COMANDO DA AERONÁUTICA

CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE ACIDENTES AERONÁUTICOS

FINAL REPORT
A - 142/CENIPA/2018

OCCURRENCE:	**ACCIDENT**
AIRCRAFT:	**PT-OCB**
MODEL:	**F33A**
DATE:	**01SEPT2018**

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 Appendix 2, 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 01SEPT2018 accident with the F-33A aircraft model, registration PT-OCB. The accident was classified as “[OTHR] Other | Loss of Consciousness”.

When flying over the municipality of Taquaraçú de Minas - MG, the aircraft presented oscillations of heading and altitude, and started a descent without any communication with the control organs, colliding into the ground.

The aircraft was destroyed.

The pilot suffered fatal injuries.

An Accredited Representative of the National Transportation Safety Board (NTSB) - USA, (State where the aircraft and the engine were designed) was designated for participation in the investigation.

CONTENTS

GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
APP-BH	Belo Horizonte Approach Control
CA	Airworthiness Certificate
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
DAC	Coronary Artery Disease
DCTA	Department of Science and Airspace Technology
HAS	Systemic Arterial Hypertension
HDL	High Density Lipoprotein
IAM	Acute Myocardial Infarct
MNTE	Airplane Single Engine Land Rating
PPR	Private Pilot License – Airplane
SBPR	ICAO Location Designator - Carlos Prates Aerodrome - MG
SNLG	ICAO Location Designator – Serra do Cipó Aerodrome, Jaboticaba – MG
SN	Serial Number
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	**Model:** F33A **Registration:** PT-OCB **Manufacturer:** Beech Aircraft	**Operator:** Private
Occurrence	**Date/time:** 01SEPT2018 – 1800 UTC **Location:** Rural Area of Taquaraçú de Minas **Lat.** 19°39'21" S **Long.** 043°38'31" W **Municipality – State:** Taquaraçú de Minas – MG	**Type(s):** [OTHR] Outros **Subtype(s):** Loss of Consciousness

1.1 History of the flight.

The aircraft took off from the Carlos Prates Aerodrome (SBPR) - MG, to the Serra do Cipó Aerodrome (SNLG) - MG, at about 1745 (UTC), in order to perform a transfer, with a pilot on board.

With about 15 minutes of flight, the aircraft presented oscillations of heading and altitude, and started descending, without communication with the control agencies, until it collided with the ground in a mountainous area, in the municipality of Taquaraçú de Minas - MG.

The aircraft was destroyed.

The pilot suffered fatal injuries.

1.2 Injuries to persons.

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

1.3 Damage to the aircraft.

The aircraft was destroyed.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Flight Hours	Pilot
Total	1.300:00
Total in the last 30 days	05:00
Total in the last 24 hours	00:15
In this type of aircraft	50:00
In this type in the last 30 days	00:15
In this type in the last 24 hours	00:15

N.B.: The data related to the flown hours were obtained through the CIV's records and by information from third parties.

1.5.2 Personnel training.

The pilot took the PPR course at the Starflight Aviation School LTD. - MG, in 2001.

1.5.3 Category of licenses and validity of certificates.

The pilot had the PPR course and valid MNTE Rating.

1.5.4 Qualification and flight experience.

The pilot was qualified and had experience in the kind of flight.

1.5.5 Validity of medical certificate.

The pilot had valid CMA.

1.6 Aircraft information.

The aircraft, serial number CE-1491, was manufactured by Beech Aircraft, in 1990, and was registered in the TPP category.

The aircraft had valid CA.

The airframe, engine and propeller logbook records were updated.

The last inspection of the aircraft, the “100 hours/IAM” type was carried out on 07MAR2018 by the maintenance organization *Marília de Aviação* LTD. (OMA), Marília - SP, with the aircraft having flown 22 hours and 25 minutes after the inspection.

The aircraft maintenance program considered the “100 hour” type inspection to be the largest planned inspection, due to the lack of a general overhaul.

