “loss of control in flight”.

During the en-route phase of the flight, the aircraft collided with the terrain.

The pilot and the two passengers perished in the crash.

The aircraft sustained substantial damage.

An accredited representative of the US *National Transportation Safety Board* - NTSB, state of design, was designated for participation in the investigation.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
ANP	Brazil's National Petroleum, Natural Gas, and Biofuels Agency
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CHT	Technical Qualification Certificate
CIV	Pilot's Flight Logbook
CM	Registration Certificate
CMA	Aeronautical Medical Certificate
IAM	Annual Maintenance Inspection
Lat	Latitude
Long	Longitude
Ltda.	Limited Liability Company.
METAR	Routine Aerodrome Weather Report
MNTE	Airplane, single engine, land - ASEL
NSCA	Command of Aeronautics' Systemic Norm
NTSB	National Transportation Safety Board (USA).
PPR	Private Pilot (airplane category)
RBAC	Brazilian Civil Aviation Regulation
RBHA	Brazilian Aeronautical Homologation Regulation
RS	Safety Recommendation
SDNB	ICAO location designator – Sítio Flyer Private Aerodrome
SJQZ	ICAO location designator – Dona Iracema Private Aerodrome
SIPAER	Aeronautical Investigation and Prevention System
TPP	Private Air Services
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	Model: 210N	Operator: Private
	Registration: PT-OMX	
Occurrence	Manufacturer: Cessna Aircraft	Type(s): Loss of control in flight
	Date/time: 09FEB2014 / 13:30UTC	
	Location: <i>Taquaralto</i>	
	Lat. 10°22'38"S Long. 048°16'00"W	
	Municipality – State: <i>Palmas - Tocantins</i>	

1.1 History of the flight.

At about 13:15 UTC, the aircraft took off on a transport flight from SJQZ, destined for SDNB, with the pilot and two passengers on board.

During the enroute phase of the flight, there was loss of control, and the aircraft crashed into the ground.

The aircraft was substantially damaged.

The aircraft occupants were killed in the crash.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	1	2	-
Serious	-	-	-
Minor	-	-	-
None	-	-	-

1.3 Damage to the aircraft.

There was substantial damage to practically the entire aircraft structure.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Hours Flown	
	Pilot
Total	unknown
Total in the last 30 days	unknown
Total in the last 24 hours	unknown
In this type of aircraft	unknown
In this type in the last 30 days	unknown
In this type in the last 24 hours	unknown

N.B.: The pilot's flight logbook could not be found for verification of his flight hours.

1.5.2 Professional formation.

The pilot did the Private Pilot course (airplane category) at the *Aeroclube de Porto Nacional*, state of *Tocantins*, in 2008.

1.5.3 Category of licenses and validity of certificates.

The pilot held a private pilot license (airplane category). However, the validity of his ASEL technical qualification certificate had expired in January 2014.

1.5.4 Qualification and flight experience.

The pilot was not qualified, since he hadn't renewed his technical qualification certificate.

The investigation commission could not verify the pilot's flight experience, for not having had access to the records of his flight hours.

1.5.5 Validity of medical certificate.

The pilot held a valid Aeronautical Medical Certificate (CMA).

1.6 Aircraft information.

The SN21064360 aircraft was manufactured by Cessna Aircraft in 1980, and had been registered in the Private Air Services category (TPP).

It was equipped with an IO-520-L *Teledyne* Continental engine (SN270167-R).

The airworthiness certificate had been suspended on 18 July 2013, due to lack of compliance with the required annual maintenance inspection (IAM).

The records of the airframe, engine, and propeller logbooks were not up-to-date.

The last annual maintenance inspection (IAM) of the aircraft was done on 18 July 2012, cumulatively with the "50 hours" inspection, by the Águia Aviação e Manutenção Ltda. workshop, in Goiânia, state of Goiás. Due to lack of updated information, it was not possible to determine the hours flown after the inspection.

The aircraft logbook was not up-to-date. There were no discrepancies reported.

