COMANDO DA AERONÁUTICA

CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE ACIDENTES AERONÁUTICOS

FINAL REPORT
A - 133/CENIPA/2018

OCCURRENCE:	**ACCIDENT**
AIRCRAFT:	**PP-MES**
MODEL:	**AS 350 B2**
DATE:	**10AUG2018**

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 by taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document that 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 into the Brazilian legal system by 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 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 10AUG2018 accident with the AS 350 B2 aircraft model, registration PP-MES. The accident was classified as “[CTOL] Collision With Obstacle(s) During Take-off and Landing”.

It was found that, during landing, the aircraft collided with a movable goalpost that was located in the center of the soccer field where the operation was being conducted.

The aircraft had substantial damage.

The pilots and passengers left unharmed.

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

ADE	Aircraft Registration Category – Direct State Administration
ANAC	Brazil's National Civil Aviation Agency
BEA	Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CMA	Aeronautical Medical Certificate
DECEA	Airspace Control Department
HMNT	Single-Turbo Helicopter Rating
NADSO	Acceptable Operational Safety Performance Level
NSCA	Aeronautics Command System Standard
PCH	Commercial Pilot License – Helicopter
PIC	Pilot in Command
PPH	Private Pilot License – Helicopter
PSO-BR	Operational Safety Plan for the Brazilian Civil Aviation
RBAC	Brazilian Civil Aviation Regulation
RBHA	Brazilian Aeronautical Certification Regulation
SIPAER	Aeronautical Accident Investigation and Prevention System
SJIE	ICAO Location Designator – Official Residence Helipad, Vila Velha - ES
SGSO	Safety Management System
SIC	Second in Command
UAP	Public Air Unit
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	**Model:** AS 350 B2 **Registration:** PP-MES **Manufacturer:** HELIBRAS	**Operator:** Secretariat of the Military House (GEES)
Occurrence	**Date/time:** 10AUG2018 - 1450 UTC **Location:** INCAPER Farm **Lat.** 20°22'10"S **Long.** 041°03'42"W **Municipality – State:** Domingos Martins – ES	**Type(s):** "[CTOL] Collision With Obstacle(s) During Take-off and Landing" **Subtype(s):** NIL

1.1 History of the flight.

The aircraft took off from the Official Helipad (SJIE), Vila Velha - ES, to the soccer field of the INCAPER Farm, Domingos Martins - ES, in order to transport personnel, with two pilots and two passengers on board.

During the landing on the soccer field, the aircraft collided with an obstacle located in the center of the area chosen for the landing. After that first impact, there was a loss of control and the helicopter fell to the right side.

The aircraft had substantial damage and all occupants left unharmed.

1.2 Injuries to persons.

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

1.3 Damage to the aircraft.

The aircraft had substantial damage to its entire structure, including rupture of the tail cone and main and tail rotors.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Flight Hours		
	PIC	SIC
Total	739:54	247:12
Total in the last 30 days	11:12	05:12
Total in the last 24 hours	00:42	00:22
In this type of aircraft	518:18	103:36
In this type in the last 30 days	11:12	05:12
In this type in the last 24 hours	00:42	00:22

N.B.: The data relating to the flown hours were obtained through the crewmembers themselves.

1.5.2 Personnel training.

The PIC took the PPH course at EFAI *Escola de Aviação Civil*, Contagem - MG, in 2010.

The SIC took the PPH course at EDRA *Aeronáutica*, Ipeúna - SP, in 2014.

1.5.3 Category of licenses and validity of certificates.

The PIC and the SIC had the PCH License and both had valid HMNT Rating.

1.5.4 Qualification and flight experience.

The PIC was qualified, had experience in the aircraft, in the type of flight, and had already operated several times in the location where this accident occurred.

The SIC was qualified and had 103 hours on the aircraft model. This was his first flight to the INCAPER Farm, and for that reason, the PIC was demonstrating all the steps of the operation, mainly the approach and landing procedures, due to the particularities of the place.

1.5.5 Validity of medical certificate.

The pilots had valid CMAs.

