

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



**FINAL REPORT**  
**IG-085/CENIPA/2014**

<b>OCCURRENCE:</b>	<b>SERIOUS INCIDENT</b>
<b>AIRCRAFT:</b>	<b>PR-HFC</b>
<b>MODEL:</b>	<b>AS-355N</b>
<b>DATE:</b>	<b>26APR2014</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 26APR2014 serious incident with the AS-355N aircraft, registration PR-HFC. The serious incident was classified as “Collision with Obstacle In-Flight”.

During the landing in a restricted area, the helicopter's tail rotor touched a bush.

The aircraft suffered minor damage.

The pilots, one crewmember and three passengers left unharmed.

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



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**GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS**

ADF	Federal Direct Administration Aircraft Registration Category
ANAC	National Civil Aviation Agency
BEA	Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile
CA	Airworthiness Certificate
CAOP	Operational Aviation Coordination
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
CRM	Crew Resource Management
DIREX	Executive Board
DPF	Federal Police Department
IFRH	Instrument Flight Rating - Helicopter
NSCA	Aeronautics Command System Rule
PCH	Commercial Pilot License – Helicopter
PF	Pilot Flying
PIC	Pilot in Command
PPH	Private Pilot License– Helicopter
PLH	Airline Pilot License - Helicopter
PNF	Pilot Not Flying
RBHA	Brazilian Regulation of Aeronautical Homologation
UTC	Universal Time Coordinated

## 1. FACTUAL INFORMATION.

<b>Aircraft</b>	<b>Model:</b> AS-355N <b>Registration:</b> PR-HFC <b>Manufacturer:</b> Eurocopter France	<b>Operator:</b> Federal Police Department
<b>Occurrence</b>	<b>Date/time:</b> 26APR2014 - 1900 UTC <b>Location:</b> Ilhota do São Francisco <b>Lat.</b> 08°37'22"S <b>Long.</b> 039°35'52"W <b>Municipality – State:</b> Orocó - PE	<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 municipality of Orocó - PE, at about 0630 pm (UTC), in order to fly over an area with caatinga vegetation in the countryside of Pernambuco, with two pilots, one crew member and three passengers on board.

During the landing in a restricted area, the helicopter's tail rotor touched a bush.

The Pilot Flying (PF) decided to perform a go-around procedure, landing in a safe place that would allow the verification of the general conditions of the aircraft.

After the Pilot Not Flying (PNF) found that, apparently, there was no abnormality, a new takeoff was performed to the municipality of Orocó - PE, where the landing occurred normally.

The aircraft suffered minor damage.

The two pilots, one crewmember and three passengers left unharmed.

### 1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-		-
Serious	-	-	-
Minor	-		-
None	3	3	-

### 1.3 Damage to the aircraft.

The aircraft had damage in the tail rotor blades (Figure 1).



Figure 1 - Damage in the tail rotor blades.

### 1.4 Other damage.

Nil.

## 1.5 Personnel information.

### 1.5.1 Crew's flight experience.

Hours Flown		
	Pilot	Co-Pilot
Total	2.300:00	250:00
Total in the last 30 days	80:00	40:00
Total in the last 24 hours	05:00	05:00
In this type of aircraft	1.000:00	150:00
In this type in the last 30 days	50:00	40:00
In this type in the last 24 hours	05:00	05:00

**N.B.:** The Data on flown hours were obtained from the Pilot's Flight Logbook (CIV).

### 1.5.2 Personnel training.

The pilot took the Private Pilot course - Helicopter (PPH) at *EFAI - Escola de Aviação Civil*, in Contagem - MG, in 2003.

The co-pilot took the Private Pilot course - Helicopter (PPH) at *EDRA Aeronáutica*, in Ipeúna - SP, in 2012.

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

The pilot had the Airline Pilot License - Helicopter (PLH) and had valid Technical Qualifications for H355 aircraft and Instrument Flight Rating – Helicopter.

The co-pilot had the Commercial Pilot License - Helicopter (PCH) and had valid Technical Qualifications for H355 aircraft.

### 1.5.4 Qualification and flight experience.

The pilots were qualified and had experience in that kind of flight.

