

COMMAND OF AERONAUTICS
AERONAUTICAL ACCIDENT INVESTIGATION AND
PREVENTION CENTER



FINAL REPORT
A - 044/CENIPA/2014

<u>OCCURRENCE:</u>	ACCIDENT
<u>AIRCRAFT:</u>	PR-GFD
<u>MODEL:</u>	C-172N
<u>DATE:</u>	09 SEPT 2012



NOTICE

According to the Law n° 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 n° 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.

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SYNOPSIS

This is the Final Report of the 09 September 2012 accident with the C-172N aircraft, registration PR-GFD. The accident was classified as Loss of control in flight.

After taking off for a scenic flight, the aircraft turned left and ended up crashing into the ground.

The pilot and passengers were killed in the crash.

The aircraft was completely destroyed.

An Accredited Representative of the National Transportation Safety Board of the USA was appointed for participation in the investigation.

GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	National Civil Aviation Agency
CG	Center of Gravity
CHT	Technical Qualification Certificate
CIV	Pilot's Logbook
CMA	Aeronautical Medical Certificate
DA	Airworthiness Directive
FAA	Federal Aviation Administration
FIAM	Annual Maintenance Inspection Sheet
GPH	Gallons per Hour – unit of consumption
IAM	Annual Maintenance Inspection
Lat	Latitude
Long	Longitude
MPR	Manual of Procedures
NTSB	National Transportation Safety Board
PLA	Airline Transport Pilot
RFB	Brazil's Internal Revenue Service
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
SJER	ICAO Location Designator - <i>Fazenda Canadá, Acreúna, State of Goiás</i>
TEAT	Term of Entry and Temporary Admission
UTC	Coordinated Universal Time
VTI	Initial Technical Inspection

AIRCRAFT	Model: CESSNA - 172N Registration: PR-GFD Manufacturer: <i>Cessna Aircraft</i>	Operator: Private
OCCURRENCE	Date/time: 09 SEPT 2012 / 20:00 UTC Location: Close to the runway Lat. 17°25'38"S – Long. 050°21'12"W Municipality – State: Acreúna - Goiás	Type: Loss of control in flight

1 FACTUAL INFORMATION

1.1 History of the occurrence

The aircraft took off from a landing strip (neither registered nor homologated by the Civil Aviation authority) located at a distance of approximately 4Km from the town of Acreúna, State of Goiás, with the pilot and three passengers on board, with the purpose of making a scenic flight.

After taking off, the aircraft made a left turn, lost altitude, and collided with the ground.

1.2 Injuries to persons

Injuries	Crew	Passengers	Third parties
Fatal	01	03	-
Serious	-	-	-
Minor	-	-	-
Uninjured	-	-	-

1.3 Damage to the aircraft

The aircraft was completely destroyed.

1.4 Other damage

None.

1.5 Personnel information

1.5.1 Information on the crew

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

NB.: The pilot's logbook was not found. The attempt to obtain such information from the Brazilian Civil Aviation Authority and from the National Transportation Safety Board has proved unfruitful.

1.5.1.1 Professional formation

It was not possible to obtain information on the aviation school attended by the pilot, despite consultation made to the Brazilian Civil Aviation Authority and to the National Transportation Safety Board (USA).

1.5.1.2 Validity and category of licenses and certificates

The pilot did not have licenses or technical qualification certificates issued in Brazil. He only had an Airline Transport Pilot license issued in the USA by the Federal Aviation Administration (FAA).

1.5.1.3 Qualification and flight experience

The pilot had qualification granted by the FAA for the type of aircraft, but in the archives of the ANAC (Brazil's National Civil Aviation Agency), there were no records relative to any technical qualification certificates or licenses bestowed to him.

1.5.1.4 Validity of the medical certificate

The pilot had a valid aeronautical medical certificate.

1.6 Aircraft information

The aircraft (SN17272930) was manufactured by Cessna Aircraft in 1979.

The aircraft did not have an airworthiness certificate with validity in Brazil.

The airframe, engine and propeller logbooks had up-to-date records.

During the initial action, the investigators did not find any documents (such as aircraft, airframe, propeller, and engine logbooks, registration certificate or annual maintenance inspection sheet to corroborate the aircraft airworthiness status.