1.6 Aircraft information.

The aircraft, serial number 4501, was manufactured by HELIBRAS in 2008 and was registered in the ADE Category.

The aircraft had a valid CA.

The airframe and engine logbook records were updated.

The last inspection of the aircraft, the “7D” type, was carried out on 03AUG2018 by a mechanic accredited by the ANAC, with 2 hours and 55 minutes flown after the inspection.

The last more comprehensive inspection of the aircraft, the “600H” type, was carried out on 15APR2017 by HELIBRAS, with 256 hours flown after the inspection.

1.7 Meteorological information.

The weather conditions were favorable for the visual flight.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

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 aircraft collided with a movable goalpost, which was in the center of the field where the landing took place.

Figure 1 - Marks from the collision of the tail rotor blades against the soccer goalpost.

The goalpost's paintwork was gray, it was very worn and showed rust in several spots, offering little contrast to the local lawn.

The topography of the region around the field where the landing took place was characterized by elevations throughout the surrounding area. There were also trees around the landing site.

The investigators observed that, in the afternoon, the natural lighting at the accident site was reduced due to the shadow produced by the topography of the place (Figure 2).

Figure 2 - Image taken at the accident site in the afternoon showing the shadows produced by the topography.

After the first impact, the helicopter destabilized and began an uncontrolled spin to the left, which resulted in the main rotor colliding with the ground and tipping the aircraft to the right. The wreckage was grouped in the center of the soccer field.

Figure 3 - View of the aircraft after coming to a complete stop and of the obstacle it collided with.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

Nil.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

According to information provided by the PIC, he had flown on Tuesday and Wednesday of that week. On the day of the occurrence, a Friday, the pilot worked on administrative tasks for the organization in the morning and subsequently performed two flights. The first was an aeromedical flight. Then he flew one more flight to attend to a police report.

The PIC reported that he was called to transport the State Governor and his wife to the INCAPER Farm while he was debriefing the police mission (the second flight of the day) and, for this reason, he did not have time to have lunch.

Based on the statements collected, it was found that, in the week in which this occurrence took place, the PIC was also involved with a significant number of private tasks.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

Nil.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

The aircraft was operated by the UAP of the Espirito Santo State Government`s Secretariat of the Military House and carried out police, aeromedical and institutional operations of interest to the state government, under Subpart K - Air Operations of Public Security and/or Civil Defense of the RBHA nº 91. The crews of this operator were composed of military police officers.

On 12APR2019, Subpart K of the RBHA 91 was revoked and replaced by the RBAC No. 90, which established the requirements for special public aviation operations by public administration agencies and entities.

Regarding the SGSO, the RBAC 90 established that:

> 90,131 General requirements
>
> (a) The public agency or entity shall implement and maintain the SGSO within the scope of the respective UAP.
>
> (b) The UAP SGSO must be approved by the responsible manager of the public agency or entity.
>
> (c) The SGSO of the public agency or entity shall:
>
> (1) be established by the structure provided for in these Regulations;
>
> (2) be compatible with the size and complexity of the UAP's operations;
>
> (3) be within the reach of the NADSO;

(4) develop, implement, and execute monitoring with operational safety performance measurement; and

(5) be efficient in the identification and resolution of its systemic deficiencies related to the operational safety required for the execution of air activities.

(d) The body or entity must comply with the following general requirements for risk management:

(1) integration of risk management across all UAP flight phases, sectors, and operations;

(2) those responsible for risk acceptance must have the hierarchical level and knowledge compatible with the decision to be taken;

(3) no risk is admitted outside the NADSO; and

(4) apply risk management cyclically and continuously.

Regarding the operation at the INCAPER Farm, the pilots reported that there was a consolidated doctrine that a ground team from the Military House of the Government would travel to the site in advance and inform the landing conditions on the soccer field, reporting to the crew if the area whether or not was free of obstacles.

However, that day, the aforementioned team did not arrive in time to fulfill this task. Thus, the pilots performed the approach and landing without coordination with the ground.

1.18 Operational information.

The pilots reported that the weather conditions were favorable to the accomplishment of the mission. There was a dry fog, which did not affect the operation, and they remained in visual conditions throughout the flight.

