

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



**FINAL REPORT**  
**A - 128/CENIPA/2014**

|                    |                  |
|--------------------|------------------|
| <b>OCCURRENCE:</b> | <b>ACCIDENT</b>  |
| <b>AIRCRAFT:</b>   | <b>PR-HSC</b>    |
| <b>MODEL:</b>      | <b>AS 350 B2</b> |
| <b>DATE:</b>       | <b>25JUL2014</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 25JUL2014 accident with the AS 350 B2 aircraft, registration PR-HSC. The accident was classified as “[LALT] Low Altitude Operation”.

During the flight, the aircraft collided with a power grid while flying over a highway.

An emergency landing was made on the lateral of the highway.

The aircraft had substantial damage.

The pilot was unharmed and the passenger suffered minor injuries.

An Accredited Representative of the Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile (BEA) – France, (State where the aircraft was designed) was designated for participation in the investigation.



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## GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
| AIF      | Aircraft Registration Category of Federal Indirect Administration                              |
| ANAC     | Brazil's National Civil Aviation Agency                                                        |
| ATS      | Air Traffic Services                                                                           |
| BEA      | <i>Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile</i>                   |
| CA       | Airworthiness Certificate                                                                      |
| CENIPA   | Aeronautical Accident Investigation and Prevention Center                                      |
| CMA      | Aeronautical Medical Certificate                                                               |
| IAM      | Annual Maintenance Inspection                                                                  |
| IBAMA    | Brazilian Institute of the Environment and Renewable Natural Resources.                        |
| ICA      | Command of Aeronautics' Instruction                                                            |
| IFR      | Instrument Flight Rules                                                                        |
| INFRAERO | Brazilian Airport Infrastructure Company                                                       |
| METAR    | Meteorological Aerodrome Report                                                                |
| MGSO     | Safety Management Manual                                                                       |
| NOA      | Air Operations Center                                                                          |
| PCH      | Commercial Pilot License – Helicopter                                                          |
| PPH      | Private Pilot License – Helicopter                                                             |
| RBHA     | Brazilian Aeronautical Certification Regulation                                                |
| SBCC     | ICAO Location Designator - Campo de Provas Brigadeiro Veloso<br>Aerodrome, Novo Progresso - PA |
| SBEK     | ICAO Location Designator – Jacareacanga Aerodrome - PA                                         |
| SERIPA I | First Regional Aeronautical Accident Investigation and Prevention<br>Service                   |
| SIPAER   | Aeronautical Accident Investigation and Prevention System                                      |
| UTC      | Universal Time Coordinated                                                                     |
| VFR      | Visual Flight Rules                                                                            |

## 1. FACTUAL INFORMATION.

|            |                                                 |                                                   |
|------------|-------------------------------------------------|---------------------------------------------------|
| Aircraft   | <b>Model:</b> AS 350 B2                         | <b>Operator:</b><br>IBAMA                         |
|            | <b>Registration:</b> PR-HSC                     |                                                   |
|            | <b>Manufacturer:</b> HELIBRAS                   |                                                   |
| Occurrence | <b>Date/time:</b> 25JUL2014 - 1153 UTC          | <b>Type(s):</b><br>"[LALT] Low Altitude Operation |
|            | <b>Location:</b> Road Margin                    |                                                   |
|            | <b>Lat.</b> 08°02'21"S <b>Long.</b> 055°08'46"W | <b>Subtype(s):</b><br>NIL                         |
|            | <b>Municipality – State:</b> Altamira - PA      |                                                   |

### 1.1 History of the flight.

The aircraft took off from the IBAMA Base, located in the municipality of Novo Progresso - PA, to the Castelo dos Sonhos District, located in the municipality of Altamira - PA, at about 1110 (UTC), in order to transport personnel with a pilot and one passenger on board.

With about 40 minutes of flight, the aircraft collided with a power grid while flying over a highway.

The aircraft showed increased vibration and the pilot flew for about 1km until performing an emergency landing on the side of the highway.

The aircraft had substantial damage.

The pilot left unharmed and the passenger suffered minor injuries.

### 1.2 Injuries to persons.

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

### 1.3 Damage to the aircraft.

The aircraft had substantial damage. There was a rupture of the tail cone and fairings of the tail rotor drive shaft, damage to the main rotor star (starflex) and in the radiator air intake.

### 1.4 Other damage.

There was the sectioning of the power grid wires.