1.7 Meteorological information.

The prevailing weather conditions were VMC.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

Not applicable.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

The wreckage remained concentrated in a mountainous area, with low vegetation and on a predominantly rocky ground.

The landing gear was in the retracted position, with the corresponding switch selected to "up".

The aircraft resting position was about two meters beyond the point of first impact (Figure 1).



Figure 1 – Point of first impact with the ground.



Figure 2 – Front view of the aircraft after impact with the ground.

In the field investigation, the investigators verified that the coupling shaft between the propeller assembly and the engine had fractured on account of flexion. The three blades (Figure 3), one of them found under the engine, had kneading consistent with impact with little or even no power at the moment of collision with the ground.

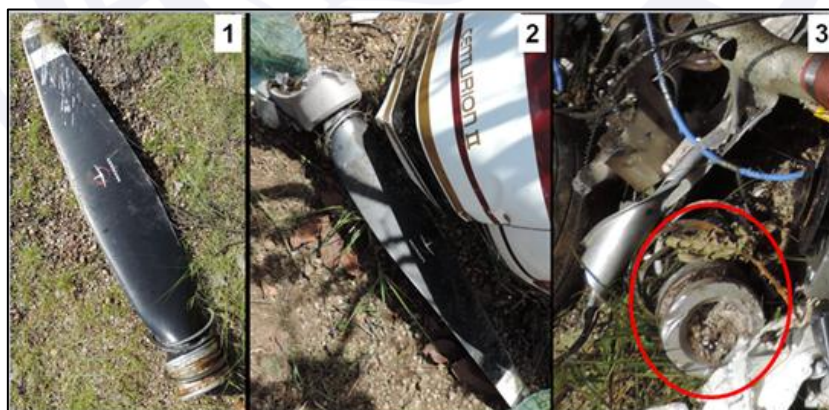


Figure 3 – Aspect of the propeller blades.

Due to rupture of the wings and respective lines, and the resulting leakage of fuel after impact with the ground, it was not possible to determine the quantity of aviation gasoline remaining in the aircraft.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

In July 2013, the pilot had done his last health-checkup, which resulted in no restrictions.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

The investigation commission found out that the mechanic who was providing maintenance services to the aircraft on the day of the accident was not qualified for such. The mechanic, however, denied having done the service.

According to a witness that was at the aerodrome on the day of the accident, the pilot, while waiting for the maintenance service to be completed, was pressed to take off by one of the passengers.

1.14 Fire.

No signs of either inflight or post-impact fire.

1.15 Survival aspects.

The aircraft occupants perished in the crash site.

1.16 Tests and research.

At the post-accident field investigation, the investigators verified the presence of aviation gasoline in the fuel distribution valve.

Physical-chemical tests of the fuel collected from the fuel station located in the *Sítio Flyer* aerodrome showed that the fuel was within normal parameters, typical of aviation gasoline. The tests were carried out by the laboratory of the National Agency of Petroleum, Natural Gas and Biofuels.

It was not possible for the investigators to collect fuel from the tanks and filters of the aircraft on account of the damage caused by the impact.

1.17 Organizational and management information.

Apparently, the operator did not monitor pieces of information that were vital for controlling the aircraft maintenance, such as the records of the maintenance services provided or even the records of existing operational dysfunctions.

The pilot, who was simultaneously owner and operator of the aircraft, did not regularly update the pertinent documentation. Thus, the information contained in the airframe, engine, and propeller logbooks was out of date.

1.18 Operational information.

A few days before the accident, the pilot flew the PT-OMX for approximately 15 minutes. Aboard the aircraft was a pilot's friend, who later informed that an inflight engine failure had occurred on the occasion. According to him, the problem was solved by the pilot by means of an action known as "dar bomba".

This procedure was interpreted by the investigation commission as the act of switching on the booster electrical pump of the fuel system.

After the landing, the pilot asked his friend to remind him to tell the mechanic to adjust the engine operation, which, in his opinion, was operating too slow when in idle.

The engine failure mentioned above was not reported in the aircraft logbook.