The crewmembers also reported that no abnormalities regarding the performance of the aircraft or its systems were observed. According to their reports, the flight was uneventful until the start of the hover over the soccer field, landing site on the INCAPER Farm. The sketch shown in Figure 4 illustrates the aircraft's approach trajectory.

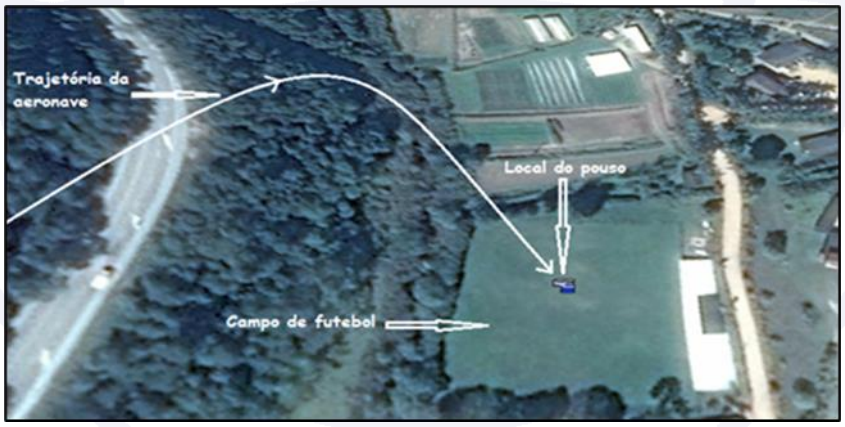

Figure 4 - Aircraft trajectory during approach for landing on the soccer field.

After positioning the aircraft in hover, in the center of the field, the PIC commanded a left turn to complete the landing procedure and, at that moment, the helicopter's tail rotor collided with the soccer goalpost.

After this first collision, the helicopter initiated an uncontrolled left turn, during which the main rotor collided with the terrain, and the aircraft tipped to the right after several other impacts occurred.

1.19 Additional information.

Nil.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

It was a personnel transport flight, conducted in an aircraft operated by the UAP of the Espirito Santo State Government`s Secretariat of the Military House under the rules of Subpart K of the RBHA 91.

According to the pilots' report that the meteorological conditions were favorable to the accomplishment of the mission, that the dry fog present did not affect the operation and that they remained in visual conditions throughout the flight, it was concluded that these aspects did not participate in this event.

Likewise, the declarations of the crewmembers that no abnormalities concerning the performance of the aircraft, or its systems were observed and that the flight proceeded normally to the destination, including the descent and approach to the soccer field, led the investigators to conclude that no failure of the aircraft or its systems contributed to this occurrence.

On the other hand, the marks identified on the soccer goalpost, associated with other indications, such as the estimated height of the hovering flight, the position in which the goal was located, as well as its height, made it evident that the tail rotor collision had occurred against that obstacle.

With this impact, the tail rotor had serious damage and lost its ability of acting to counteract the torque produced by the main rotor, which destabilized the flight, causing the aircraft to spin without control to the left, a few meters from the ground.

During this uncontrolled spin, the main rotor touched the ground, which triggered the sequence of impacts that followed until the helicopter tipped over and came to a complete stop.

The goalpost against which the collision took place was painted in gray and the paintwork was worn, offering little contrast with the local lawn, a factor that made it difficult to see.

Considering the fact that the PIC had already operated in the location several times, it is likely that he did not expect to encounter an obstacle in the place where he routinely positioned the helicopter.

These conditions, associated with the reduced natural lighting at the time of landing 1940 (UTC), impaired the pilot's ability to identify the existing obstacle near the point which he was approaching and led to a reduction in his level of situational awareness, which resulted in the tail rotor touching the soccer goalpost.

In this context, the decision to proceed with the landing without the support of the Government`s Military House ground team to inform whether or not the area was free of obstacles, according to the doctrine consolidated in the UAP, characterized the inadequate assessment of the possible risks involved in the operation, as well as inadequate flight preparation work.

