

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A-560/CENIPA/2016

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PR-OMV
MODEL:	EC 225 LP
DATE:	06JUN2012



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 06JUN2012 accident with the EC 225 LP aircraft, registration PR-OMV. It was classified as “[LOC-G] Loss of Control - Ground”.

After the flight, during the taxiing, near the threshold, Pilot Flying (PF) had difficulties to clear the runway to the right and stopped.

The PF took off again, while the aircraft slightly rotated with its nose to the right. Then, the aircraft turned its nose to the left, more quickly, the PF lost control and the aircraft fell to the right, colliding with the ground.

The aircraft suffered substantial damage.

One crewmember suffered a minor injury and the other left unharmed.

An Accredited Representative of 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

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
CIV	Pilot's Flight Logbook
CM	Registration Certificate
CRM	Crew Resource Management
CVFDR	Cockpit Voice and Flight Data Recorder
GSO	Safety Manager
IFR	Instrument Flight Rules
IFRH	Instrument Flight Rating - Helicopter
INFRAERO	Brazilian Airport Infrastructure Company
METAR	Meteorological Aerodrome Report
MGSO	Safety Management Manual
MNTE	Airplane Single Engine Land Rating
NEP	National School of Piloting
PCH	Commercial Pilot License - Helicopter
PF	Pilot Flying
PLH	Airline Transport Pilot License - Helicopter
PM	Pilot Monitoring
PPR	Prevention Report
RBAC	Brazilian Civil Aviation Regulation
RBHA	Brazilian Regulation of Aeronautical Homologation
RELPREV	Prevention Report
RS	Safety Recommendation
SBCB	ICAO location designator – Cabo Frio – RJ
SBME	ICAO location designator – Macaé – RJ
SERIPA	Regional Aeronautical Accidents Investigation and Prevention Service
SIPAER	Aeronautical Accidents Investigation and Prevention System
TPX	Aircraft Registration Category of Non-Regular Public Air Transport
UTC	Universal Time Coordinated
VFR	Visual Flight Rules

1. FACTUAL INFORMATION.

Aircraft	Model: EC 225 LP	Operator: OMNI Air Taxi Joint-Stock Company
	Registration: PR-OMV	
	Manufacturer: Eurocopter France	
Occurrence	Date/time: 06JUN2012 - 2155 UTC	Type(s): "[LOC-G] Loss of Control - Ground"
	Location: Macaé Aerodrome - RJ	
	Lat. 22°20'34"S Long. 041°45'50"W	Subtype(s):
	Municipality – State: Macaé - RJ	

1.1 History of the flight.

The aircraft took off from the Cabo Frio Aerodrome - RJ (SBCB), to the Macaé Aerodrome - RJ (SBME), at about 2135 (UTC), in order to perform a transfer flight, with two pilots on board.

At the request of the Commander, the Copilot remained on the aircraft's controls during approach, landing, and taxiing on the ground. After landing, during taxiing, near threshold 24, in taxiway "D", the pilot had difficulties to clear the runway to the right and stopped.

Upon taking off again, to align the aircraft with taxiway "D", the aircraft turned its nose slightly to the right and then, more quickly, to the left. Then the helicopter fell to the right, colliding with the ground.

The aircraft suffered substantial damage.

One pilot had minor injuries and the other one left unharmed.

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 to the main rotor, tail rotor, tail cone, fuselage, main and rear transmission (sudden stop) and landing gear.



Figure 1 - View of damage to the aircraft.

1.4 Other damage.

An aircraft from another company, PR-JAF, was struck by wreckage of the crashed aircraft.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Hours Flown		
	Pilot	Copilot
Total	4.191:55	535:55
Total in the last 30 days	03:20	03:20
Total in the last 24 hours	00:20	00:20
In this type of aircraft	30:20	30:20
In this type in the last 30 days	03:20	03:20
In this type in the last 24 hours	00:20	00:20

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

1.5.2 Personnel training.

The pilot graduated in the Navy, in 1977.

The copilot took the Private Pilot Course – Helicopter (PPH) at the National School of Piloting (NEP), in Jacarepaguá – RJ, in 1996.

