

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A - 507/CENIPA/2018

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PT-YON
MODEL:	R44
DATE:	10SEPT2010



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 10SEPT2010 accident with the R44 aircraft, registration PT-YON. The accident was classified as “[CFIT] Controlled Flight into Terrain”.

Fifteen minutes after takeoff, the helicopter collided against a mountainous terrain of native forest (Serra do Mar).

The aircraft was destroyed.

The pilot and the passenger perished at the site of the accident.

An Accredited Representative of the National Transportation Safety Board (NTSB) - USA, (State where the aircraft was manufactured) was designated for participation in the investigation.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
CCF	Physical Capacity Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CFIT	Controlled Flight Into Terrain
CIV	Pilot's Flight Logbook
DECEA	Airspace Control Department
FAB	Brazilian Air Force
GRPAe	Air Patrol Radio Group
IFR	Instrument Flight Rules
INVH	Flight Instructor Rating - Helicopter
IMC	Instrument Meteorological Conditions
METAR	Aviation Routine Weather Report
PCH	Commercial Pilot License – Helicopter
PPH	Private Pilot License – Helicopter
SALVAERO	Search and Rescue Coordination Center
SAR	Search and Rescue
SBMT	ICAO Locator Designator – Campo de Marte Aerodrome, São Paulo - SP
SIPAER	Aeronautical Accident Investigation and Prevention System
SSMW	ICAO Locator Designator – Ica Aerodrome, Peruíbe - SP
TPP	Registration Category of Private Service - Aircraft
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	Model: R44	Operator: AM Transportes Ltd. ME
	Registration: PT-YON	
	Manufacturer: Robinson Helicopter	
Occurrence	Date/time: 10SEPT2010 - 1445 UTC	Type(s): [CFIT] Controlled Flight into Terrain
	Location: Serra do Mar	
	Lat. 24°03'05"S Long. 046°50'56"W	Subtype(s): NIL
	Municipality – State: Itanhaém – SP	

1.1 History of the flight.

The aircraft took off from the Ica Aerodrome (SSMW), Peruíbe - SP, to the Campo de Marte Aerodrome (SBMT), São Paulo - SP, at about 1430 (UTC), in order to transport personnel, with a pilot and a passenger on board.

With about fifteen minutes of flight, the aircraft collided against Serra do Mar.

In the collision, the tail cone separated from the rest of the aircraft, getting stuck at the top of the trees.

The aircraft was destroyed. The pilot and the passenger perished at the site.



Figure 1 - Tail cone of the aircraft trapped on the top of trees.

1.2 Injuries to persons.

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

1.3 Damage to the aircraft.

The aircraft was destroyed.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Hours Flown	Pilot
Total	155:00
Total in the last 30 days	Unknown
Total in the last 24 hours	Unknown
In this type of aircraft	95:00
In this type in the last 30 days	Unknown
In this type in the last 24 hours	00:00

N.B.: The Pilot's Flight Logbook was not found. The flown hours were obtained at the Aeroclub where he flew.

1.5.2 Personnel training.

The pilot took the PPH course at Bravo Escola de Aviação Civil - SP, in 2009.

1.5.3 Category of licenses and validity of certificates.

The pilot had the PCH License and had valid RHBS aircraft type (which included the R44 model) and INVH Ratings.

1.5.4 Qualification and flight experience.

It was not possible to determine if the pilot was qualified on the type of flight.

In relation to the experience, the available reports come from the Aeroclub friends, who affirmed that the pilot had 155 hours of flight.

His aviation career was lived in the premises of the Bravo Civil Aviation School. The passenger involved in the occurrence was one of the school's owners.

The pilot used to travel on the aircraft both on local flights and towards the coast of São Paulo, knowing the route proposed. Such route had already been fulfilled a few times, however, always in visual conditions.

1.5.5 Validity of medical certificate.

The pilot had valid CCF.

1.6 Aircraft information.

The aircraft, serial number 0674, was manufactured by Robinson Helicopter, in 1999 and it was registered in the TPP category.

