

**COMANDO DA AERONÁUTICA**  
**CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE**  
**ACIDENTES AERONÁUTICOS**



**FINAL REPORT**  
**A - 155/CENIPA/2014**

<b>OCCURRENCE:</b>	<b>ACCIDENT</b>
<b>AIRCRAFT:</b>	<b>PR-TOT</b>
<b>MODEL:</b>	<b>172-R</b>
<b>DATE:</b>	<b>07SEPT2014</b>



## 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 Appendix 2, 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.**

## SYNOPSIS

This is the Final Report of the 07SEPT2014 accident with the 172-R aircraft, registration PR-TOT. The accident was classified as "Collision with Obstacle in Flight".

During the go-around procedure, the aircraft collided with power grid cables near threshold 33 of the Comandante Gastão Aerodrome (SDVI).

The aircraft was destroyed.

The pilot and one passenger perished at the site.

The second passenger suffered minor injuries.

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



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**GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS**

ANAC	(Brazil's) National Civil Aviation Agency
CA	Airworthiness Certificate
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
DCTA	Aeronautics' Science and Technology Department
DECEA	Airspace Control Department
DTCEA	Airspace Control Detachment
IAM	Annual Maintenance Inspection
MNTE	Qualification Type – Airplane Single Engine Land
NOTAM	Notice to Airmen
NTSB	National Transportation Safety Board
PPR	Private Pilot License– Airplane
ROTAER	Auxiliary Air Route Manual
SDVI	ICAO location designator – Comandante Gastão Aerodrome - MT
SERIPA VI	Sixth Regional Aeronautical Accident Investigation and Prevention Service Aeronautical Accidents Investigation and Prevention System
SIPAER	
TPP	Aircraft Registration Category of Private Air Service
VFR	Visual Flight Rules

## 1. FACTUAL INFORMATION.

<b>Aircraft</b>	<b>Model:</b> 172-RI <b>Registration:</b> PR-TOT <b>Manufacturer:</b> Cessna Aircraft	<b>Operator:</b> Private
<b>Occurrence</b>	<b>Date/time:</b> 07SEPT2014 - 1600 UTC <b>Location:</b> Comandante Gastão Aerodrome - (SDVI) <b>Lat.</b> 14°39'07"S <b>Long.</b> 057°30'02"W <b>Municipality – State:</b> Tangará da Serra - MT	<b>Type(s):</b> "Collision with Obstacle in Flight"  <b>Subtype(s):</b>

### 1.1 History of the flight.

The aircraft took off from the Marechal Rondon Aerodrome, MT (SBCY), to the Comandante Gastão Aerodrome (SDVI), located in the city of Tangará da Serra, MT, to carry out personnel transportation with one pilot and two passengers on board.

After the approach to land at threshold 15, there were two abrupt touches, with subsequent go-around procedure. During this procedure, the aircraft collided with a power grid cable, being projected to the ground, catching fire after that.

The aircraft was destroyed.

The pilot and one passenger died and the second passenger suffered minor injuries.

### 1.2 Injuries to persons.

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

### 1.3 Damage to the aircraft.

The aircraft was destroyed.

### 1.4 Other damage.

Nil.

### 1.5 Personnel information.

#### 1.5.1 Crew's flight experience.

Hours Flown	
	Pilot
Total	49:10
Total in the last 30 days	02:00
Total in the last 24 hours	02:00
In this type of aircraft	02:00
In this type in the last 30 days	02:00
In this type in the last 24 hours	02:00

**N.B.:** It was not possible to obtain the Pilot's Flight Logbook (CIV) to check the updated records of his flight hours.

### **1.5.2 Personnel training.**

The pilot took the Private Pilot course - Airplane (PPR) at the *Escola SkyFly*, Bolivia, being validated by ANAC on 18MAR2014.

### **1.5.3 Category of licenses and validity of certificates.**

The pilot had the Private Pilot License - Airplane (PPR) and had valid technical qualifications for Airplane Single Engine Land (MNTE).

### **1.5.4 Qualification and flight experience.**

The pilot was qualified.

It was not possible to prove the pilot's experience, due to the lack of records.

### **1.5.5 Validity of medical certificate.**

The pilot had valid Aeronautical Medical Certificate (CMA).

### **1.6 Aircraft information.**

The aircraft, serial number 17280150, was manufactured by Cessna Aircraft, in 1997, and was registered at the Private Air Service category (TPP).

The aircraft had valid Airworthiness Certificate (CA).

The airframe, engine and propellers logbook records were not updated.

The last inspection of the aircraft, the "50 hours" type, was performed on 17OCT2013 by the HAR3 shop in Santo Antônio do Leverger - MT. Due to the lack of updated documentation; it was not possible to check the flown hours after the inspection.

