

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
IG-187/CENIPA/2013

OCCURRENCE:	SERIOUS INCIDENT
AIRCRAFT:	PR-EKN
MODEL:	BK 117 C-2
DATE:	15OCT2013



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 15OCT2013 serious incident with the BK 117 C – 2 aircraft, registration PR-EKN. It was classified as “Others”.

During landing on a soccer field, the touch of the tail guard and the left vertical stabilizer of the helicopter on the ground occurred.

The aircraft suffered minor damage.

All occupants were unharmed.

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



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ADE	Aircraft Registration Category Direct State Administration
AIS	Aeronautical Information Services
ANAC	National Civil Aviation Agency
ATS	Air Traffic Services
BEA	Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CHT	Technical Qualification Certificate
CMA	Aeronautical Medical Certificate
IFR	Instrument Flight Rules
METAR	Meteorological Aerodrome Report
PCH	Commercial Pilot License - Helicopter
PPH	Private Pilot License - Helicopter
RS	Safety Recommendation
SBFZ	ICAO location designator – Fortaleza Aerodrome - CE
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accidents Investigation and Prevention System
UTC	Universal Time Coordinated
VFR	Visual Flight Rules

1. FACTUAL INFORMATION.

Aircraft	Model: BK 117 C - 2	Operator: Secretaria da Ciência e Tecnologia da Educação Superior - SECITECE
	Registration: PR-EKN	
	Manufacturer: Eurocopter Deutschland	
Occurrence	Date/time: 15OCT2013 - 1430 UTC	Type(s): "Others"
	Location: Soccer Field	
	Lat. 03°29'37"S Long. 039°36'02"W	Subtype(s):
	Municipality – State: Itapipoca - CE	

1.1 History of the flight.

The aircraft took off from the Pinto Martins Aerodrome (SBFZ), located in the city of Fortaleza - CE, to Itapipoca - CE, at about 0200 (UTC), in order to transport personnel, with one pilot and eight passengers on board.

During the landing on a soccer field, there was the touch of the tail guard and the left vertical stabilizer of the helicopter on the ground.

After the engine shutdown, it was observed that the aircraft had minor damage in the tail guard and left vertical stabilizer.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	1	8	-

1.3 Damage to the aircraft.

The aircraft had minor damage in the tail guard and in the left vertical stabilizer.



Figure 1 - Damage caused in the vertical stabilizer and tail guard.

1.4 Other damage.

Nil.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Hours Flown	
	Pilot
Total	1.200:00
Total in the last 30 days	07:30
Total in the last 24 hours	00:30
In this type of aircraft	43:30
In this type in the last 30 days	03:00
In this type in the last 24 hours	00:30

N.B.: The Data on flown hours were obtained from the Pilot.

1.5.2 Personnel training.

The pilot took the Private Pilot course - Helicopter (PPH) at EDRA Aeronáutica - SP, in 2004.

1.5.3 Category of licenses and validity of certificates.

The pilot had the Commercial Pilot License – Helicopter (PCH) and had valid Ratings for BK 117 aircraft type and Instrument Flight - Helicopter (IFRH).

1.5.4 Qualification and flight experience.

The pilot was qualified and had experience in that kind of flight, but he had about 43 hours of flight in the model of the occurrence.

1.5.5 Validity of medical certificate.

The pilot had valid Aeronautical Medical Certificate (CMA).

1.6 Aircraft information.

The aircraft, serial number 9547, was manufactured by Eurocopter Deutschland in 2013 and was registered in the category of Direct State Administration (ADE).

The Certificate of Airworthiness (CA) was valid.

The airframe and engine logbooks records were updated.

The last inspection of the aircraft, the "50 hour-type" was performed on 15JUN2013 by the Helibras shop, in Itajubá - MG, having flown 48 hours and 45 minutes after the inspection.

The aircraft had a total of 97 hours and 45 minutes of flight.

1.7 Meteorological information.

The 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 outside the Aerodrome.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

During the hovering flight that preceded the landing on an irregular terrain, the aircraft touched the ground with the rear (tail guard and left vertical stabilizer).

There was no detachment of parts from the aircraft.

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.

Nil.

1.18 Operational information.

The aircraft was within the limits of weight and center of gravity (CG) specified by the manufacturer.

The pilot reported that he checked the weather conditions of the route in the AIS Room at Pinto Martins International Airport (SBFZ) before the flight.

After sending the flight plan, the pilot proceeded to the aircraft, performed the pre-flight, checked the fuel supply and the list of passengers that would continue on the flight.

He had previously used the Itapipoca soccer field for landing with other helicopter models; however, it would be the first on-site operation using the BK 117. The helicopters previously operated by the pilot had the performance (power of the thruster group) less than BK 117.