According to information provided by third parties, the pilot went to SDNB on 09 February 2014, and bought 40 liters of aviation gasoline, which were stored for transport in two containers with capacity of 20 liters each.

In his own car, the pilot (accompanied by one of the passengers) drove to SJQZ (*Dona Iracema* aerodrome). There, he refueled the aircraft with the 40 liters of aviation gasoline (20 liters in each wing). It was not possible to determine the quantity of fuel existing in the tanks before this refueling.

The purpose of the flight was the transport of two passengers from SJQZ to SDNB at a distance of 30 nautical miles.

In SDNB, the pilot would fill up the aircraft tanks, and take two more passengers, in addition to the other two already in the aircraft, to a social event that was to take place in nearby city of the state of Tocantins.

According to a witness, maintenance services were being provided to the aircraft by a mechanic before the takeoff from SJQZ. According to reports, the mechanic had made comments about the need to correct the mixture. However, one of the passengers was eager to take off the soonest possible, and the task was not performed.

The mechanic was interviewed by investigators of the go-team, and denied having done any maintenance services in the aircraft, emphasizing that there were no formal records attesting the provision of such service. The validity of the mechanic's technical qualification certificate had expired in July 2012.

According to reports made by third parties, the aircraft, after taking off from SJQZ, did not fly direct to SDNB, but circled the departure aerodrome five times before proceeding to the destination.



Figure 4 – Croquis with the trajectory intended and point of impact.

An eyewitness who observed the aircraft en route said that it was approaching with an intermittent noise “as if the aircraft was about to stop”. The witness reported that on two occasions there was a perception that the engine had stopped functioning.

Shortly later, the aircraft rolled to the left, entered a steep descending trajectory (almost vertical) and disappeared. Then, the witness heard the noise of the impact.

1.19 Additional information.

According to the RBAC (Brazilian Civil Aviation Regulation) 61 – Amendment 01, Resolution 276, dated 18 June 2013, published in the Federal Government Gazette of 21 June 2013, Section 1, page 21:

61.3 Conditions for the utilization of licenses, certificates, qualifications and authorizations

(a) Pilot's license/certificate and qualifications: a person is allowed to fly as pilot in command or second in command aboard civil aircraft registered in Brazil, only if this person is holder and is carrying a pilot's license/certificate with valid qualifications, issued in accordance with this Regulation, and appropriate to the aircraft operated, the operation conducted, and function performed on board.

According to the RBHA (Brazilian Aeronautical Homologation Regulation) 91.7, in force at the time of the occurrence:

91.7 – Airworthiness of Civil Aircraft

(a) No person is allowed to operate a civil aircraft, unless the aircraft is in airworthy conditions.

(b) The pilot in command is responsible for verifying the condition of the aircraft in terms of flight safety, and shall discontinue the flight whenever there are maintenance or structural problems degrading the airworthiness of the aircraft.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

Among the facts intervening in this accident, it is possible to identify inobservance of the aeronautical regulations in force.

Systemically, the aeronautical regulation functions as an important defense mechanism, aiming at preventing the trajectory of accident opportunity capable of leading to the accident.

In this occurrence, the aircraft was observed by a witness exactly when the engine noise seemed to become intermittent until stopping. This piece of information, indicating a possible engine failure, was reinforced by the arrangement of the parts and components of the aircraft in the crash site.

The damage sustained by the propeller blades (see item 1.12 of this report) indicated that at the moment of impact the engine was delivering little or no power at all.

Due to the rupture sustained by the wings and fuel lines after the impact with the ground, and which resulted in fuel leak, the investigation commission was not able to verify the quantity of fuel remaining in the aircraft.

In relation to the maintenance of the aircraft and, especially, of the engine, there were reports of possible interventions made in the system for correction of the air-fuel mixture by a mechanic whose technical qualification certificate was no longer valid

The mechanic, however, denied having done any maintenance services to the aircraft, emphasizing that there were no formal records attesting the provision of such maintenance.