### 1.5 Personnel information.

#### 1.5.1 Crew's flight experience.

| Hours Flown                       | Pilot    |
|-----------------------------------|----------|
| Total                             | 2.900:00 |
| Total in the last 30 days         | 43:25    |
| Total in the last 24 hours        | 05:55    |
| In this type of aircraft          | 600:00   |
| In this type in the last 30 days  | 43:25    |
| In this type in the last 24 hours | 05:55    |

**N.B.:** The data related to the flow hours were obtained with the pilot.

### **1.5.2 Personnel training.**

The pilot took the PPH course, in 2008.

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

The pilot had the PCH License and had valid AS350 B2 type rating.

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

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

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

The pilot had valid CMA.

### **1.6 Aircraft information.**

The aircraft, serial number 4937, was manufactured by HELIBRAS, in 2010 and it was registered in the AIF category.

The aircraft had valid Airworthiness Certificate (CA).

The airframe, engine and propeller logbooks records were updated.

The last "100-hour" inspection of the aircraft was performed on 05DEC2013 by the Helisul maintenance organization, in Curitiba - PR, having flown 11 hours after the inspection.

The last "3000-hour" revision of the aircraft was performed on 19NOV2013, by the Helisul maintenance organization, in Curitiba - PR, having flown 504 hours and 40 minutes after the revision.

### **1.7 Meteorological information.**

The Local Meteorological Bulletins (METAR) of SBCC and Jacareacanga (SBEK), 78 NM and 188 NM away from the accident site respectively, had the following information:

METAR SBCC 251200Z 16008KT 4000BR OVC005 20/18 Q1019=

METAR SBEK 251200Z 24001KT 0800FG VV003 24/24 Q1014=

It was verified that visibility varied between 800m and 4.000m, due to the presence of humid mist and fog, with a completely overcast sky at 500ft. In Jacareacanga, vertical visibility was of 300ft. The wind had intensity between 1 and 8kt. At the satellite image, it was observed that all region was covered by low cloudiness.

At the Amazonic Region, due to the air relative high humidity, it's normal the fog and low clouds formation at the hours after the sunrise.

This phenomenon, known in the region as "aru", occurs most frequently in the rainy periods.

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

Nil.

### **1.9 Communications.**

Nil.

### **1.10 Aerodrome information.**

The occurrence took place outside the Aerodrome.

### **1.11 Flight recorders.**

Neither required nor installed.

## 1.12 Wreckage and impact information.

The accident occurred on a highway stretch between the city of Novo Progresso - PA, and the District of Castelo dos Sonhos, in the municipality of Altamira - PA.

The first impact occurred against power grid wires, which were about 7m (21ft) high, on the highway in the transverse direction.

In the collision, the energy wires broke the windshield and then, after being sectioned by the device called "wire cut", also reached the upper engine fairings and starflex of the main rotor.

After the impact, the aircraft presented vibrations in the controls.

The collision of the blades against the wires caused the break of the starflex, affecting the function of this component related to damp the effects of recoil and beat of the blades, which generated the increase of vibration of the aircraft.

By slowing down, the vibration increased. The aircraft still flew about 1km until it made an emergency landing on the side of the highway.

At landing, the tail collided against the ground, damaging the tail cone.

The damage caused misalignment between the rear drive shaft and the front coupling shaft.

This misalignment damaged the benders and caused the decoupling between the axles, which consequently ripped the fairing of the tail rotor drive shaft (Figure 1).



Figure 1 - Tail cone and fairing of the tail rotor drive shaft damaged.

## 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.

## 1.14 Fire.

There was no fire.



### 1.15 Survival aspects.

Nil.

### 1.16 Tests and research.

Nil.

### 1.17 Organizational and management information.

In the air surveillance operation, the IBAMA, through a contract, used a helicopter chartered by Helisul Air Taxi Ltd. This company was responsible for the supply of pilots, to perform the function of commander, and mechanics.

The aircraft were constantly monitored by the Air Operations Center (NOA) of IBAMA in Brasília - DF, where it was also performed the operational control of the crew that flew by the Institute.

The pilot, belonging to Helisul's staff, and a passenger belonging to the Civil Police of the State of Rondônia, assigned to the IBAMA through operational agreement, were on board.

The environmental agency directly operated the aircraft, in accordance with the rules of the Brazilian Aeronautical Certification Regulation (RBHA) 91, Subpart K, established by the National Civil Aviation Agency (ANAC).

The management of the missions was IBAMA's responsibility, with no interference by Helisul.

### 1.18 Operational information.

On 25JUL2014, the PR-HSC took off to the district of Castelo dos Sonhos, in order to seek personnel to carry out an observation mission.

According to the pilot, due to the smoke present in the region, he chose to fly at a height of 200ft towards the destination.

Since on the route to the district of Castelo de Sonhos there was a highway, the pilot decided to fly over it, making it, at that moment, at an even lower altitude than the initial 200ft.