On the day of the accident, the aircraft logbook recorded a total of 2,955 flight hours.

1.7 Meteorological information.

The weather conditions were favorable for the visual flight.

The locality weather reports (METAR), from 01SEPT2018, of 1700 (UTC) and 1800 (UTC), from the locations of Carlos Prates (SBPR) and Lagoa Santa (SBLS), respectively 19 NM and 13 NM away from the occurrence site, brought the following information:

SBPR METAR 011700Z 06007KT 9999 FEW025 30/11 Q1018=

SBPR METAR COR 011800Z 05004KT 9999 SCT030 30/10 Q1018=

SBLS METAR 011700Z 09006KT 020V170 9999 FEW035 29/10 Q1018=

SBLS METAR 011800Z 15008KT 090V200 9999 FEW040 28/09 Q1018=

1.8 Aids to navigation.

Nil.

1.9 Communications.

According to the transcripts of the radio communication audios between PT-OCB and the control agencies, it was found that the crewmember kept contact with the Belo Horizonte Approach Control (APP-BH) and there was no technical abnormality of the radio equipment communication during the take-off, climb and, leveling of the aircraft.

At 17h53min12s (UTC), the PT-OCB made the last contact with the APP-BH and informed: “after Taquaraçú direct destination.”

At 17h59min29s (UTC), the PT-OCB information disappeared from the radar screen.

At 17h59min39s (UTC), the APP-BH initiated a sequence of three attempts to contact the PT-OCB aircraft, but had no response.

Then, the APP-BH requested that two other aircraft (PR-HGE and PR-BOI), which were close to the last position verified on the radar, to make an attempt to contact PT-OCB, but these were also unsuccessful.

1.10 Aerodrome information.

The occurrence took place out of the Aerodrome.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

The impact occurred near the top of a mountain, located in a rural area, in the municipality of Taquaraçú de Minas - MG.

The distribution of the wreckage was of the concentrated type.

The collision was observed by residents of the region.

The first and only impact occurred in a pitch up attitude with a high angle (approximately 90° to the ground surface) and great speed, which caused the engine to enter hard ground (about 1.5 meters deep).

Due to the high energy of the impact, the entire structure was twisted. The wings and flight controls detached from the aircraft and were in a position posterior to the final position of the cabin and fuselage. The retractable landing gear has also come off its larger set.

The compensators for the elevators were symmetrical and positioned in neutral.

All surfaces of the aircraft's primary and secondary controls were found at the crash site (Figure 1).

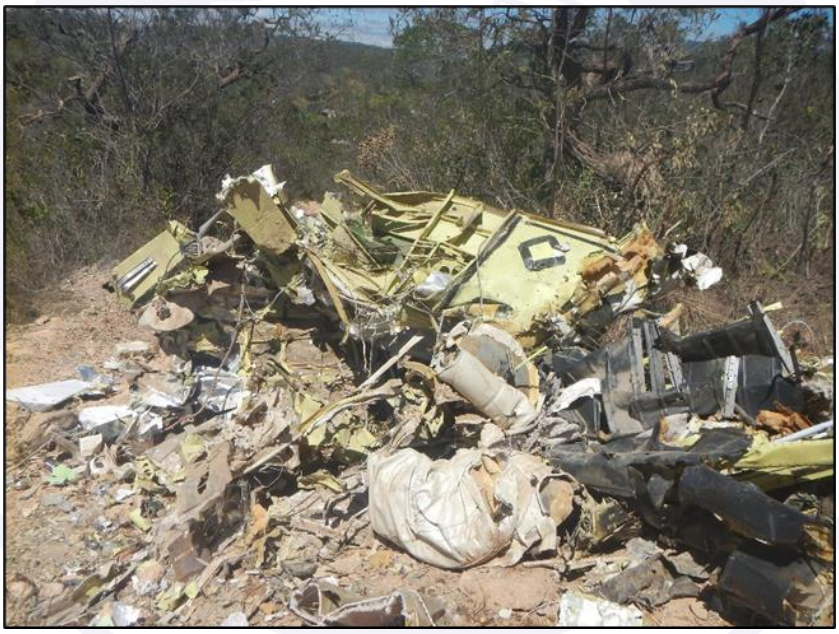

Figure 1: Aircraft wreckage concentrated at the accident site.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

According to the records of the ANAC, the pilot had carried out his last health inspection on 21MAR2018, with an accredited doctor, when he obtained a favorable opinion. The records of this last inspection included a diagnosis of HAS and Dyslipidemia, as well as a history of previous surgery for Herniated Disc.