The aircraft had valid Airworthiness Certificate (CA).

The airframe and engine logbook records were outdated.

The last inspection of the aircraft, the "2.200 hours" type, was performed on 15APR2010, by the Horus Air Taxi Maintenance Organization, in Joinville - SC, having flown 78 hours and 48min after the inspection.

1.7 Meteorological information.

Weather information was available for the crew at take-off, however, its use could not be confirmed.

According to information collected from pilots who flew on the day of the accident, conditions on the coast and on the plateau of São Paulo were visual, but on the route there was a low ceiling. The top of Serra do Mar was not in visual conditions. A dense layer of mist, characteristic of the region at that time of the year, covered the top of the mountain cliff.

Observers at the take-off Aerodrome in the afternoon of the accident, reported difficulty seeing the top of the mountain, due to the fog.

The METAR of Santos (SBST), Guarulhos (SBGR), São José dos Campos (SBSJ) and Marte (SBMT) provided the following information:

METAR SBST 101400Z 09010KT 9999 SCT025 SCT070 23/15 Q1024=

METAR SBGR 101400Z 08011G22KT 9999 SCT021 20/13 Q1027=

METAR SBSJ 101400Z 09005KT 9000 FEW017 BKN023 20/12 Q1026=

METAR SBMT 101400Z 10007KT 9999 SCT020 20/12 Q1026=

In the satellite image in the section between SSMW and SBMT, there was a strip of clouds (dense) over the coastal region, but on the city of São Paulo it was already much less dense (Figure 2).

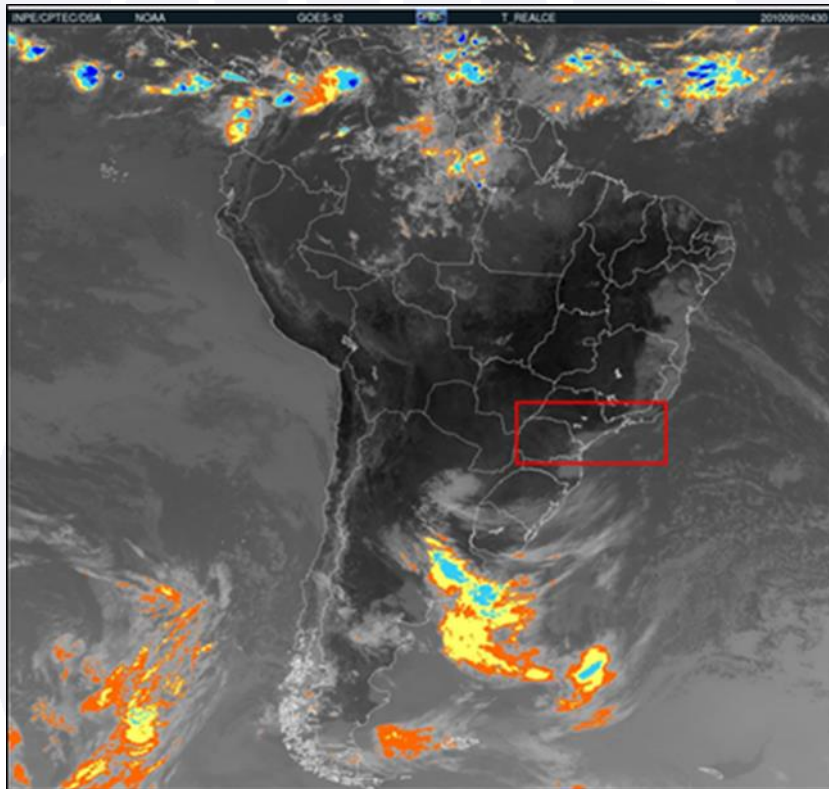


Figure 2 - Satellite image.

The clouds seen in the images are low (between 800ft and 2.500ft), there were Stratus, and Stratocumulus clouds over the Serra do Mar.