### 1.5.5 Validity of medical certificate.

The pilots had valid Aeronautical Medical Certificates (CMA).

## 1.6 Aircraft information.

The aircraft, serial number 5704, was manufactured by Eurocopter France, in 2002, and was registered at the Federal Direct Administration category (ADF).

The aircraft had valid Airworthiness Certificate (CA).

The airframe and engine logbook records were updated.

The last inspection of the aircraft, the "100 hour" type was performed on 16APR2014 by *Líder Aviação* shop in Brasília, DF, having flown with 42 hours and 12 minutes after the inspection.

## 1.7 Meteorological information.

Nil.

## 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 impact occurred during the landing, in a restricted area. During the landing, the aircraft turned to the left colliding the tail rotor against a bush.

### **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.**

The Operational Aviation Coordination of the Federal Police Department (CAOP / DPF) was responsible for promoting air support for the operational activities of the Federal Police and other public security agencies at the federal level. It was subordinated to the Executive Board (DIREX) of the Federal Police.

The CAOP / DPF was based at the Brasilia International Airport, with operational bases scattered throughout the country.

Composed by pilots, aero tacticians (gunners) and ground support personnel, its mission was to support Federal Police operations, armed air support for the location and destruction of cocaine laboratories, recognition and plotting of marijuana growing areas, destruction of clandestine runways, border patrols, recognition and delimitation of areas subject to environmental crimes (mainly deforestation and illegal mining), observation and monitoring of civil unrest, repression of crimes against property (especially robbery of banks), transportation of federal police officers to national territory, transportation of prisoners and authorities, medical evacuation in police operations (and other pertinent situations), air support to counterterrorism operations and support to police intelligence activities, among other functions.

The CAOP / DPF staff establishment plan consisted exclusively of federal police officers (observing the responsibilities of each position) who had fulfilled the minimum service time required in the initial assignment.

Pilots were required to hold a pilot license (IFR / PCH or higher) and operators were required the completion of the Aero-Tactical Operations Course.

### 1.18 Operational information.

The aircraft was within the limits of weight and center of gravity (CG) specified by the manufacturer and it was fulfilling a planned mission, of police nature, being carried out in the countryside of Pernambuco.

During the landing, in a restricted area, the touch of the tail rotor occurred in a characteristic bush of the native vegetation. The pilot then aborted the landing and started a go-around procedure, verifying whether there was any kind of vibration in the aircraft's controls.

Further, on, in an area with fewer obstacles and safe for landing, the pilot landed safely and made it possible to better evaluate the conditions of the aircraft.

After a visual inspection by the co-pilot, there was a new takeoff to the municipality of Orocó - PE, where, through a technical inspection performed by mechanics, it was identified the presence of scratches on the tail rotor blades and kneading in the respective impact fingers (Figure 1).

The pilots had experience in the type of operation and knew the region.

The crew was composed by the commander, in the position of Pilot Flying (PF), co-pilot, in the position of Pilot Not Flying (PNF) and the tactical aero operator.

In addition to the crew, there were three more people on board.

The operation of helicopters in a restricted area was typical of police activity.

Allied to this, the mission was carried out in a hostile environment and involved risks.

This activity required adequate coordination among the crew, which included mass Crew Resource Management (CRM) concepts.

In this type of operation, the use of standard phraseology by the tactical aero operator would enable pilots to effectively manage information, constituting a relevant aspect to avoid the establishment of any cabin conflict. In the case in question, the tactical operator acknowledged that he was not readapted for that type of operation.

The CAOP / DPF Training Program did not establish a systematic procedure that appropriately included the participation of the aero-tactical operator in the context of air operations, notably with regard to CRM.

In order to carry out the different types of operation, it was not properly taken into consideration the proficiency degree in which the aero-tactical operators were.

For the pilots, the Training Program established the readaptation for a flight leave case for more than 30 days; however, there was no clear definition about the type of training to which the pilot would be subjected.

A technical consulting firm carried out the monitoring of the CAOP / DPF operational routine. This was a supervision of the training and training processes of the crew, including activities such as CRM. At the time of this serious incident, this activity was suspended.