The last revision of the aircraft, the "IAM" type was performed on 17OCT2013 by the by HAR3 shop in Santo Antônio do Leverger - MT. Due to the lack of updated documentation; it was not possible to check the flown hours after the inspection.

At that time, the aircraft had 1,799 hours and 6 minutes since it was new.

The logbook was on the aircraft and was destroyed by fire. It was not possible to recover it, as well as to verify some reported discrepancy.

### **1.7 Meteorological information.**

The weather conditions were favorable for the visual flight.

During the initial/first action, according to information from third parties, it was verified that, at the time of the accident, the direction and the intensity of the wind were favorable for landing at threshold 33. However, the pilot tried to land on runway 15.

### **1.8 Aids to navigation.**

Nil.

### **1.9 Communications.**

Nil.

### **1.10 Aerodrome information.**

The aerodrome was private and operated under the Visual Flight Rules (VFR) in the daytime.

The runway was made of gravel, with thresholds 15/33, dimensions of 700m x 25m, with elevation of 1391 feet.

### **1.11 Flight recorders.**

Neither required nor installed.

### **1.12 Wreckage and impact information.**

The wreckage was concentrated near threshold 33 of the Comandante Gastão Aerodrome (SDVI), under the power grid in which the impact occurred (Figure 1).



Figure 1 – Aircraft's wreckage.

The analysis of the wreckage indicated the impact of the right wing against the power grid and the impact of the left wing tip against a small natural elevation. This caused the aircraft to rotate about 160 ° anticlockwise and had a sudden stop. Due to the collision against the ground, there were ruptures of the wings and pipes, with consequent leakage of fuel, causing the fire that consumed the whole aircraft.

It was not possible to verify the amount of aviation gasoline remaining in the aircraft.

### **1.13 Medical and pathological information.**

#### **1.13.1 Medical aspects.**

The last health inspection performed by the pilot, in OCT2013, indicated that he was fit for the air activity, without any type of restriction.

#### **1.13.2 Ergonomic information.**

Nil.

#### **1.13.3 Psychological aspects.**

Nil.

### **1.14 Fire.**

The fire started soon after the impact, possibly due to broken fuel lines and the contact with the engine in high temperature.

### **1.15 Survival aspects.**

The pilot and a passenger were able to leave the aircraft by their own means. This passenger suffered minor injuries.

After suffering serious injuries, the pilot was hospitalized and died on 21SEPT2014.

The second passenger, who was unconscious and attached to the hardware of the aircraft, could not abandon it or removed, and died at the accident site.

### 1.16 Tests and research.

The Lycoming IO-360-L2A, n / s L-27055-51A engine, belonging to the Cessna 172R SKYHAWK aircraft, registration PR-TOT, was disassembled and inspected by the DCTA (Figure 2).



Figure 2 - Top view of the Lycoming IO-360-L2A engine, n / s L-27055-51A.

The research carried out on this engine did not find anything that could have influenced in its normal operation.

The engine's fuel pump was consumed by fire and only part of it remained. Its internal components were examined and nothing was detected that could lead to a deficiency in the supply of fuel to the engine. Nothing was observed that could have blocked the passage of fuel.

The engine's primary oil filter was removed and, after visual inspection, nothing was identified that could result in engine malfunction.

It was found that the oil pump, when manually turned, did not offer resistance to movement. In its disassembly, it was found residual of lubricating oil and carbonization in the teeth of the gear resulting from the fire.

In the lubrication system, no filings or other signs indicating any discrepancy in operation were found.

Both the spark plugs and the magnets could not be tested because of the fire's action. However, it could be verified that the spark plugs had normal appearance and coloration, and there was no evidence that they had undergone pre-ignition or detonation.

It was verified that the alternator was not stuck because it did not offer resistance when being moved manually.

In the lubrication, power, fuel and ignition systems nothing was found that could compromise or induce engine failures.

Other evidence that the engine was running at the instant the aircraft was involved in the accident could be identified by the presence of dirt deposited along the propeller blades and the scratches existing in the transverse direction of these blades (Figure 3).

The engine cylinders were disassembled and there was no malfunction. These were inspected for longitudinal hazards, abnormal wear, evidence of pre-ignition and / or detonation and lack of lubrication.



Figure 3 - View of the propeller with dirt deposited along the blades.

In the pistons of the engine a work similar to the one of the cylinders was carried out, where also no anomaly was found that could compromise the operation of the engine.

The internal components of the engine fuel distribution valve were examined and nothing was identified that could lead to a deficiency in the fuel supply to the engine.