1.5.3 Category of licenses and validity of certificates.

The pilot had the Airline Transport Pilot License – Helicopter (PLH) and had valid Rating for the EC25 aircraft.

The copilot had the Commercial Pilot License – Helicopter (PCH) and had valid Rating for the EC25 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 pilot had valid Aeronautical Medical Certificates (CMA).

1.6 Aircraft information.

The aircraft, serial number 2832, was manufactured by Eurocopter France, in 2012 and it was registered in the TPX category.

The aircraft had valid Certificate of Airworthiness (CA).

The airframe and engine logbook records were updated.

The aircraft was new and had completed the receiving process in Brazil by the operator on the day of the accident. With this, there was no inspection or review to be carried out.

The aircraft had semi-retractable landing gear with wheels and tires in tricycle configuration.

The main landing gear had brakes on both sides with independent controls, installed on the yaw control pedals on both pilot stations. The brakes could be actuated on each wheel independently and from any of the pilot stations.

The nose landing gear was designed in such a way as to be able to rotate 360° around its vertical axis and had no brake. There was a lever-operated lock between the pilot's seat and the copilot's that prevented the nose-landing gear from turning, locking it in a position aligned with the longitudinal axis of the aircraft.

1.7 Meteorological information.

Nil.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

The Aerodrome was public, administered by INFRAERO and operated under visual flight rules (VFR) and by instrument (IFR), in daytime and nighttime.

The runway was made of asphalt, with thresholds 06/24, dimensions of 1,200m x 30m, with elevation of 7 feet.

1.11 Flight recorders.

The aircraft was equipped with a Cockpit Voice and Flight Data Recorder (CVFDR).

The equipment was sent to the facilities of the CENIPA to perform the readings of the communications maintained by the crew in the cockpit and the data related to the flight.

In the exchange of messages between the pilots in the cockpit, it was possible to identify the moment when the pilot in command transferred the commands from the aircraft to the Copilot, with the purpose of him to perform approach, landing, and taxiing.

1.12 Wreckage and impact information.

During the turning of the nose to the left, in relation to the vertical axis of the aircraft, it tilted to the right, with the main rotor touching the taxiway asphalt pavement. This was the first impact.

The main part of the wreckage, consisting of the fuselage and tail cone, was concentrated between the taxiway "D" and threshold 24 of the runway. The fragments resulting from the breaking of the main rotor and tail blades spread in a circular distribution from the fuselage impact site.



Figure 2 - Aircraft tilted to the right and impact of the main rotor against the ground.

An aircraft from another company was hit by the pieces of the main rotor blades that were thrown after the impact on the ground.

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 took off from SBCB to SBME, carrying out a transfer flight, with two crewmembers on board.

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

The Copilot, occupying the left flight station, was performing Pilot Flying (PF) tasks while approaching, landing and taxiing in Macaé. The Commander, occupying the right pilot station, was performing the Pilot Monitoring (PM) tasks.

It was found that the nose wheel locking system was not unlocked after landing, as provided on the check, after landing, in the checklist.

The locking of the directional control prevented the rotation of the nose wheel and kept it aligned with the longitudinal axis of the aircraft.

During the taxi and near threshold 24, on taxiway "D", the PF had difficulties to clear the runway. The aircraft made a smooth right turn with a large curve radius and it was not enough to remain in the horizontal lane exit signaling range, despite the use of the right pedal, right brake and cyclic control.

The PF applied the aircraft brakes and stopped at the intersection of the runway and taxiway "D". At this point, the PM lowered his head to check the position of the nose gear's directional control lock between the driver's seats.