In addition, according to reports from family members, the pilot regularly used antihypertensive medication and control of Blood Pressure and Cholesterol, although he had low High-Density Lipoprotein (HDL - good cholesterol), which was a risk factor for DAC.

According to cardiac risk stratifications for coronary ischemic event (64 years old, 1.81m tall and 85kg), the pilot was in the high-risk range for Acute Myocardial Infarct (IAM), because, despite the adequate treatment for HAS and Dyslipidemia, performed “Myocardial Perfusion Tomographic Scintigraphy” on 31JAN2018, when moderate DAC with a Calcium Score of 594 was evidenced, which corresponded to a risk of IAM 7.2 times greater than that of the general population.

The fact that the pilot is male, over 60 years old, and has the diagnosis of HAS and Dyslipidemia, only corroborates the conclusion of the image exam.

There were no references to any symptoms on the day of the accident or the use of medication other than antihypertensive or behavioral changes.

According to the data obtained, the pilot had no digestive, genitourinary or psyche complaints before the accident or in other days.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

According to reports by people who had already flown with the pilot and by employees of the Aeroclub, the pilot rigorously carried out the checks provided and assessed the condition of the aircraft before each flight. Furthermore, he did not use to enter instrument flight conditions, thus respecting the fact that he was not qualified for this type of operation.

The pilot used to fly without the use of an autopilot, in order to exercise his piloting skills and technique. In addition, he used to train the emergency procedures, in a simulated way, with another pilot on board.

In the month prior to the occurrence, he had undergone a psychological assessment to obtain a gun license. The report issued did not identify elements that indicated any psychological problem.

The pilot was going through a good family and professional time. On the day of the accident, he was moving to the hangar he built in Serra do Cipó.

In addition to owning the plane involved in the accident, in partnership with other people, he also owned an experimental aircraft, RV-10 model, which he used for leisure activities, not for profit.

According to reports, the pilot had a good interpersonal relationship with family and friends. As for the partners, he maintained a relationship without problems regarding the use of the aircraft.

The contact between them, usually took place through an instant messaging application, basically to check the availability of the aircraft. According to reports, there was no kind of animosity between the partners.

In the morning of the accident, the pilot taught classes at the Aeroclub on Flight Physiology.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

Nil.

1.16 Tests and research.

The continental engine, model IO-520-BB, Serial Number (SN) 578640, was analyzed by the DCTA, in order to verify the operating conditions at the moment of impact.

The characteristics of the damage to the engine and the propeller blades were torsions and ruptures by overload. The conclusions of the analysis showed that the engine had evidence that it was operational and that it was developing power at the time of the accident. In addition, the propeller blades showed deformations and breaks characteristic of an engine that developed power at the moment of the impact against the ground, corroborating the conclusions of the analysis of the aircraft engine (Figure 2).

The terminals of the control surfaces were also analyzed and there were no signs of malfunction or possible breakage of these components in flight.