### 1.19 Additional information.

Regarding air operations of Public Security and / or Civil Defense, Subpart K of the Brazilian Regulation of Aeronautical Homologation (RBHA) 91, in force at the time of the occurrence, established that:

91.961 - SPECIAL CONDITIONS OF OPERATION.

(a) The DAC, a priori, authorizes the following special operating conditions, excepting the general provisions of this regulation, in public security and / or civil defense air operations, provided that the objective is protection and public help. It

is the duty of the Authority to establish training programs and standard operation and flight safety procedures to guide the conduct of crews under such special conditions.

(1)...

(2)...

(3) exemption from the requirements set in paragraph 91.102 (d) of this RBHA for landings and departures at non-approved or registered locations, as well as in landing areas.

(...)

(c) In order to authorize or perform an air operation under paragraphs (a) and (b) of this section, the Organ and / or the commander of the aircraft involved shall manage the risks taking into account, among others:

(1) whether the risks created by the operation will not aggravate an already serious situation;

(2) whether the risks created by the operation, regarding third parties, are valid in terms of "cost-benefit";

(3) whether the risks assumed in the operation are acceptable in relation to the objectives of the operation; and

(4) whether the crews involved are adequately trained and capable of carrying out the mission.

According to Pinto (2011, p.179):1

[...] the possibility of human error in the accomplishment of the emergency missions of the Brazilian Public Security Aviation is described in the eight phases of an emergency or planned air mission, specifying each one of them, indicating a high-risk exposure due to the complexity of acts and decisions taken in each of the eight phases:



Figure 2- Complete Cycle of a Public Security Aviation Mission / Operation.

1 PINTO, Milton Kern. A sobrevivência de helicópteros como um dos fatores preponderantes na aviação de segurança pública do Brasil. Revista Conexão SIPAER, Brasília, v.2,n.3, p.171-189, ago. 2011. Disponível em:<<http://conexaosipaer.cenipa.gov.br/index.php/sipaer/article/view/109/136>>. Acesso em 21abr.2017.

Still according to Pinto (2011, p. 180), the fourth phase, which deals with the visualization of the mission site and approach to landing, addresses, among others, aspects related to the influence of direction and wind intensity:

[...] the fourth phase concerns the visualization of the mission location and approach, with possible inaccuracies, such as: hot ticket in the approach circuit of the emergency mission with a lot of speed, generating inattention to obstacles on the ground (high voltage, trees, poles etc.). Also, flaire (rounding) accentuated for landing, propitiating, according to direction and intensity of the wind, a possible pre-stol or stol of flaire power (rounding) with nose up accented with wind tail. improper selection of the landing site (overly restricted area or touch area with a lot of ground inaccuracy) generating danger to the disembarkation or embarkation; Incorrect judgment on the approximation of the landing ramp or hovering flight with obstacles, associated with the direction and intensity of the wind; incorrect or lack of standard operating phraseology by the crew, in the coordination of approaches and landings in restricted areas; distraction of the crew as to the coordination procedures in the approaches, focusing more attention (tunnel vision) on the occurrence on the ground, such as: victims, people, vehicles etc., forgetting to visualize the obstacles present in the approach ramp for a restricted area (wires, birds, wind, towers, trees, etc.); inattention of the crew to the presence of people in movement in the area of landing and touch of the helicopter; forget about the anticipated planning for a probable go-around procedure in the approaching site, evaluating its availability of power reserve for a possible transposition of obstacles to the detriment of the required power; lack of co-ordination or incorrect cockpit phraseology in acts and functions of each crew member on landing approaches on rocks, elevated helipads, or terraces of burning buildings; lack of application of effective situational awareness with decisive and anticipated behavior in approaches and landings (restricted areas) in places where there are circumstances at risk of helicopter landing such as wires, birds, towers, antennas, fire, smoke, calorie, large numbers of people and vehicles on the move nearby.

## 1.20 Useful or effective investigation techniques.

Nil.

## 2. ANALYSIS.

The aircraft carried out a planned police mission in a region characterized by the caatinga vegetation.

When performing a restricted area operation, the aircraft was influenced by lateral winds, causing the tail rotor to touch a bush. Then the pilot aborted the landing and started a go-around procedure to see if there was any kind of vibration in the aircraft controls.