Seven months after the accident, the investigation commission had access to the airframe, engine, and propeller logbooks, whose records had been written by American companies. There were not any logbooks containing records entered in Brazil.

Before the ANAC, the aircraft had a 'status' of Reservation of Markings, and, up to the date of the accident, had not been subjected to the Initial Technical Inspection (VTI). The registration marks shown by the aircraft were N1009F.

The last aircraft inspection (Annual Maintenance Inspection) was made by the Gardner Aviation Services Inc. workshop in Massachusetts, USA, on 8 May 2012. According to informal records kept by the pilot, the aircraft flew approximately 147 hours and 10 minutes after the inspection.

The aircraft had an approximate total of 11,230 hours and 30 minutes since new relative to the airframe.

The aircraft had not been subjected to any inspection in Brazil, since the time of its arrival in the national territory.

The maintenance program of the manufacturer recommended inspections at every 100 hours of flight (item 2-46, "A", page 2-35 of the Service manual – Revision 2).

According to records kept by the pilot, there was an oil change (drain and replacement) on 19 July 2012, although no confirmation could be found in any official document.

According to the pilot's informal records, during the oil change the aircraft had approximately 803 flight hours, however, it was not possible to establish a correlation of those hours.

According to the Airworthiness Certificate issued by the USA the aircraft was included in the "Normal and Utility" category.

On 4 June 2012, the aircraft entered the Brazilian territory via SBBV, where it received the Term of Entry and Temporary Admission (TEAT) from the Brazilian Internal Revenue Service (RFB) no. 123/2012, valid up to 31 July 2012.

The issuance of the TEAT belongs to the competence of the RFB, and is regulated by the Decree 97464 of 20 January 1989.

On 25 July 2012, the validity of the TEAT was prorogated by the SBCF Customs' Office to 30 August 2012.

Between 1 and 3 September 2012, the validity of the flight authorization granted by the ANAC (AVANAC) expired. In this period, no movement of the aircraft was registered by the ANAC.

According to annotations made by the pilot, on 1 September 2012 the aircraft flew from Pontalina, State of Goiás, to a non-identified destination.

On 4 September 2012, the aircraft import was registered by the SBCF Customs' Office. As a result of this action, the aircraft AVANAC was prorogated up to 13 September 2012, allowing the aircraft to make a ferry flight to the venue of the Initial Technical Inspection (VTI).

The figure below clarifies, in a chronological order, the pieces of information aforementioned.

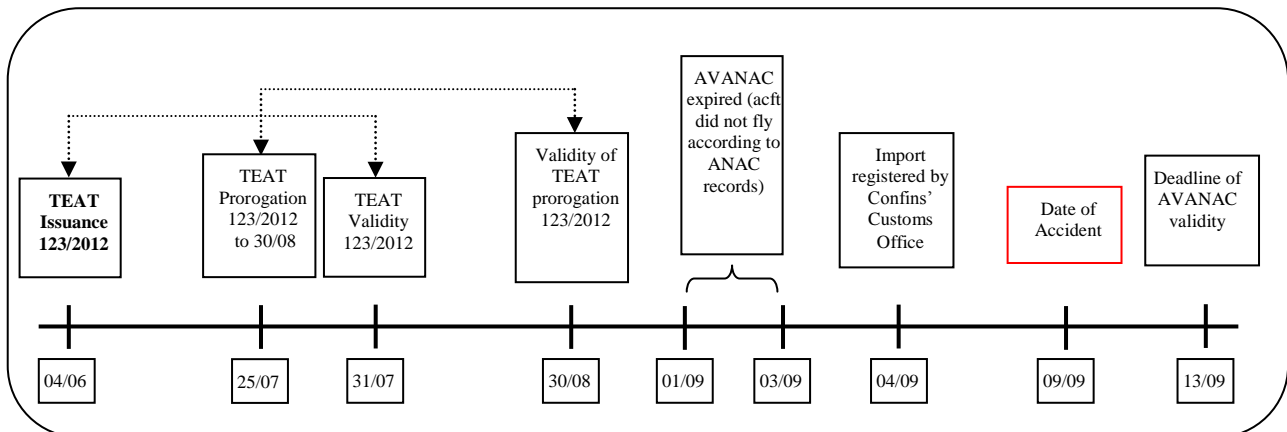


Figure 1- Summary of the authorizations granted by the competent organizations.

