

COMMAND OF AERONAUTICS
AERONAUTICAL ACCIDENT INVESTIGATION AND
PREVENTION CENTER



FINAL REPORT
A - 031/CENIPA/2013

<u>OCURRENCE:</u>	ACCIDENT
<u>AIRCRAFT:</u>	PR-FPM
<u>MODEL:</u>	EC-120 B
<u>DATE:</u>	30 April 2009



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 trigger 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 item 3.1, Annex 13 of 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.

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SYNOPSIS

This is the Final Report of the 30 April 2009 accident involving the aircraft model EC120B, registration PR-FPM. The accident was classified as loss of control in flight.

While hovering short of landing, the aircraft performed four fast turns to the left, before the pilot commanded touchdown.

Both the passenger and the pilot got out unhurt.

The aircraft sustained serious damage.

An accredited representative from the French *Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile* (BEA) was appointed for participation in the investigation.

GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	(Brazil's) National Civil Aviation Agency
ATS	Air Traffic Services
CA	Airworthiness Certificate
CCF	Medical Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CHT	Technical Qualification Certificate
FCU	Fuel Control Unit
IAM	Annual Maintenance Inspection
IFR	Instrument Flight Rules
Lat	Latitude
Long	Longitude
LTE	Loss of Tail Rotor Effectiveness
METAR	Routine Aerodrome Meteorological Report
MGO	General Operating Manual
PCH	Commercial Pilot – Helicopter category
PPH	Private Pilot – Helicopter category
RSV	Flight Safety Recommendation
SBSJ	ICAO location designator – São José dos Campos Aerodrome, SP
SBSP	ICAO location designator – Congonhas Aerodrome, SP
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
UTC	Coordinated Universal Time
VFR	Visual Flight Rules

AIRCRAFT	Model: EC120 B Registration: PR-FPM Manufacturer: EUROCOPTER	Operator: Federal Highway Police
OCURRENCE	Date/time: 30 April 2009 / 19:40 UTC Location: BR 116 Lat. 23°18'24"S – Long. 046°02'30"W Municipality– State: Jacareí - SP	Type: Inflight loss of control

1 FACTUAL INFORMATION

1.1 History of the occurrence

The aircraft departed on a ferry flight from SBSP, destined for the Base of Operations of the Federal Highway Police in São José dos Campos, State of São Paulo, with a passenger and the pilot on board.

While en route, according to the pilot, the aircraft received a request to provide police support to an occurrence in the vicinity of the junction between the highways *Presidente Dutra* (BR-116) and *Dom Pedro I* (SP-065).

The pilot chose an appropriate obstacle-free area free for landing. The pilot reported that, while hovering, there was a strong yaw to the left, with the aircraft starting a sequence of four fast turns to the left, after which he commanded the touchdown.

1.2 Injuries to persons

Injuries	Crew	Passengers	Third parties
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
Unhurt	01	01	-

1.3 Aircraft damage

The aircraft sustained serious damage to the ski, and minor damage to the fuselage.

1.4 Other damage

None.

1.5 Personnel information

1.5.1 Information on the crew

HOURS FLOWN	
	PILOT
Total	940:30
Total in the last 30 days	41:05
Total in the last 24 hours	05:10
In this type of aircraft	831:30
In this type in the last 30 days	41:05
In this type in the 24 hours	05:10

NB.: data provided by the operator.

1.5.1.1 Professional formation

The pilot did his Private Pilot (Helicopter category) course at the *Escola Edra Aeronáutica* in the year 2000.

1.5.1.2 Validity and category of licenses and certificates

The pilot had a valid Commercial Pilot (Helicopter category) license, as well as a valid EC20 type aircraft technical qualification.

1.5.1.3 Qualification and flight experience

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

1.5.1.4 Validity of the medical certificate

The pilot had a valid medical certificate (CCF).

1.6 Aircraft information

The (serial number 1280) aircraft was manufactured by *EUROCOPTER* France in 2002.

Its airworthiness certificate was valid.

The airframe and engine logbooks had up-to-date records.

In the last 48 hours before the accident, nine complete cycles (landing and takeoff) had been written in the Logbook, including the one of the accident flight.

The last inspection of the aircraft (100/500 hours type) was made on 31 March 2008 by the *Líder Aviação* Workshop in Brasília, Federal District. The aircraft flew 72 hours and 10 minutes after the inspection.

The last overhaul of the aircraft (Annual Maintenance Inspection type) was made on 13 March by the *Líder Aviação* Workshop in Brasília, Federal District. The aircraft flew 1,924 hours and 35 minutes after the overhaul.

1.7 Meteorological information

Prevailing weather conditions were VMC.