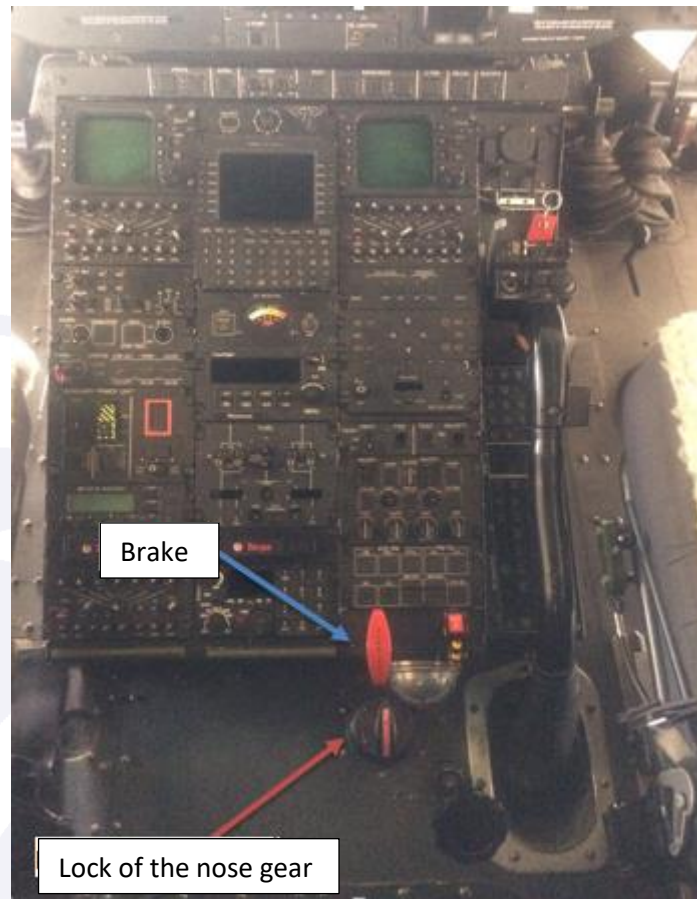


Figure 3 - View of the two levers (brake and lock of the nose gear).

While the PM was head down, the PF reported that he would apply power, pulling the collective, to realign the aircraft in the hovering, without waiting for the Commander's response.

The PF applied power, taking the aircraft off the ground, which caused it to rotate initially to the right, still in a controlled manner, but with a slight slope to the right, around its longitudinal axis.

Then the PM raised his head, and when he noticed the aircraft turning to the right, he applied the pedal to the left.

In the post-accident interviews, the PM stated that he fully applied the left pedal because the aircraft was turning to the right. He also said that the speed of the turn increased and that the aircraft made about three turns to the right, off the ground, at great speed, falling to the right at the end.

Also in the post-accident interviews, the PF stated that he perceived the aircraft somewhat unstable, shortly after removing it from the ground in the hovering, and that there was a sharp turn of 360 ° to the left, uncontrollably. He also said that he tried to apply right pedal, but did not succeed, because the pedal was all applied to the left.

The aircraft went out of control, turned about 360 ° to the left, around its vertical axis, and fell to the right, colliding against the ground. With the overturning, there was the touch of the main rotor with the ground, followed by the shock of the blades of the tail rotor and the right fuselage. The aircraft continued in a left turn, with the right fuselage on the ground, completing a further 270 °, and ended the turn at about 90 ° with the taxiway "D".



Figure 4 - View of the occurrence site.

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

1.19 Additional information.

Camera in the Cockpit

Images were obtained from a cockpit camera that recorded the key moments of the occurrence, including approach, landing, taxi, and loss of control.

In these filming, it was possible to observe that the copilot (PF) was acting in the commands of the aircraft during the approach and the landing. In addition, it was possible to visualize the sequence of events that triggered the accident.

Flight Simulator Training

The initial piloting training stipulated by the aircraft manufacturer consisted of 27 hours in a flight simulator and three hours of flight.

The pilots performed the 27-hour flight simulator training, specified by the manufacturer, and carried out two flights; 1-hour and 30-minute each.

As a result, the pilots only actually taxed the aircraft on two occasions. On these flights, the route between the helicopter's parking lot and the take-off runway required only a 90 ° bend on the ground.

The flight simulator training did not emphasize the operation of the aircraft on the ground.

Crew Resource Management (CRM)

The pilots had valid CRM training.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

The aircraft took off from SBCB to SBME, carrying out a transfer flight, with only two crewmembers on board. The helicopter had completed the process of receipt in Brazil by the operator on the day of the accident.