#### 1.17 Organizational and management information.

Nil.

#### 1.18 Operational information.

The Comandante Gastão (SDVI) private Aerodrome, according to the record in the Auxiliary Air Route Manual (ROTAER), had a 700m long runway with 15/33 thresholds. However, the actual length was higher and there was no definite indication of the thresholds (Figure 4). In addition, with regard to the operation of the Aerodrome, this one consisted of both the Register of Private Aerodromes of ANAC and the aeronautical publications in force. There was no record of any restriction on its operations.



Figure 4 - Photo of the runway, with the sign of the accident site.

However, the existence of power cables, which could affect the safety of operations, near threshold 33 were not included in either the ROTAER or the Notice to Airmen (NOTAM) of the locality.

During the initial/first action, according to information from third parties, it was verified that on 07SEPT2014, at the time of the accident, the direction and the intensity of the wind were favorable for landing at threshold 33.

However, as the power grid restricts the approach to threshold 33, the pilot decided to proceed to threshold 15. This restriction can be evidenced by the existence of a wood marking represented by the letter "X" and placed close to threshold 33. (Figure 5).

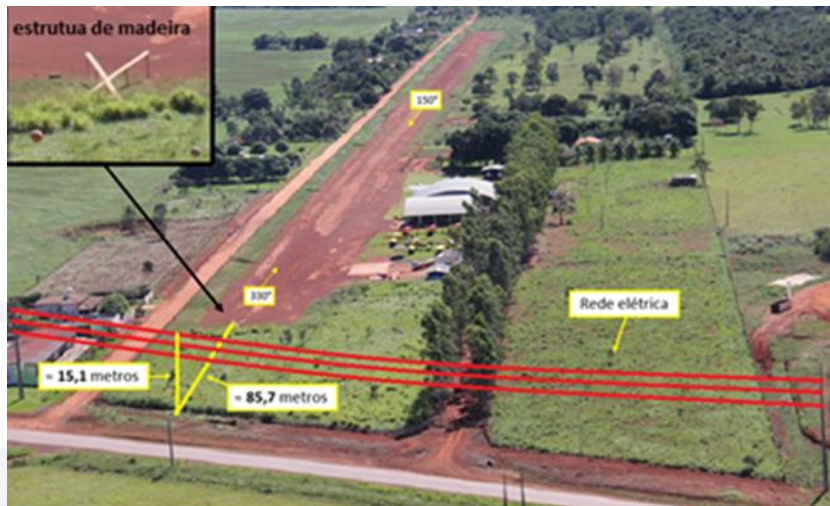


Figure 5 - Aerial photo of the runway. The “X” marking is highlighted.

### 1.19 Additional information.

Nil.

### 1.20 Useful or effective investigation techniques.

Nil.

## 2. ANALYSIS.

The Lycoming IO-360-L2A engine, n / s L-27055-51A, belonging to the Cessna 172R Skyhawk aircraft, registration PR-TOT, was disassembled and inspected by the Department of Aerospace Science and Technology (DCTA). The engine suffered severe malfunctions due to the action of the fire after the fall of the aircraft.

In all internal components, such as crankshafts, connecting rods, cylinders, bearings, valve and piston control, have not been checked and / or found anomalies that could cause malfunction or damage, with consequent stopping or loss of engine power.

In the lubrication, fuel supply and ignition systems nothing was found that could compromise or induce engine failures.

Another indication that the engine was running the instant the aircraft was involved in the accident could be identified on the propeller blades of the engine.

In this sense, all the evidences in this research work show that there was no contribution of the powertrain in the occurrence that involved this aircraft. The evidences indicate that the engine that equipped the aircraft was functioning and had normal operation at the moment it was involved in the crash that occurred on 07SEPT2014.

The landing attempt on the runway of the Comandante Gastão Aerodrome was carried out on runway 15, although the direction and intensity of the wind were unfavorable at that moment, as determined by the investigation.

After two abrupt touches and subsequent go-around procedure, the aircraft collided against a power grid and against the ground, sequentially. After the total stop, the PR-TOT was consumed by fire.

The initiative to approach threshold 15 with the unfavorable wind was related to the presence of the power grid in the opposite threshold, which restricted the operation. Although this was an attempt to manage the risks of a possible collision against the wires

near runway 33, his evaluation was not entirely adequate, given the decision to land under unfavorable wind conditions, evidencing flaws in judgment and flight planning.

The power grid installed near the threshold restricted the approach to runway 33. The wood marking installed in this threshold and represented by the letter "X" (Figure 5) sought to guide the unfeasibility of the landing from that place.