It was also found that the planning and execution activities in the administrative and operational scopes, given the activation of this type of mission without adequate time for planning and the execution of preparations at the destination, were considered insufficient for the maintenance of the NADSO.

Additionally, having the highest authority in the state as a passenger may have led to self-imposed pressures for the flight to be completed in the shortest possible time. This

condition could produce difficulties in perceiving, analyzing, and choosing the most appropriate alternative, compromising the quality of the crew's decision-making process.

Finally, based on the PIC's report on his accumulation of professional tasks, it is likely that the inefficiency in the organization of the work context has favored a high burden on the PIC, which may have compromised his operational performance and contributed to this occurrence.

3. CONCLUSIONS.

3.1 Facts.

a) the pilots had valid CMAs;

b) the pilots had valid HMNT Ratings;

c) the PIC was qualified and had experience in the type of flight;

d) the SIC was qualified and had 103 hours on the aircraft model, this being his first flight to the INCAPER Farm;

e) the aircraft had a valid CA;

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

g) the airframe and engine logbook records were updated;

h) the weather conditions were favorable for the flight;

i) the PIC stated that, on the day of the occurrence, he worked on administrative tasks for the organization in the morning and, later, performed two flights;

j) the PIC reported that he was called to transport the State Governor during the debriefing of the second flight of the day and that he did not have time to have lunch;

k) for the operation on the INCAPER Farm, there was a consolidated doctrine that a ground team from the Government`s Military House should go to the location to inform the crew whether or not the area was free of obstacles;

l) the crewmembers reported that no abnormality concerning the performance of the aircraft, or its systems was observed by them;

m) on the day of the occurrence, the Military House team did not arrive in time to carry out their tasks and the pilots performed the approach and landing without any coordination with the ground;

n) the flight was uneventful until the beginning of the hover over the soccer field;

o) there was a movable goalpost in the center of the field, which was painted gray, it was very worn and showed rust in several places;

p) in the afternoon, natural lighting at the accident site was reduced due to the shadow produced by the topography of the place;

q) after positioning the aircraft in hover, in the center of the field, the PIC commanded a left turn to complete the landing procedure and, at that moment, the helicopter's tail rotor collided with the soccer goalpost;

r) the aircraft had substantial damage; and

s) all occupants left unharmed.

3.2 Contributing factors.

- **Piloting judgment – a contributor.**

The decision to proceed with the landing without the support of the Casa Militar do Governo ground team to inform whether or not the area was free of obstacles, according to the consolidated doctrine reported to the investigators, characterized the inadequate assessment of the risks involved in the operation without such information.

- **Work organization – undetermined.**

The inefficiency in the organization of the work context has likely favored the accumulation of functions and a high workload on the PIC, which may have compromised his operational performance and contributed to this occurrence.

- **Perception – a contributor.**

The worn gray paint on the goalpost (which offered little contrast in relation to the soccer field lawn), the reduced natural lighting, and the fact that the PIC did not foresee the obstacle in the place where the helicopter was routinely positioned, impaired the pilot`s ability to identify the obstacle and led to a reduction in his level of situational awareness.

- **Flight planning – a contributor.**

The planning and execution of activities at the administrative and operational levels, given the activation of this type of mission without adequate time for planning and performing the preparations at the destination, were considered insufficient for the maintenance of the NADSO.

- **Decision-making process – undetermined.**

It is possible that self-imposed pressures, resulting from having the highest authority in the state as a passenger, have produced difficulties in perceiving, analyzing, and choosing the most appropriate alternative, compromising the quality of the crew's decision-making process.

- **Managerial oversight – a contributor.**

The absence of support personnel at the time of landing and the accumulation of tasks by the PIC characterized inadequate supervision of activities in the administrative and operational spheres carried out by the management (non-crew) of the organization.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation made intending to prevent 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 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-133/CENIPA/2018 - 01 **Issued on 09/21/2022**

Work with the UAP of the Espirito Santo Government`s Secretariat of the Military House in the sense that the operator improves the policy, procedures, instructions, and guidelines contained in its SGSO, particularly with regard to the general requirements for risk management established in the letter (d) of section 91.131 of the RBAC 90.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On September 21th, 2022.