The crewmember reported that he knew the conditions of the terrain (presence of sand and dust) in Itapipoca.

The takeoff from SBFZ was performed normally. After approximately 30 minutes, the aircraft was prepared for landing by observing the wind and obstacles present on the site.

The helicopter made the approach to the soccer field and, during the transition from the approach to landing, the main rotor blow raised dust and other wreckage, causing a momentary loss of visual references with the ground.

The pilot, even without these references, continued to land. The aircraft remained with an attitude surpassed the ideal, which caused the touch of the tail guard and left vertical stabilizer of the helicopter against the ground.

The pilot reported that he had never experienced similar situation and that all aircraft commands were acting correctly.

1.19 Additional information.

The landing and takeoff of a helicopter on a sand or dusty terrain may produce a dense cloud and lead to the pilots' disorientation. This phenomenon is known as brownout and can cause an aeronautical occurrence.

During the occurrence of brownout, air recirculation and flat surface runoff produced by the rotating wings (main rotor) cause clouds of dust to appear, making it difficult to see the external references by the pilot.

Such a scenario impairs the directional control of the aircraft near the ground, reducing the situational awareness of the crew and, therefore, significantly increasing the risks of collisions against obstacles or against the ground.



Figure 2 - Occurrence of brownout at takeoff (illustrative image).



Figure 3 - Occurrence of brownout in the landing (illustrative image).

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

During the investigation, it was found that the operating conditions of the aircraft were normal and did not contribute to the occurrence.

The pilot was aware that the soccer field in Itapipoca had sand and dust. Although the pilot had already operated on the spot, it was the first time he had landed with the BK 117 in that locality, which showed lack of experience in this model during this type of operation.

This aircraft had two engines and performance (power of the propulsion group) superior to the other types previously operated by the pilot in that same place.

This fact compromised his pilot judgment, because it was not considered that the higher the power of the helicopter, the greater the blow of the main rotor and, consequently, the greater the possibility of brownout.

In the scene of the incident involving the PR-EKN, the pilot was landing on a soccer field, in which there was sand and dust that, combined with the blow of the main rotor, provided the formation of the brownout phenomenon.

It was observed that the touch of the tail guard and left vertical stabilizer of the helicopter against the ground was the result of the momentary loss of the view of the terrain by the pilot, after the appearance of a dense cloud of dust, characteristic of the brownout.

The occurrence of brownout during the landing decreased the situational awareness of the pilot, influencing his performance, making it difficult to control the aircraft, which caused the collision of the vertical stabilizer and the tail guard against the ground.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilot had valid Aeronautical Medical Certificate (CMA);
- b) the pilot had valid Technical Qualification for the aircraft BK117;
- c) the pilot was qualified and had only 43 hours of flight in that aircraft model;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the aircraft was within the weight and balance parameters specified by the manufacturer.
- f) the airframe and engine logbooks records were updated;
- g) the weather conditions were favorable for the visual flight;
- h) during the landing on a soccer field, there was momentary loss of visual references with the ground due to the dust raised by the blowing of the main rotor of the helicopter (brownout);
- i) the tail guard and the left vertical stabilizer of the aircraft touched the ground;
- j) the aircraft suffered minor damage; and
the occupants were unharmed.

3.2 Contributing factors.

- **External influences – a contributor.**

The occurrence of brownout interfered with the crewmember's operational performance.

- Piloting judgment – a contributor.

There was an inadequate assessment regarding certain aspects related to the performance of the aircraft, about the effects that the blow of the rotor would cause to the landing in that locality.

The lack of understanding of this possible scenario led the pilot to decide on the landing in a condition that he was unaware of, when dealing specifically with that model of helicopter, with greater power.

- Insufficient pilot's experience – a contributor.

The pilot's lack of experience in that aircraft model, in this type of operation, was a contributing factor for the occurrence.

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 Brazil's National Civil Aviation Agency (ANAC):

IG-187/CENIPA/2013 - 01

Issued on 09/04/2018

Act in conjunction with civil aviation schools, so that these training centers for helicopter pilots emphasize in their courses the factors that contribute to the occurrence of brownout, especially during landings and departures from unlicensed or unregistered locations, and the risks associated with this phenomenon.

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Disclose the lessons learned in this research in order to alert pilots and helicopter operators to the risks associated with the phenomenon known as brownout, especially during landings and departures from unlicensed or unregistered sites.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

In April 2014, SERIPA II prepared and published the journal PreviNE, in which it alerted pilots to the risks caused by brownout.

On September 4th, 2018.