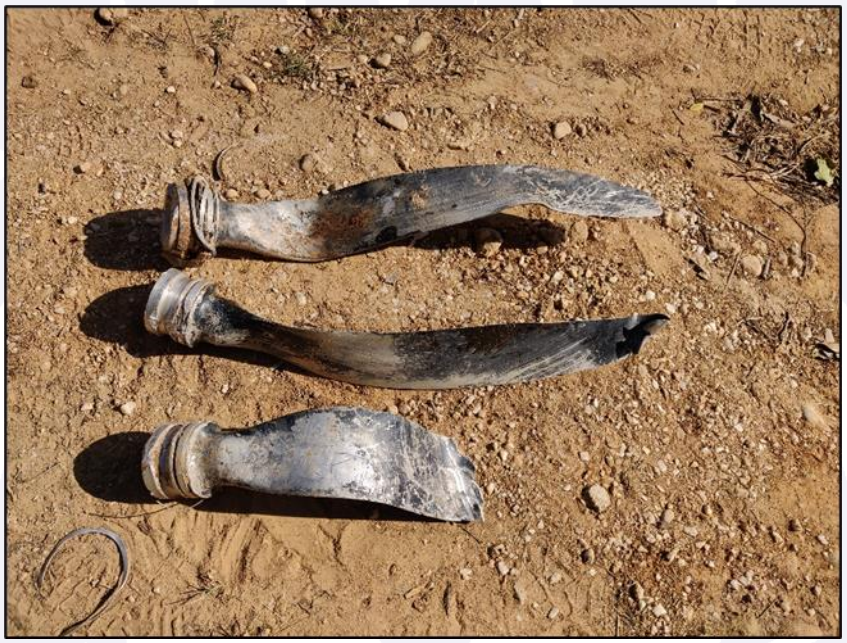

Figure 2 - Propeller blades with torsions and ruptures typical of power impact.

1.17 Organizational and management information.

The pilot was the owner of the aircraft along with two other partners. All were responsible for managing issues related to the aircraft. Thus, there was a collaborative supervision between the partners in its operation and maintenance, since the information about the aircraft and the costs were shared among the owners.

All records of maintenance, fuel and use of the PT-OCB were in order, demonstrating the involvement of the owners in the management of activities related to the use of the aircraft.

1.18 Operational information.

The aircraft was within the weight and balance limits specified by the manufacturer and the total flight duration would be approximately 30 minutes.

According to the statements collected, the aircraft spent the night with full fuel tanks, which would allow the flight between SBPR and SNLG with an adequate safety margin, in terms of autonomy.

During the Field Investigation at the scene, the investigators found that the impact of the aircraft on the ground caused a significant amount of fuel to spill from the tanks on the ground, evidencing the presence of fuel on the aircraft.

Information was collected from the aircraft's flight plan, images from the APP-BH radar plot of the day of the occurrence and the transcript of the communications made between the pilot and the control agencies.

The aircraft's flight plan had, as a proposed route, entry into the visual corridors ROMEU, GOLF, FOXTROT, DELTA and VICTOR, from the visual corridors chart at the BH terminal to the TAQUARAÇU position, following a direct route from that position until the destiny.

The speed to be used on this route, after leveling, would be 150kt, maintaining flight level FL045.

According to the communications transcript, the aircraft was allowed, after takeoff, to fly directly to the TAQUARAÇU position, climb to FL050 and proceed straight to the destination after that position.

Based on the RADAR images and the aircraft's communication with the control agencies, the pilot followed all the instructions transmitted until he was close to the TAQUARAÇU position.

After that last position, there was a change in the piloting pattern, with variations in the heading outside the desired flight profile and, also, variations in the altitude and speed of the aircraft, without any answers from the pilot to the questions of the control agencies.

In TAQUARAÇU, the aircraft should have started a left turn in order to proceed towards the destination, however it was observed that the pilot maintained the heading for about 3NM before starting a slow left turn, with altitude gain and speed reduction. Then, the aircraft took a right turn, in a heading that diverged from the ideal course to the destination, for no apparent reason.

By reconstituting the flight path, it was observed that, from that moment on, while the aircraft maintained a right turn, there was a substantial increase in speed and a constant loss of altitude, until the loss of RADAR contact, when the aircraft crossed the FL039 descending, without communication with the control agencies, until it collides with the ground in a mountainous area in the municipality of Taquaraçú de Minas - MG.