1.7 Meteorological information

The weather conditions were VMC.

1.8 Navigational aids

Nil.

1.9 Communications

Nil.

1.10 Aerodrome information

The accident occurred in a landing strip neither registered nor homologated by the Civil Aviation Authority.

The dirt landing strip had the following characteristics:

- Length and Width Dimensions: 950m x 10m;
- Threshold: 18 / 36;
- Altitude: 564m (1850ft); and
- Location: 12NM Southeast of Acreúna (17°25'22"S / 050°21'18"W).



Figure 2 – Characteristics of the landing strip.

1.11 Flight recorders

Neither required nor installed.

1.12 Wreckage and impact information

The aircraft collided with the ground at angle of approximately 80° in a pitch-down attitude with a slight inclination to the left.

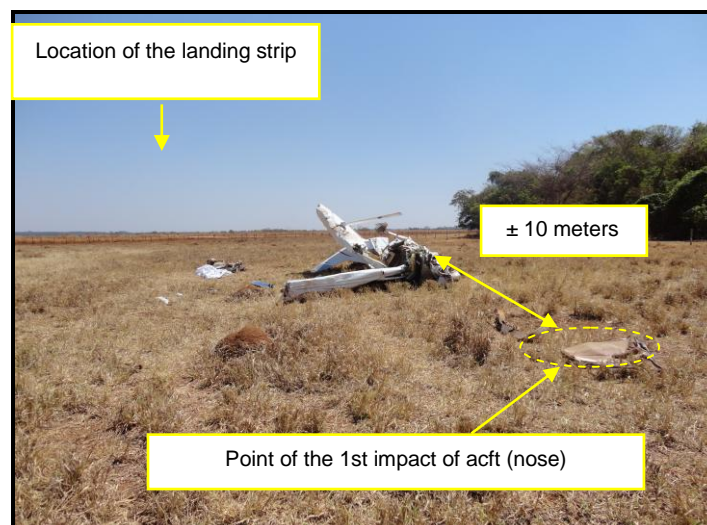


Figure 3 – Position of the aircraft after the accident.

After the impact, the aircraft stopped in an inverted position, at a distance of 10 meters from the point of the first impact (nose of the aircraft). The wreckage lay-out remained concentrated, with signs of significant damage.

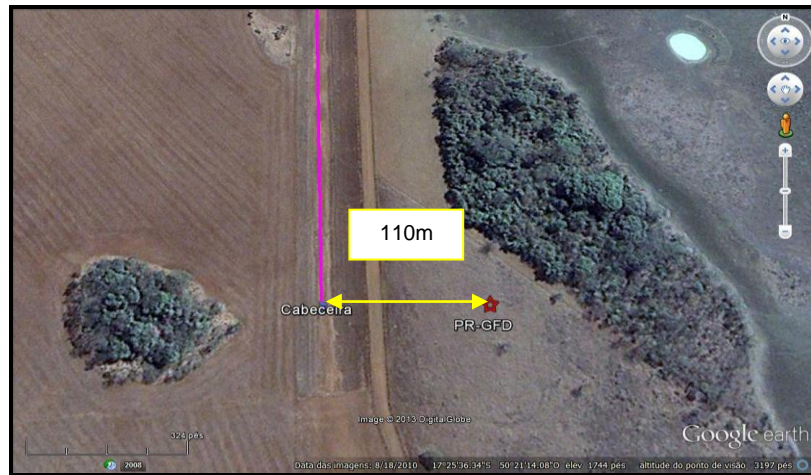


Figure 4 – Location of aircraft wreckage relative to landing strip.

1.13 Medical and pathological information

1.13.1 Medical aspects

Not investigated.

1.13.2 Ergonomic information

Nil.

1.13.3 Psychological aspects

Not investigated.

1.13.3.1 Individual information

Nil.

1.13.3.2 Psychosocial information

Nil.

1.13.3.3 Organizational information

Nil.

1.14 Fire

According to witnesses, there was an incipient post-impact fire, which was put out by means of automobile fire-extinguishers.