In the aeronautical publications in force, at the time of the accident, there was no record of any restrictions on the operation at that Aerodrome.

In the same way, the existence of power cables, which affected the safety of the operations, near threshold 33, did not appear in either the ROTAER or the Notice to Airmen (NOTAM) of the locality. This signaled an inadequacy of the operating support systems, which, if they existed, could have anticipated a risk to be managed by the pilot, enabling conditions for better landing planning.

The decision to land and the attempt of performing a go-around procedure with tailwind, on a narrow runway (700m) and with obstacles in the opposite threshold proved to be potentially inadequate, especially in this case where there was an unsuccessful attempt to abort landing.

This inopportune judgment may be associated, in turn, with the pilot's lack of experience in the air activity, in the aircraft model and in the environmental conditions surrounding the operation, since the pilot had obtained his license less than six months before.

### **3. CONCLUSIONS.**

#### **3.1 Facts.**

- a) the pilot had valid Aeronautical Medical Certificate (CMA);
- b) the pilot had valid Technical Qualification MNTE;
- c) the pilot was qualified but it was not possible to measure his experience;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the landing attempt was performed with tailwind
- f) the aircraft performed a go-around procedure after two abrupt touches on runway 15 of the Comandante Gastão Aerodrome (SDVI);
- g) there was no record of any restriction on SDVI operations;
- h) the existence of power grid cables, near threshold 33, did not appear in the ROTAER or in the NOTAM of the locality;
- i) the aircraft collided against the power grid and against the ground sequentially;
- j) after the total stop, the aircraft was consumed by the fire and was destroyed;
- k) as a result of the accident, the pilot and one passenger died; and
- l) a second passenger suffered minor injuries.

#### **3.2 Contributing factors.**

##### **- Control skills – a contributor.**

The attempt of landing and performing the go-around procedure proved to be unsuccessful, due to the inadequacy of the use of aircraft commands.

##### **- Airport infrastructure – undetermined.**

The physical conditions of the Aerodrome, with the presence of an X-shaped wood marking, located at runway's threshold 33, together with the presence of a power grid installed near the thresholds may have played a relevant role in the occurrence of the accident.

**- Piloting judgment – a contributor.**

The pilot did not properly evaluate the approach and the go-around procedure as well as the safe height to be maintained so as not to collide against the power grid existing in the place.

**- Flight planning – a contributor.**

The flight planning proved to be inadequate, as a flight stage was scheduled for a runway whose physical infrastructure might prove to be improper for the operation.

**- Insufficient pilot's experience – undetermined.**

Although not quantified, the pilot's limited experience in the air activity, in the aircraft, and specifically in the circumstances of the tailwind landing may have contributed to the accident.

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

The decision to land and the attempt of performing a go-around procedure with tailwind on a runway of reduced dimensions (700m) and with obstacles in the opposite threshold proved to be potentially inadequate possibly associated with the pilot's limited experience in the air activity, in the aircraft model and in conditions that involved the operation at that time.

**- Support systems – a contributor.**

The absence of data in the ROTAER or NOTAM on the existence of power grid cables that affected the operation near threshold 33 signaled an inadequacy of the operating support systems, which, if they existed, could have anticipated a risk to be managed by the pilot, enabling conditions for better landing planning.

#### **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".*

**Recommendations issued at the publication of this report:**

**To the Airspace Control Department (DECEA):**

**A-155/CENIPA/2014 - 01**

**Issued on 27/07/2018**

Evaluate the interference of the presence of the power grid, located near threshold 33, in the operation of the Aerodrome and, if necessary, take the appropriate actions within the competence of the DECEA.

**A-155/CENIPA/2014 - 02****Issued on 27/07/2018**

Issue an NOTAM regarding the existence of a power grid located near runway's threshold 33 of SDVI.

**A-155/CENIPA/2014 - 03****Issued on 27/07/2018**

Analyze the pertinence of including in the ROTAER the information of the presence of a power grid located near runway's threshold 33 of SDVI.

**5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.**

The ANAC was formally notified by SERIPA VI, through Official Letter 62 / CH / 514 (20NOV2014), regarding the accident involving the PR-TOT aircraft.

Consultation was made, for prevention purposes, due to the height, as well as the proximity of the power grid in relation to the start of threshold 33 of the Comandante Gastão Private Aerodrome (SDVI).

It was requested information on the treatment for the necessary inquiries regarding the effective safe operation of the Aerodrome in evidence.

In response, the ANAC informed that, since this was a subject of the Basic Aerodrome Protection Zone Plan (PBZPA), it forwarded the matter to the DECEA who started to discuss the topic with the Aerodrome operator.

On July 27<sup>th</sup>, 2018.