The influence of the wind is related to a tendency of the helicopter to approach the relative wind when it is not perfectly aligned with the longitudinal axis of the aircraft. In this case, the pilot should cancel this trend, through an efficient use of the pedals, contrary to the displacement of the nose.

Further on, in a less obstructed and safe area, the pilot landed safely and made it possible to better evaluate the conditions of the aircraft.

The pilots were familiar with the area in which the police operation was taking place.

At the time of the serious incident, the aircraft was engaged in a police operation in which the crew was exposed to the hazards and threats characteristic of a hostile environment.

The specificities of Public Security air operations required the crew to effectively manage both aspects related to flight and those concerning the police operation.

The operation in restricted area required adequate coordination of the crew (CRM), with the management of the information transmitted by the aero-tactical operator, through the use of a standard operating phraseology.

However, the CAOP / DPF Training Program did not establish a systematic procedure that appropriately included the participation of the aero-tactical operator in the context of air operations, especially with regard to CRM.

It should be emphasized that CRM is a training focused on the development and / or enhancement of non-technical skills. In doing so, it works out the cognitive and social skills required for team integration and proper flight management.

The aero-tactical operator was not readapted to carry out such an operation, and the reduction of his situational awareness of the obstacles around the helicopter compromised the interaction between the crew.

The performance presented by the tactical aero operator was possibly related to the inadequate flight training of that nature, notably with regard to CRM, including the use of standard phraseology.

It was also observed that, for the different types of police operation, the aero-tactical operators were scheduled without an appropriate assessment of their degree of proficiency.

These facts denoted flaws in what concerns the organizational processes aimed at monitoring and evaluating the performance of the crew. Such failures, considered latent conditions present in the organization, allowed the crew to be composed without one of the crewmembers being adequately prepared for that mission.

Helicopter landings and take-offs at non-approved or registered sites, under Public Security and Social Defense operations, were covered by RBHA 91.961.

Pilots operating in this segment of the aviation and operating in a restricted area assume full responsibility for the conduct of the flight, subjectively assessing the conditions of the chosen landing site, taking into account aspects such as dimensions, presence of obstacles, wind intensity etc.

In the case of this serious incident, the lack of use or inappropriate use of the standard operating phraseology during the approach to landing in the restricted area, as well as the lowering of the level of situational awareness, may have compromised the decision-making process of the crew. Furthermore, it is possible that such circumstances would have rendered the anticipation necessary for the approach and landing phases unworkable, without which the touch of the tail rotor of the aircraft against the bush became irreversible.

Also based on the information available and according to the aspects of the fourth phase of the Complete Cycle of a Public Aviation Air Operation, described by Pinto (2011, p.180), are inferred as more probable hypotheses for the occurrence the following factors:

- improper selection of landing site;
- inadequate assessment of wind conditions (direction and intensity);
- incorrect visualization of the restricted area and its approach axis, due to entering the approach circuit with excessive speed, generating inattention to obstacles on the ground (vegetation), followed by the realization of flaire accented for landing;
- incorrect judgment of the approach ramp for landing;

- distraction of the crew during the landing approach phase, focusing more attention (tunnel vision) on the unfolding of the police activity on the ground, failing to adequately visualize the obstacles present in the approach ramp (bushes) for a restricted area.

The circumstances present in this occurrence have shown once again that, when operating in an environment with a high degree of risk and characterized by complexity and unpredictability, Public Security and Social Defense Aviation differs from other civil aviation segments, among other aspects, in relation to Flight Planning and Risk Management, even when it comes to planned missions.