Although it was not possible for the investigation commission to confirm that this intervention in the system for correction of the air-fuel mixture really took place, it was not possible, either, to rule out the hypothesis that the intervention had started, but had to be discontinued on account of a passenger that was eager to take off soon.

After taking off, the aircraft circled the aerodrome five times. Such procedure was not to be expected on account of the “haste” factor mentioned earlier. These maneuvers, although not being a confirmation, reinforce the hypothesis that the functioning of one of the aircraft systems was being checked by the pilot.

On account of the inexistence of formal records on the aircraft maintenance since 18 July 2013 (date of the last annual maintenance inspection), it was not possible for the investigation commission to confirm the provision of services aimed at adjusting the engine.

Meanwhile, the operation of the engine, without control of the hours, in disagreement with the manufacturer’s maintenance program, may have had as an expected result a possible failure.

Compliance with the RBHA 91.7 would have prevented the flight from taking place (and, consequently, the occurrence of the accident), since the failure to do the annual maintenance inspection on 18 July 2013 led to suspension of the aircraft airworthiness certificate.

If the engine of a single-engine aircraft fails in flight, it is possible for the aircraft to maintain a glide path leading to a forced landing in an area of less probability of damage.

According to a witness, when the noise of the engine ceased, the aircraft rolled to the left, entering a steep (almost vertical) descending trajectory.

It is possible that the pilot did not handle the aircraft flight controls adequately for keeping the aircraft gliding until a forced landing, instead of allowing it to stall.

This probable inadequacy in the handling of the flight controls by the pilot may have been the result of lack of training, which in turn may have raised his level of anxiety in face of the adverse situation.

Emergency situations tend to create in the pilot a more intense emotional response. If such situations are associated with lack of training, the management of the response becomes even more difficult. Thus, one’s level of anxiety may grow in a way that is capable of leading one to slow cognitive and psychomotor reactions (or even of blocking these reactions) during the abnormal condition.

The analysis of the wreckage showed significant damage to the nose of the aircraft, which was not consistent with an attempted forced landing, but, on the contrary, resulting from a non-controlled flight trajectory.

It is worth pointing out that the pilot did not do the operational re-exam prescribed by the ANAC, an activity that would have led the pilot to updating his technical and operational knowledge. This fact resulted in impediment of a deeper analysis of the pilot’s operational capability. Nevertheless, it is possible to affirm that he was not qualified to fly the aircraft, according to the prescriptions of the RBAC 61.3.

The pilot’s decision to operate in disagreement with criteria established in the legislation reflected a sequence of inadequate judgments, associated to his willing to run the risk of flying the aircraft with an invalid technical qualification certificate, and utilizing an aircraft whose airworthiness validity had been suspended.

Such decision had the potential of strengthening a set of complacent attitudes on the part of the pilot by simultaneously operating that aircraft outside the minimum safety parameters and disobeying the regulations in force.

Besides, the lack of currency affecting the airframe, engine, propeller, and aircraft logbooks indicated the presence of failures in the process of filing and monitoring pieces of information that were essential for keeping the aircraft airworthy.

The control of these pieces of information must be part of a continuous process. It is an important feedback mechanism for the operator, by signaling possible operational and maintenance dysfunctions, and allowing corrective actions, according to either the need or legislation in force.

In this sense, the lack of monitoring may have favored loss of control of the deadlines for the provision of prescribed maintenance services and revalidation of the airworthiness certificate.

In the causal sequence of human error, there may be both active failures and latent conditions. An accident occurs when all the failures align, creating a “trajectory of accident opportunity”. In the case in question, compliance with the RBHA 91.7 and RBAC 61.3 by the operator would have functioned as an important defense against the occurrence of the accident.