According to the METAR of SBSJ (at a distance of 20 Km from the site of the accident), at the time of the occurrence, the wind was varying between 170 and 200 degrees, at 04-07kt.

1.8 Navigational aids

Nil.

1.9 Communications

Nil.

1.10 Aerodrome information

Not applicable.

1.11 Flight recorders

Neither required nor installed.

1.12 Wreckage and impact information

The impact occurred in a practically vertical direction. There was a partial opening of the skis, resulting in full damage (total loss).

The fuselage detached from the skis at the rear fixation points, with the aircraft leaning on its right side (approximately 20 degrees of inclination).



Figure n° 1 Situation of the aircraft after landing.

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.

1.13.3.1 Individual information

Nil.

1.13.3.2 Psychosocial information

Nil.

1.13.3.3 Organizational information

Nil.

1.14 Fire

None.

1.15 Survival aspects

Nil.

1.16 Tests and research

After the accident, the aircraft was removed and stored in the premises of the *LÍDER Signature* company.

Non-destructive tests (Fluorescent Penetrant Liquid method) were performed in the components of the Fuel Control Unit – FCU.

This type of test aimed to detect cracks in the component and, contingently, indicate whether there was any abnormality in the helicopter fuel/engine system, but nothing abnormal was found.

The damage technical report issued by *LÍDER Signature* detailed the damage to the structure, to the landing gear (skis), to the engine/rotary assembly, and to the systems of the aircraft.

None of the aircraft parts aforementioned presented any evidence of damage or malfunctioning that might have contributed to the occurrence.

1.17 Organizational and management information

Except for the Flight Manual written by the manufacturer, the helicopter operator did not have any publication guiding the regular operation of the equipment.

1.18 Operational information

The aircraft was on a ferry flight between SBSP and the Base of Operation of the Federal Highway Police in São José dos Campos, State of São Paulo.

The flight estimated enroute elapse time was 40 minutes, and it was conducted in VMC.

According to the pilot, at some point during the flight, the aircraft was requested to provide police support to an occurrence in the vicinity of the junction between the highways *Presidente Dutra* (BR-116) and *Dom Pedro I* (SP-065).

The pilot selected an area free of obstacles appropriate for landing near the highways mentioned above, so that the passenger (a Police Agent) could move from the copilot seat to the rear seat of the helicopter.

On the final approach for landing, near the ground, the pilot lost directional control of the helicopter, which yawed to the left.

After making four complete turns around the vertical axis, the pilot lowered the collective control in order to allow the aircraft to touch down.

In an abrupt manner, the helicopter touched the grass of the terrain selected for landing.

After the rotors came to a stop, the two aircraft occupants got out of the helicopter through the main doors with no injuries.

The aircraft was within the limits of weight and center of gravity prescribed by the manufacturer.

1.19 Additional information

The Police Agent that was being transported in the helicopter between SBSP and SBSJ was not part of the crew. However, he was sitting in the front left seat of the aircraft, in front of the cyclic and collective controls, as well as the pedals.

Characteristically, in the EC120, like in other French helicopter models, the main rotor rotates clockwise.

Thus, the reaction torque in the airframe takes place in a counterclockwise direction. Therefore, the right pedal, in particular, actuates as an anti-torque in this type of equipment.

The increase of the torque, together with certain combinations of wind direction and strength, may generate flight situations in which there is insufficient (pedal-commanded) tail rotor anti-torque capability.

In such case, no corrective is immediately effective, and the undesired turn to the left is unavoidable, giving rise to a phenomenon known as *Loss of Tail Rotor Effectiveness – LTE*.

1.20 Utilization of other investigation techniques

Nil.

2 ANALYSIS

The pilot was rather experienced both in flights over that region and in the equipment.

In relation to the last 48 hours before the accident, nine complete cycles (landing and takeoff) had been recorded in the aircraft logbook, including the one of the accident. The Police Agent that was being transported at the time was not a pilot of the aircraft.

Although this is not required by the legislation in force and applicable to the operation of the helicopter, the investigator in charge did not receive any publication aimed at disciplining the crew's operational routine, such as a General Operating Manual (GOM).

The GOM has the objective of standardizing the procedures performed by the crews and of setting the organization's doctrine, therefore, increasing the level of the pilots' situational awareness, a crucial aspect for operators who utilize the aircraft in different types of missions.

The site of the accident did not feature either natural or man-made obstacles, which might contribute for the disturbance of the aerodynamic flow acting on the helicopter rotors or restrict in any form the movement of the helicopter near the ground – on the approach for landing.

The numbers relative to the wind were not obtained in the area of the occurrence, but in SBSJ, located at a distance of 20Km from the site of the accident.