The terrain around the road was surrounded by elevations covered by forest vegetation (Figure 2).



Figure 2 - Terrain around the road and trajectory of the aircraft.

With approximately 40 minutes of flight, the pilot reported that he saw a large number of birds flying in the trajectory of the aircraft and he decided to make a 360° turn to the right to avoid collision.

After completing the curve, the crewmember did not see the wires and ended up colliding against them.

At the moment of impact, the pilot heard a loud noise, and then a loud vibration. The aircraft still flew for 1 km until landing at the edges of the highway.

The aircraft was within the weight and balance limits specified by the manufacturer.

### **1.19 Additional information.**

The Instruction of the Aeronautical Command (ICA) 100-4, Rules and Special Procedures of Air Traffic for Helicopters, of 29APR2009 established that:

#### "MINIMUM HEIGHTS FOR VFR FLIGHT

3.2.1 Except in landing and take-off operations, or when authorized by the regional SISCEAB body with jurisdiction over the area in which the operation is intended, the VFR helicopter flight shall not be carried out on cities, towns, habited places or on a group of persons less than 500ft. above the highest obstacle in a 600m radius around the aircraft.

3.2.2 In places not mentioned in 3.2.1, the flight shall not take place at a height lower than that which allows it, in an emergency, to land safely and without danger to persons or surface properties.

NOTE: This height must be at least 200ft."

### **1.20 Useful or effective investigation techniques.**

Nil.

## **2. ANALYSIS.**

It was a ferry flight for an air observation mission.

The takeoff occurred from a support base of the IBAMA operation, where there was no weather station.

At the time of takeoff, the region was covered by low cloudiness and fog. For this reason, the pilot started the flight keeping 200ft.

In the course of the flight, with reduced visibility, and passing over uneven terrain, the pilot reported that he flew over the road bed, below the minimum height predicted by ICA 100-4 (200ft), to maintain the flight in visual conditions.

This decision to continue the flight at low altitude thus revealed that the procedures required to carry out helicopter traffic safely were not complied with by the crewmember.

Therefore, there was no accurate assessment of the risk factors involved in this type of flight, especially in conditions of reduced visibility, which increase the risk of collision against obstacles.

The pilot reported that he was performing a 360° turn to divert from a flock of birds, not noticing the low-voltage power grid, colliding against the wires.

The obstacle was 7m high (21ft), which signaled that the aircraft was below the expected minimum height.

The collision of the blades against the wires caused the crash of the starflex, which generated the vibration increase of the aircraft.

Tail cone damage was caused by touching the ground at landing.

### 3. CONCLUSIONS.

#### 3.1 Facts.

- a) the pilot had valid Aeronautical Medical Certificate (CMA);
- b) the pilot had valid AS350 B2 Type Rating;
- c) the pilot was qualified and had experience in that kind of flight;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the aircraft was within the limits of weight and balance;
- f) the airframe and engine logbooks records were updated;
- g) the weather conditions were not favorable for the flight;
- h) the aircraft collided with a power grid at 7m (21ft) in height;
- i) after the collision, the aircraft showed increased vibration;
- j) the aircraft made an emergency landing next to the highway;
- k) the aircraft had substantial damage; and
- l) the pilot left unharmed and the passenger suffered minor injuries.

#### 3.2 Contributing factors.

- **Attitude – a contributor.**

Failure to comply with ICA 100-4 procedures for helicopter traffic under Visual Flight Rules (VFR) has contributed to the increased risk of collision against obstacles in the route chosen.

- **Adverse meteorological conditions – a contributor.**

The degradation of visibility and clouds height influenced the pilot's decision to fly below the minimum height, increasing the risk of the operation and contributing to the collision against the power grid.

- **Flight indiscipline – a contributor.**

When flying below the minimum height prevised in regulation, in an unknown place, with rough terrain, the pilot exposed the aircraft to the risk of collision against obstacles on the ground, contributing to the accident.

- **Flight planning – a contributor.**

The decision to take off and proceed on the flight in degraded weather conditions revealed an inadequacy in the flight preparation work and contributed to the aircraft entering an unsafe situation, flying below the minimum height, in order to remain in visual conditions.

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

The conditions under which the flight was carried out revealed a compromised assessment of the inherent risks, thereby reducing the safety levels of the operation.

### 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:**

**To the Brazil’s National Civil Aviation Agency (ANAC):**

**A-128/CENIPA/2014 - 01**

**Issued on 04/08/2019**

Act together with the IBAMA, in order to reassess the suitability and check compliance with the Safety Management Manual (MGSO) of that operator, especially with regard to the flight planning and risk management mechanisms adopted by the organization and its crew.

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

None.

On April 08<sup>th</sup>, 2019.