3. CONCLUSIONS.

3.1 Facts.

- a) The pilot had a valid aeronautical medical certificate (CMA);
- b) The validity of the pilot's Airplane, single engine, land (ASEL) certificate had expired in January 2014;
- c) The pilot held a private pilot license (airplane category), but it was not possible for the commission to determine whether he had enough experience for the flight, due to lack of available records concerning his flight hours;
- d) The aircraft airworthiness certificate had been suspended on 18 July 2013 due to lack of Annual Maintenance Inspection;
- e) The records of the airframe, engine, and propeller logbooks were out-of-date;
- f) The operation of the aircraft was in disagreement with the RBHA 91.7 – Airworthiness of Civil Aircraft;
- g) The operation of the aircraft was in disagreement with the RBAC 61.3 – Requirements for the utilization of licenses, certificates, qualifications, and authorizations;
- h) The aircraft took off from Dona Iracema aerodrome (SJQZ), destined for Sítio Flyer aerodrome (SDNB), located at a distance of 30 nautical miles
- i) While en-route between SJQZ and SDNB, the aircraft crashed into the ground at the coordinates 10°22'38"S / 048°16'00"W;
- j) It was not possible for the investigation commission to verify the quantity of fuel remaining in the aircraft;
- k) According to witness, a few days before the accident, the pilot flew the PT-OMX aircraft on a flight of approximately 15 minutes, carrying a friend on board. This person later reported that on the occasion an in-flight engine failure had occurred;
- l) The aircraft logbook did not have any records concerning any failures in the engine operation;
- m) The aircraft sustained substantial damage;and
- n) The pilot and the two passengers perished in the crash.

3.2 Contributing factors.

- **Attitude – a contributor.**

The pilot's willingness to run the risk of operating an un-airworthy aircraft, in addition to holding an expired technical qualification certificate, reflected a set of complacent attitudes towards flying without respecting the regulations in force.

- **Handling of aircraft flight controls – undetermined.**

After the supposed engine failure, there was, in fact, loss of control in flight. It is possible that the pilot did not handle the controls appropriately for maintaining the aircraft gliding up to the forced landing.

- **Emotional state – undetermined.**

It is possible that the pilot, in view of the emergency situation, may have experienced an intense emotional stress, which was probably aggravated by his lack of training, leading him to the emission of slow (or even blocked) cognitive and psychomotor reactions during the emergency.

- **Training – undetermined.**

The pilot's failure to do the ANAC-required operational re-exam may have compromised his updating of technical and operational knowledge, which could have assisted him in the analysis and management of the abnormal flight condition.

- **Flight indiscipline – a contributor.**

In the accident flight, the pilot was supposed to not fly the aircraft because the validity of his technical qualification certificate had expired (RBAC 61.3).

Besides, the aircraft was not fit for flight because its airworthiness certificate had been suspended since 18 July 2013 for having failed to undergo the Annual Maintenance Inspection (RBHA 91.7).

Therefore, a causal connection may be established between the violations of the aeronautical regulation and the accident.

- **Aircraft maintenance – undetermined.**

The aircraft was being operated without control of the hours flown and disregard of the maintenance program. Information provided by witnesses and evidence from the wreckage were indication of a possible failure of the engine in flight.

- **Decision-making process – a contributor.**

The pilot, who was owner and operator of the aircraft, decided to operate it not respecting the criteria established in the regulations and without considering the minimum safety requirements.

- **Interpersonal relationship – undetermined.**

It was not possible for the investigation commission to rule out the hypothesis that the pilot could have been pressed to take off by one of the passengers, to the point of discontinuing an important action of aircraft maintenance, necessary for the conduction of the flight.

4. SAFETY RECOMMENDATION.

A measure of preventative/corrective nature issued by a SIPAER Investigation Authority or by a SIPAER-Link within respective area of jurisdiction, aimed at eliminating or mitigating the risk brought about by either a latent condition or an active failure. It results from the investigation of an aeronautical occurrence or from a preventative action, and shall never be used for purposes of blame presumption or apportion of civil, criminal, or administrative liability.

In consonance with the Law n°7565/1986, recommendations are made solely for the benefit of the air activity operational safety, and shall be treated as established in the NSCA 3-13 “Protocols for the Investigation of Civil Aviation Aeronautical Occurrences conducted by the Brazilian State”.

None.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On November 11th 2016.