### 3. CONCLUSIONS.

#### 3.1 Facts.

- a) the crew had valid Aeronautical Medical Certificates (CMA);
- b) the pilot had valid Technical Qualification for the H355 aircraft type;
- c) the pilots were qualified and had experience in that kind of flight;
- d) the third crew member (aero-tactical operator) was not readapted to perform that type of operation;
- e) the CAOP / DPF Training Program did not establish a systematic procedure that would appropriately include the participation of the aero-tactical operator in the context of air operations;
- f) the aircraft had valid Airworthiness Certificate (CA);
- g) the aircraft was within the weight and balance parameters specified by the manufacturer.
- h) the aircraft carried out a planned mission of a police nature in a region characterized by the caatinga vegetation;
- i) the crew managed aspects related to the flight and to the police operation;
- j) during the landing, in a restricted area, the aircraft turned to the left colliding the tail rotor against a bush;
- k) after the touch of the tail rotor of the helicopter against a bush, the pilot performed a go-around procedure and landed in a safe area, aiming at the verification of the general conditions of the aircraft;
- l) It was identified the presence of scratches on the tail rotor blades and kneading on the respective impact fingers;
- m) the aircraft suffered minor damage; and
- n) the two pilots, one crew member and three passengers left unharmed.

#### 3.2 Contributing factors.

- **Handling of aircraft flight controls – a contributor.**

The contribution of this factor is related to the failure of the pilot to counteract the effect of the wind in the helicopter, through an efficient use of the pedals.

- **Control skills – a contributor.**

There was inefficiency in the management of crew tasks, since the information transmitted by the tactical operator, through the use of standard phraseology, should be a relevant aspect to avoid the establishment of any cabin conflict.

The conflict in the communication between the aero-tactical operator and the pilots of the aircraft contributed to the reduction of the level of situational awareness at the critical moment of the flight, culminating in the touch of the tail rotor against a bush.

- **Crew Resource Management – a contributor.**

The interaction of the crew was compromised by the inadequate management of the tasks in flight as well as by the lack of standardization of the phraseology used in the communication. In addition, the performance of the aero tactical operator, hampered by the need to readapt to that operation, impacted on the quality of the dynamics presented by the team.

- **Training – undetermined.**

Restricted area operation consisted of a complex and demanding task in terms of managing the information and resources available in the cabin. The lack of training focused on the development and / or enhancement of cognitive and social skills may have compromised the performance presented by the aero-tactical operator, hampering effective flight management.

- **Piloting judgment – undetermined.**

When selecting the landing location (restricted area), it is possible that the crew has failed to observe relevant aspects such as: obstacles, wind direction and intensity, approach speed, approach ramp profile, area size, etc.

- **Perception – undetermined.**

The characteristics presented by the operating context offered risks that were not properly observed and managed by the team, which showed a lowering in the level of situational awareness of the crew. This fact may have prevented the necessary anticipation for the approach and landing phases, favoring the occurrence of the touch of the tail rotor of the aircraft against the bush.

- **Management planning – a contributor.**

The fact that the aero tactical operator was not adequately readapted for the accomplishment of that type of flight characterized the contribution of this aspect in the operational scope.

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

The decision to perform the landing in the restricted area selected by the crew may have been based on an inadequate assessment of the risks present in that operating context. The inadequate observation of the characteristics present in that scenario, the lack of standard phraseology used for communication, as well as the low level of situational awareness of the crew may have favored an erroneous judgment on the landing conditions.

- **Organizational processes – a contributor.**

The Operator did not have formally established organizational processes for monitoring and evaluating the level of the crew proficiency. This failure generated a latent condition in the organization that allowed the aero tactical operator to compose the crew, although it was not adequately readapted for the accomplishment of that type of flight.

#### **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-085/CENIPA/2014 - 01**

**Issued on 05/04/2018**

Act with the operator, the Federal Police Department, in order to incorporate in its Operational Aviation Coordination Training Program (CAOP / DPF) a standardized programming for readaptation missions, directly addressing all the tasks to be accomplished by the aero tactical operators, in order to mitigate the risks involved in Aero Police.

**IG-085/CENIPA/2014 - 02**

**Issued on 05/04/2018**

Act with the operator, the Federal Police Department, in order to create mechanisms, which are capable of ensuring that only aeronautical operators with adequate proficiency in air operations are scheduled to the accomplishment of Aero Police missions.

**IG-085/CENIPA/2014 - 03**

**Issued on 05/04/2018**

Acting with the operator, the Federal Police Department, in order to implement, within the scope of its crew, an adequate CRM training program, oriented, above all, to helicopter operations in a restricted area.

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

Nil.

On April 5<sup>th</sup>, 2018.