The pilots were qualified to make the flight, but had little familiarity with the aircraft, despite the experience of the Commander, with more than 4,000 hours of flight and the Copilot, with more than 500 hours of flight.

The crew had little more than 30 hours of flight in the model, most of them in flight simulator and had valid CRM training.

Although they had completed the initial piloting training stipulated by the manufacturer, the pilots only actually taxed the aircraft on two occasions.

On these occasions, the route between the helicopter's parking lot and the take-off runway, on both flights made after flight simulator training, required only a 90 ° curve on the ground.

With this, it is possible to affirm that there was little familiarity of the pilots in the phases of taxi and maneuvers with the aircraft on the ground, because the training in flight simulator did not emphasize the operation of the aircraft on the ground.

It was verified through the interviews and the video recorded by the camera installed in the cabin that the Copilot, occupying the pilot station on the left side, was in command (Pilot Flying), during the approach, landing and taxi in Macaé, while the Commander, occupying the right-hand pilot station, was performing the Pilot Monitoring tasks.

The aircraft's landing gear was the retractable, semi-concealed type, with wheels and tires in tricycle configuration. It was fitted with brakes on both sides, with independent controls installed on the yaw control pedals at both pilot stations.

The brakes could be activated on each wheel independently, from both pilot stations. In addition, the nose landing gear, which did not have a brake, was designed in such a way as to be able to rotate 360° around its vertical axis.

There was a lever-operated lock between the pilot's seats, which prevented the nose-gear from turning, locking it in a position in line with the longitudinal axis of the aircraft.

During the taxiing and near threshold 24, on taxiway "D", the PF had difficulty leaving the runway. The aircraft made a very smooth curve with a large curve radius and it was not sufficient to remain in the horizontal lane exit signaling range, despite attempts by the PF to complete the curve by applying cyclic command to the right, right brake and right pedal.

The nose wheel locking system was not unlocked after landing, as provided in the checklist, which determined the unlocking of the nose wheel's directional control on the check immediately after landing.

Such oblivion may have been due to the crew's poor experience in this type of equipment and the failure to comply with the checklist item.

In an attempt to make the right turn with the directional control locked, the nose landing gear was submitted to stress, at the same time the tire was probably dragged against the asphalt.

As the aircraft did not make the right turn, as expected, and because of the proximity of the taxiway "D" limits, the PF applied the aircraft brakes and stopped it between the runway and taxiway "D".

At that moment, the PM lowered his head to check the position of the nose landing gear's directional control lock located between the pilot's seats because, at nighttime, the parking brake and nose landing gear lock levers were difficult to see. Although they had distinct colors, the proximity between them and similar formats made it difficult to distinguish them during the night period.

Exactly at that moment when the PM was head down, the PF reported that he would apply power, pulling the collective, to realign the aircraft in the hovering, without waiting for the Commander's response.

Immediately after affirming his intentions, the PF applied power, taking the aircraft off the ground, which caused it to turn the nose initially to the right, according to the range of control of the right pedal, still in a controlled way, but with a slight inclination to the right, around its longitudinal axis, according to the position of the cyclic control.

Then the PM lifted his head and, sensing the aircraft's nose-rotation to the right, applied the pedal to the left. In doing so, the PM may have instinctively experienced spatial disorientation, due to the rapid movement of the head from the bottom up, as the aircraft moves around the longitudinal and vertical axes.

On the other hand, the PF noticed the instability of the aircraft in the initial rotation of the nose to the right, followed by the other, to the opposite side, with higher angular velocity. He did not notice, however, that the initial bearing on the right was caused by the position of the cyclic command, which was slightly to the right during the attempt to make a right turn on the ground, before hovering.

At that moment, the aircraft went out of control, turned approximately 360° to the left, around its vertical axis, at a great angular velocity, starting the tipping to the right, because of the extrapolation of the lateral limits of the CG with the turn to the left.

Consequently, the touch of the main rotor occurred with the ground, followed by the shock of the blades of the tail rotor and the right fuselage. The aircraft continued in a left turn, with the right fuselage resting on the ground, completing a further 270°, stopping at 90° with the taxiway "D".