1.15 Survival aspects

Nil.

1.16 Tests and research

Nil.

1.17 Organizational and management information

Nil.

1.18 Operational aspects

On 4 June 2012, the aircraft entered the Brazilian territory via SBBV.

According to annotations made by the pilot, and found during the go-team initial action, the aircraft had flown from Pontalina, State of Goiás, to an unidentified destination on 1 September 2012

On 8 September 2012, the aircraft departed from Pontalina, destined for Acreúna, passing the overnight on *Fazenda Canadá* (SJER), where it was refueled with 70 liters of AVGAS. It was not possible to determine the total quantity of fuel in the aircraft after this refueling.

On 9 September 2012, the aircraft departed from SJER in the morning with the pilot and two passengers, destined for the accident, at a distance of approximately seven nautical miles.

On the day of the accident, the pilot was operating a few scenic flights from an unapproved non-registered landing strip. In those average 15 minute-flights, it would carry two to three passengers.

According to witnesses, before the accident flight, the pilot had already made some fifteen flights. Thus, the aircraft had flown 3 hours and 45 minutes up to the moment of the accident, without counting the positioning flight from the location of the last refueling to the location from where the scenic flights were to depart.

It was not possible to determine the quantity of fuel remaining in the aircraft tanks after the accident, since it had leaked after the impact of the aircraft with the ground.

Weight and balance information was an estimate, since the commission did not have access to the Weight and Balance Sheet.

So, the estimate calculation indicated the following pieces of information relative to the moment of the accident:

Basic aircraft weight	631kg
Pilot's weight	75kg
Front seat passenger weight	55kg
Right back seat passenger weight	50kg
Left back seat passenger weight	50kg
Fuel	undetermined
TOTAL	861kg + Fuel

Figure 5 – Table showing the calculation of the estimate aircraft weight.

In the aircraft manual (Section 1, Page 1-5), the maximum certified takeoff weight in the normal category is 2,300lb (1,043Kg).

According to estimated balance calculations, the aircraft center of gravity was approximately 41.8 inches behind the aircraft line of reference (firewall).

According to the aircraft manual (Section 6, Figure 6-8, page 6-12), the Center of Gravity varies with the aircraft weight and category, as can be seen in the graph below (the red dotted-line refers to the estimate calculations that were made):

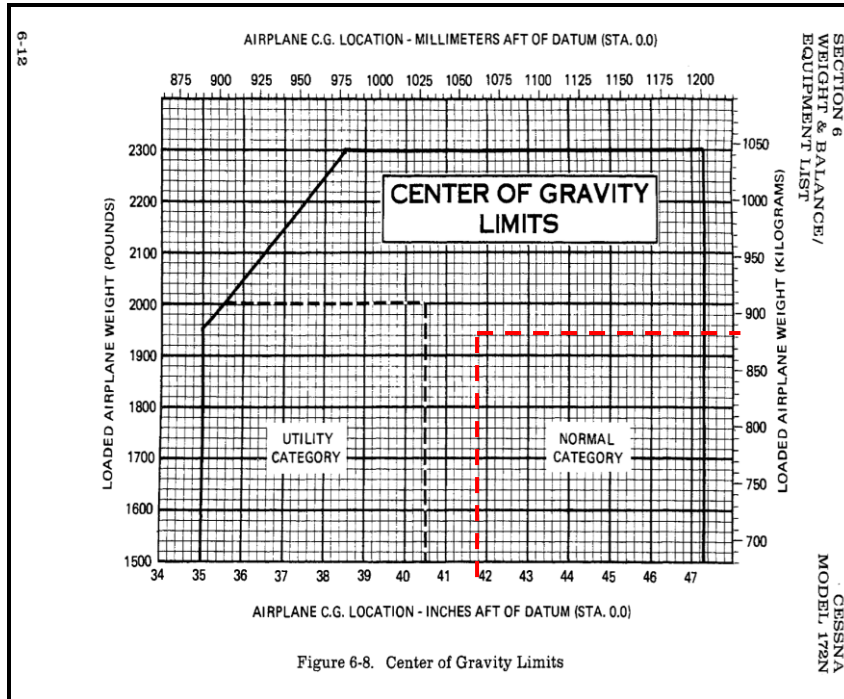


Figure 6-8. Center of Gravity Limits

Figure 6 – Graph of the Center of Gravity limits.