Considering the direction of the approach of the helicopter for landing, and the approximate direction/strength of the wind in the region of the belt highway, the conclusion was that the characteristics of the situation were compatible with a landing under normal operating conditions.

The technical reports issued did not present any evidence of damage or pre-existing malfunctioning of helicopter items or equipment, which might have contributed to the occurrence.

On account of the facts presented above, the Loss of Tail rotor Effectiveness (LTE) was identified as a possible contributing factor for the occurrence, due to an inappropriate application of the controls by the pilot.

The fact that the passenger was sitting in the front left seat, with all the installed flight controls, may have restricted the application of the controls to the extent necessary for the pilot to counteract the phenomenon, and this latter could only command the landing, by means of lowering the collective control.

3 CONCLUSIONS

3.1 Facts

- a) The pilot had a valid medical certificate;
- b) The pilot had a valid Technical Qualification Certificate (CHT);
- c) The pilot was qualified and had enough experience for the flight;
- d) The aircraft had a valid airworthiness certificate;
- e) The aircraft was within the limits of weight and balance;
- f) The aircraft was operating a ferry flight between SBSP and the operational base of the Federal Highway Police, in São José dos Campos, State of São Paulo;
- g) The flight was conducted in VMC and had an estimated elapse time of 40 minutes;
- h) While enroute, according to the pilot, the aircraft was requested to provide police support in the vicinity of the junction between the highways *Presidente Dutra* (BR116) and *Dom Pedro I* (SP-065);
- i) The pilot chose a free and appropriate area for landing;
- j) On the final approach for landing, close to the ground, the pilot lost directional control of the helicopter, which yawed to the left;
- k) After rotating four times around the vertical axis, the pilot lowered the collective control so that the aircraft could touch the ground;
- l) The aircraft skis were seriously damaged; and
- m) The passenger and the pilot got out uninjured.

3.2 Contributing factors

3.2.1 Human Factor

3.2.1.1 Medical aspect

Nil.

3.2.1.2 Psychological aspect

3.2.1.2.1 Individual information

Nil.

3.2.1.2.2 Psychosocial information

Nil.

3.2.1.2.3 Organizational information

Nil.

3.2.2 Operational factor

3.2.2.1 Concerning the operation of the aircraft

a) Application of controls – undetermined

The pilot, despite his experience and training in the aircraft model, may not have corrected the helicopter aerodynamic reaction appropriately.

The presence of a passenger on the left hand side seat may have restricted the proper application of controls for the pilot to counteract the *Loss of Tail Rotor Effectiveness* (LTE) phenomenon.

b) Managerial oversight – undetermined

The police institution did not have a General Operating Manual, and the legislation did not demand it to do so. However, the adoption of such manual favors the uniformization of procedures by the crews, through the establishment of an organizational doctrine of operation, increasing the pilots' level of situational awareness. This is vital for operators who perform different types of missions, as is the case of the Federal Highway Police.

3.2.2.2 Concerning ATS units

Not a contributor.

3.2.3 Material factor

3.2.3.1 Concerning the aircraft

Not a contributor.

3.2.3.2 Concerning ATS equipment and technology systems

Not a contributor.

4 SAFETY RECOMMENDATION (RSV)

It is the establishment of an action that the Aviation Authority or the SIPAER-Link issues within its area of responsibility, aiming at eliminating or mitigating the risk of a latent condition or the consequence of an active failure.

From the SIPAER perspective, a safety recommendation is essential to flight safety, refers to a specific hazard, and has to be fulfilled by a certain deadline.

Safety Recommendations made by the CENIPA:

To the National Civil Aviation Agency (ANAC):

A-031/CENIPA/2013 – RSV 001

Issued on 17/03/2014

On the occasion of revision of the Brazilian Aeronautical Homologation Regulation 91 (RBHA 91), make it mandatory for the operators regulated by subpart K (Public Security/Civil Defense Air Operations) to produce General Operating Manuals on account of the need to standardize/discipline the multiplicity of missions performed.

A-031/CENIPA/2013 – RSV 002

Issued on 17/03/2014

Publicize the contents of this report at seminars, lectures and similar activities targeted to rotary wing aircraft owners, operators and explorers.

5 CORRECTIVE/PREVENTATIVE ACTION ALREADY TAKEN

None.

6 DISSEMINATION

- (Brazil's) National Civil Aviation Agency - ANAC
- Brazilian Helicopter Pilots Association (ABRAPHE)
- (Brazil's) Federal Highway Police
- Bureau d'Enquêtes et d'Analyses* pour la Sécurité de l'Aviation Civile (BEA - France)
- SERIPA IV

7 APPENDICES

None.

On 17 / 03 / 2014