1.19 Additional information.

Nil.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

It was a flight to carry out an activity of private interest with a pilot on board, with an approximate duration of 30 minutes.

The aircraft was within the weight and balance limits specified by the manufacturer and the weather conditions were favorable for the flight.

As the aircraft spent the night with full fuel tanks, it is possible to say that the amount of fuel in the tanks was adequate in terms of autonomy. The fact that the investigators noticed a large spill of fuel on the ground after the impact of the aircraft into terrain corroborates this statement.

According to data from the flight plan, the aircraft would enter the visual corridors ROMEU, GOLF, FOXTROT, DELTA and VICTOR, from the visual corridors chart of the BH terminal until the TAQUARAÇU position, following a direct route from that position to the destination. The route speed would be 150kt, maintaining the FL045. However, after the

takeoff, the aircraft was allowed to climb to FL050 and proceed straight to the TAQUARAÇU position, from where it would proceed to the destination after that position.

Based on the RADAR images, it was possible to identify that, after this position, the aircraft started to fly erratically, making turns to the left, with altitude gain and speed reduction, and to the right, with speed increase and height loss, not responding to calls from the APP-BH. Following the recorded events, the aircraft continued on a downward trajectory, captured until the loss of the RADAR contact occurred in FL039.

The technical analyzes made at the aircraft wreck site and those carried out by the DCTA on the installed engine ruled out previous technical problems that could have made it uncontrollable.

Thus, considering that there was no communication from the pilot informing any problem with the PT-OCB and, also, the pilot's medical history, which pointed out records of HAS, Dyslipidemia, regular use of antihypertensive medication and adequate control of Blood Pressure and Cholesterol, and also that he was in the high-risk range for acute myocardial infarct, the Investigation Team considered, as the most likely hypothesis to explain the dynamics of the accident, the pilot's loss of consciousness or sudden illness.

3. CONCLUSIONS.

3.1 Facts.

a) the pilot had valid CMA;

b) the pilots had valid MNTE Rating;

c) the pilot was qualified and had experience in the kind of flight;

d) the aircraft had valid CA;

e) the aircraft was within the weight and balance limits;

f) the airframe, engine and propeller logbook records were updated;

g) the weather conditions were favorable for the flight;

h) the aircraft followed all instructions transmitted by the control agencies until it was close to the TAQUARAÇU position;

i) after TAQUARAÇU, there was a change in the piloting pattern, with variations in the heading, altitude and speed of the aircraft;

j) the pilot did not answer any questions from the control agencies after TAQUARAÇU;

k) after TAQUARAÇU, the aircraft made turns to the left, with altitude gain and speed reduction, and to the right with speed increase and altitude loss;

l) after TAQUARAÇU, the aircraft started a downward trajectory, until the loss of RADAR contact;

m) the conclusions of the analysis showed that the engine had evidence that it was operational and that it was developing power at the time of the accident;

n) the propeller blades had deformations and ruptures, characteristic of an engine that developed power at the moment of the impact against the ground;

o) at the last health inspection, the pilot obtained a favorable opinion, but with records of HAS, dyslipidemia and previous surgery for herniated discs;

p) the pilot used regular antihypertensive medication and adequate control of blood pressure and cholesterol, which is a risk factor for DAC;

q) the pilot was in the high-risk range for Acute Myocardial Infarction (IAM);

r) the aircraft was destroyed; and

s) the pilot suffered fatal injuries.

3.2 Contributing factors.

- **Unconsciousness – undetermined.**

It is likely that the pilot was affected by an IAM during the flight, considering the medical history, which placed him in a high-risk condition for this type of illness.

This hypothesis is reinforced by the fact that, before the impact, there was a change in the piloting pattern identified in the radar images, with variations of the heading, altitude and speed, outside the desired profile and without any answers to the questions of the control agencies.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation, made with the intention of preventing accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident. In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from diverse sources, including safety studies.

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".

Recommendations issued at the publication of this report:

Nil.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On July 8th, 2021.