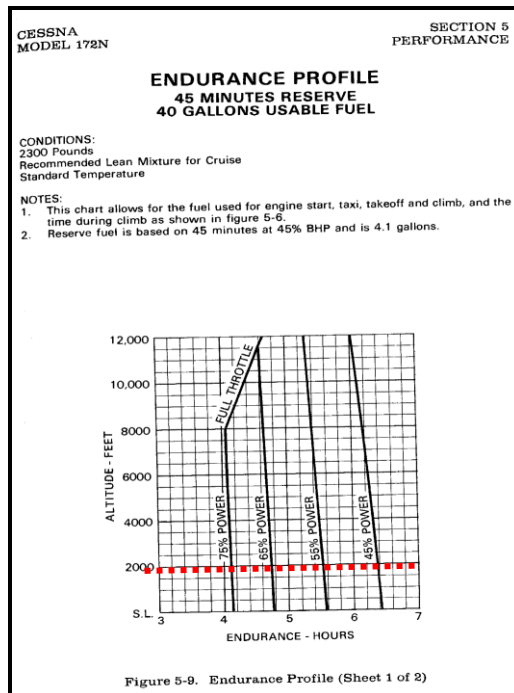


Figure 5-9. Endurance Profile (Sheet 1 of 2)

Figure 7 – Graph of the aircraft endurance.

The red dotted-line indicates the airfield altitude considered on the day of the accident.

According to pilot's annotations, the longest flight leg lasted 4 hours and 20 minutes, from Boa Vista, State of Roraima, to Manaus, State of Amazonas.

According to witnesses, the aircraft took off in the direction of threshold 18, made a left turn, lost altitude and collided with the ground.

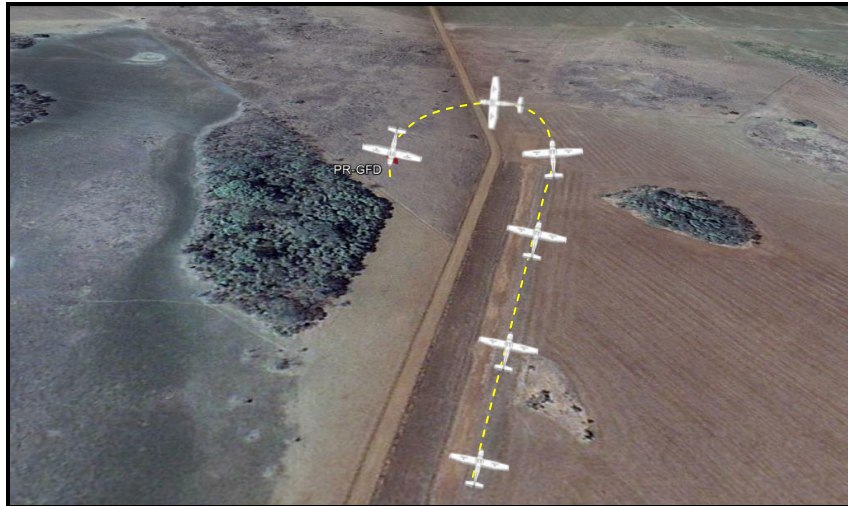


Figure 8 – Slant view of the takeoff profile.

1.19 Additional information

The Manual of Procedures – Airworthiness Certification (MPR-100/SAR – Revision 6) of the ANAC established in its item 4.3.1 (b) and 5.4 (b) the obligatoriness of the Initial Technical Inspection (VTI) when the aircraft is imported.

The aircraft export certificate (nº 3A12 E-274 P-910) issued by the FAA on 11 May 2012 made it clear that, in spite the fact that the aircraft was airworthy under the American rules, this was not an authorization for operation, as described below:

Export Certificate of Airworthiness

This certifies that the product identified below and particularly described in Specification(s)¹ of the Federal Aviation Administration, Numbered 3A12 E-274 P-910 has been examined as of the date of this certificate, is considered airworthy in accordance with a comprehensive and detailed airworthiness code of the United States Government, and is in compliance with those special requirements of the importing country filed with the United States Government, except as noted below. The certificate in no way attests to compliance with any agreements or contracts between the vendor and purchaser, nor does it constitute authority to operate an aircraft.