In the moments that preceded the occurrence, there was a lack of coordination among the pilots, since both the PF's action in removing the aircraft from the ground to align it with the taxiway's exit, and the PM's action in making the locking system check and the left pedal command, were not properly agreed between the two of them.

The failure to coordinate the actions in the cockpit at a critical moment in the flight was decisive for the loss of control of the aircraft, since the pilots acted simultaneously in opposite directions on the interlinked pedal control.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilots had valid Aeronautical Medical Certificates (CMA);
- b) the pilots had valid Ratings for EC25 aircraft and IFRH;
- c) the pilots were qualified and had experience in that kind of flight;
- d) the pilots had little familiarity with the aircraft, despite the accumulated experience;
- e) the pilots performed the 27-hour flight simulator training, specified by the manufacturer, and carried out two flights: 1 hour and 30 minute each;
- f) prior to the occurrence, the pilots only performed the taxi of the aircraft in two opportunities;
- g) training in flight simulator did not emphasize aircraft operation on the ground;
- h) the aircraft had valid Airworthiness Certificate (CA);
- i) the aircraft was within the limits of weight and balance;
- j) the airframe and engines logbook records were updated;
- k) the aircraft took off from SBCB to SBME, with two crewmembers on board, to perform a transfer flight;

- l) the Copilot, occupying the left pilot station, was performing the Pilot Flying (PF) functions during approach, landing and taxiing in Macaé;
- m) the Commander, occupying the right pilot station, was performing the Pilot Monitoring (PM) tasks;
- n) the nose wheel locking system was not unlocked after landing;
- o) the PF had difficulty clearing the runway during the taxi near threshold 24, in the taxiway "D" ;
- p) the PF took the aircraft off the ground and applied the right pedal, in order to align it with the runway exit;
- q) the PM applied left pedal to counteract the right turn;
- r) the aircraft went in a uncontrolled turn to the left, colliding the blades of the main rotor against the ground;
- s) the aircraft had substantial damage; and
- t) one crewmember suffered a minor injury and the other left unharmed.

3.2 Contributing factors.

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

The uncoordinated and large extent application of the pedal controls, increased the angular velocity, keeping the aircraft in uncontrolled rotation until the rotor blades collided against the ground.

- **Cabin Coordination - a contributor.**

The failure to coordinate the actions in the cockpit at a critical moment in the flight was decisive for the loss of control of the aircraft, since the pilots acted simultaneously in opposite directions on the interlinked pedal control.

- **Forgetfulness – a contributor.**

There was forgetfulness in the fulfillment of an item from the checklist that foreseen the unlocking of the nose wheel after the landing.

- **Instruction – undetermined.**

Although they had completed the initial pilot training stipulated by the manufacturer, the simulator and aircraft training process did not emphasize the operation of the aircraft on the ground, which may have contributed to the occurrence.

- **Insufficient pilot's experience – undetermined.**

The pilots had only 30 hours of flight in the model, most of them in flight simulator. The Commander's forgetfulness of unlocking the nose wheel after landing and the lack of familiarity with the aircraft's maneuvers on the ground, since they only taxied the aircraft, in fact, on two occasions, may be associated with the little experience of the crew on this type of equipment.

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:

Nil.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

After the event, Omni Air Taxi Company started to give greater power of decision to the Chiefs of Equipment, who began to work outside the flight schedule.

In this way, these professionals can closely follow the line-checks and simulator trainings, in order to better know the pilots of their fleet and to effectively standardize the training of the crewmembers.

The Operations Department created a permanent committee to evaluate the training and performance of the crew, to study the promotions to Commander.

This committee is composed by the Operations Director, Operations Manager, Chief Pilot, GSO, ASV, Team Leader and other members as needed.

The company's MGO was revised to raise the minimum requirements needed for the duties of Commander and Co-pilot of large aircraft.

Pilot Monitoring (PM) and Pilot Flying (PF) procedures have been revised, alerting pilots that the PM always have to be responsible for carrying out the checklist aloud.

On December 4th, 2018.