In accordance with the RBHA 91.203 (Amendment 91.10 of 30 December 2004) (e) “no person is allowed to operate a civil aircraft, unless the airworthiness certificate, the flight authorization certificates or experimental flight certificate, the certificate of airworthiness for aircraft with provisional homologation certificate or the certificate of airworthiness of newly-manufactured aircraft, mentioned respectively in the paragraphs (a), (b), (c), and (d) of this Section, as applicable, are valid and exhibited in location accessible to the crew.”

Moreover, the person primarily responsible for the preservation of the aircraft in an airworthy condition is the owner of operator, according to the RBHA 91, item 91.403 (a).

The RBHA 91.409 deals with inspections. Its letter (b) reads:

“(b) Except as prescribed in the paragraph (c) of this section, no person is allowed to operate an aircraft transporting any passengers (except crewmembers) with purposes of profit, and no person may give paid-for flight training in an aircraft under his/her control, unless, within the 100 hours preceding the operation, the aircraft has undergone an annual

inspection or “100 hours” inspection, and has been approved for a return to service in accordance with the RBHA 43, or has been subjected to an inspection for the issuance of a certificate of airworthiness in accordance with the RBHA 21. The 100-hours’ limit may be exceeded by no more than 10 hours, in case it is necessary to reposition the aircraft in a Location where the inspection will be carried out. The excess time, however, will be included in the next 100 hours of service time”.

Besides, the RBHA 91, item 91.7 – “Civil Aircraft Airworthiness”, reinforced the following:

“(a) No person is allowed to operate a civil aircraft, unless it has an airworthiness condition”.

“(b) The pilot in command of a civil aircraft is responsible for verifying the aircraft condition in regards to flight safety. He must discontinue the flight whenever maintenance or structural problems occur, degrading the airworthiness of the aircraft.”

1.20 Utilization of other investigation techniques

Nil.

2 ANALYSIS

The non-observance of airworthiness requirements established in regulations has the potential of jeopardizing the safe operation of an aircraft, as it can present problems (corrosion, leak of fluids, non-compliance with AD, etc.) likely to be detected in a technical inspection (VTI).

Thus, for an aircraft to be considered safe for operation within the national territory, it is fundamental that it be subjected to a VTI (technical inspection), as a way to guarantee compliance with all airworthiness requirements established by the ANAC in the Manual of Procedures – Aircraft Certification (MPR-100/SAR – Revision 6), item 4.3.1(b) and 5.2(b).

The maintenance program of the manufacturer recommended the aircraft to be inspected every 100 hours of flight (item 2-46, “A”, page 2-35 of the Service Manual – Revision 2).

It is estimated that, as for the day of the accident, the aircraft had exceeded the extension limit authorized by the manufacturer (10 hours) in approximately 37 hours and 10 minutes after the last inspection made in the USA (Annual Maintenance Inspection).

The precious calculations were result of estimation, based on the pilot’s informal annotations, due to the lack of an aircraft logbook with formal records, prescribed by the legislation of the Brazilian civil aviation authority.

The non-compliance with the maintenance program established and recommended by the manufacturer may give rise to failures in the various systems of the aircraft (electrical, fuel, hydraulic, engine, etc.) putting the operation to risk. Therefore, based on the RBHA 91.409. (b), the aircraft was not airworthy, i.e., it could not be flying due to lack of inspection.

The lack of national documents and records attesting the real situation of the aircraft (airframe, propeller and engine logbooks) corroborates the aircraft unworthy condition in Brazil, since there are not any inspection records after the Annual Maintenance Inspection.

According to the weight and balance data (estimated) the aircraft was within the limits established by the manufacturer.

According to the information collected, the weather was VMC.

By reviewing the aircraft endurance graph, it was verified that, for an altitude of 1,850ft (relative to the landing strip utilized), the aircraft endurance would be somewhat between 4 hours 10 minutes (75% thrust) and 6 hours 20 minutes (45% thrust), considering a full load of fuel (40 usable gallons).

According to witnesses, the aircraft had made 15 sorties of approximately 15 minutes each, in a total of three hours forty-five minutes of flight, without counting the positioning flight from the last point of refueling to the location where the accident eventually occurred. The distance between the two locations was seven nautical miles, but there are no records of this flight.

On the day before the accident, the aircraft was refueled with 15.4 gallons of AVGAS. However, there are no records of the total fuel of the aircraft after the last refueling, so it was not possible to guarantee that it had enough endurance for all the subsequent flights.

Thus, the possibility of insufficient fuel for the operation cannot be discarded.

The takeoff profile observed by the witnesses and the angle of impact of the aircraft with the ground are compatible with the occurrence of loss of control in flight resulting from the aircraft loss of lift (stall).

However, due to the inexistence of flight data recorders and a pilot's logbook, it became unviable to proceed with an analysis of the factors that might have contributed to the loss of control.

3 CONCLUSIONS

3.1 Facts

- a) The pilot had a valid aeronautical medical certificate;
- b) The pilot did not have a technical qualification certificate issued in Brazil;
- c) The aircraft did not comply with the maintenance program of the manufacturer;
- d) The aircraft did not have an airworthiness certificate valid in Brazil;
- e) the aircraft had not undergone an initial technical inspection (VTI);
- f) the aircraft had a Reservation of Markings "status";
- g) there were no logbooks (relative to airframe, engine and propeller) valid in Brazil;
- h) the prevailing weather conditions were VMC;
- i) the aircraft took with a pilot and three passengers on board for a scenic flight;
- j) during a left turn after departure, the aircraft collided with the ground;
- k) the aircraft impacted the ground at an angle of 80° in a pitch-down attitude;
- l) the pilot and passengers were killed in the crash; and
- m) the aircraft sustained substantial damage.

3.2 Contributing factors

3.2.1 Human Factor

3.2.1.1 Medical Aspect

Nil.

3.2.1.2 Psychological Aspect

3.2.1.2.1 Individual information

Nil.

3.2.1.2.2 Psychosocial information

Nil.

3.2.1.2.3 Organizational information

Nil.

3.2.2 Operational Factor

3.2.2.1 Concerning the operation of the aircraft

a) Application of the controls – undetermined

Considering the flight profile observed by witnesses, as well as the angle of impact with the ground, it is possible that the pilot utilized the flight controls in an inadequate manner, gradually leading the aircraft to a loss of lift (stall).

b) Flight indiscipline – undetermined

The violation of the pre-established airworthiness requirements may have affected the aircraft systems, and caused a failure during the operation.

c) Aircraft maintenance – undetermined

The non-compliance with the maintenance program (established and recommended by the manufacturer), may have restricted the aircraft airworthiness condition, jeopardizing its operation, since the various systems were not inspected with an adequate periodicity. However, it was not possible to affirm that the accident resulted from the failure to execute the prescribed maintenance

d) Flight planning – undetermined

Based on the information available to the investigation commission, it was not possible to discard the hypothesis of insufficient fuel for operating the flight.

3.2.2.2 Concerning ATS units

Not a contributor.

3.2.3 Material Factor

3.2.3.1 Concerning the aircraft

Not a contributor.

3.2.3.2 Concerning ATS technology systems and equipment

Not a contributor.

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 liability.

In accordance with the Law n°12970/2014, recommendations are made solely for the benefit of the air activity operational safety.

Compliance with a Safety Recommendation is the responsibility of the holder of the highest executive position in the organization to which the recommendation is being made. An addressee who judges to be unable to comply with a Safety Recommendation must inform the CENIPA on the reason(s) for the non-compliance.

Safety Recommendations made by the CENIPA:

To the National Civil Aviation Agency (ANAC):

A-044/CENIPA/2014 – 001

Issued on 03/06/2014

Publicize the lessons learned from this accident as a way to alert the general aviation operators as to the need to comply with the regulations mentioned in this report.

5 CORRECTIVE/PREVENTATIVE ACTION ALREADY TAKEN

Nil.

6 DISSEMINATION

- National Civil Aviation Agency (ANAC)
- National Transportation Safety Board (NTSB)
- SERIPA VI

7 APPENDICES

Nil.

On 03 June 2014.