The airports that had a forecast service, already mentioned, did not constitute a scenario consistent with the phenomena found in Serra do Mar, as well as in the valleys of the region, where the occurrence of low temperatures, associated with the coastal humidity and the vegetation cover, provided atmospheric condensation.

The relief, characteristic of the region, contributed to the occurrence of "mountain circulation", originating from the local orography, which could trigger the convection processes and, consequently, fog and turbulence formations.

In the upper part of the Serra do Mar, there was the so-called "high-mountain" formation, generally established on shallow and/or organic soils, in places almost permanently subject to the condensation of moist air masses from the sea, even, weak rains for most of the time.

This fact motivated several scholars on the subject to designate this formation with names like "nebular forest" or "haze forest".

The latitudinal position, cut by the Tropic of Capricorn, its rugged topography and the influence of disturbed circulation systems are factors that lead to sudden climatic changes in the Southeast.

At Serra do Mar, in São Paulo, it rained an average of more than 3.600mm per year. Near Paranapiacaba and Itapanhaú was recorded the maximum rainfall of the country (4.457.8mm, in one year).

In the valleys of the Jequitinhonha and Doce rivers were recorded the lowest annual rainfall, around 900mm.

The Serra do Mar in the region of São Paulo had an average altitude of 900m. It moved away from the sea at some points, approaching it in others. The humid winds that blow from the sea towards the interior of the continent, when they rise, they cool and they lose the humidity that they possess. The excess condenses and precipitates mainly in the higher parts of the mountain range, in the form of fog or rains.

It is worth remembering that orographic turbulence arises from the friction of the air when blowing against mountainous elevations, that is, it is a way of mechanical turbulence. The intensity of this phenomenon depends very much on the direction and intensity of the wind, the roughness of the terrain, the height of the obstacle and the stability of the air.

The pilots, who flew in the region on the day of the occurrence, confirmed the bad weather conditions.

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 aircraft was located in a dense forest at Serra do Mar, in the municipality of Itanhaém - SP. The trees that composed the forest were in the majority of the eucalyptus family, that is, tall, with little area of top and robust trunks.

Other large trees made up the scenery. The average height of the treetops was of 40m. The highest point of the elevation was about 700m.

Due to the first impact, there was a breakdown of the aerodynamic structures and control surfaces of the aircraft. Then the helicopter plunged at an angle of approximately 60 degrees toward the ground.

Most of the wreckage was concentrated. The cabin, engine and main transmission were destroyed. The visual analysis performed at the point of rupture on the tail rotor drive shaft made it possible to identify that an overload occurred, indicating that the engine was working at the moment of impact.

The tail rotor was attached to the treetops at a height of approximately 30m and at a distance of approximately 300m from the cabin. The rear drive has separated, as well as

the blades of the main rotor, with the respective head. The skis also sectioned and buried themselves on the ground.



Figure 3 - The wreckage was located through the tail cone, which was at the top of the trees.

There was no incidence of intense fire in the engine area. All components were concentrated in a radius of approximately 300m.

The cutting characteristic of the top of the trees as well as the deformations found in the blades of the main rotor and the tail rotor denoted normal rotation and consequently normal engine power.

The region was steep and the access was only by air.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

No evidence was found that problems of physiological nature could have affected the flight crew performance.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

The pilot had been with the company for less than a year.

According to the information obtained in interviews with people of his conviviality, the pilot showed no signs of fatigue or stress in the period before the accident. According to the interviewees' perception, he was in good health and did not use medication.

Although hired a short time ago, the pilot had a good relationship with the owner of the aircraft and with the company's friends. As reported, it had acquired the confidence of the aircraft owner in the conduct of flights. This bond had been reinforced, due to the previous knowledge among them, since the pilot had completed all his training in the school where the owner of the aircraft had participation as a partner.

According to the data obtained, the aircraft owner did not use to pressure the pilot to comply with flights, especially in unfavorable weather conditions.

However, situations of delay were common for the employer. As reported, the aircraft owner used to like to take off immediately upon arrival, as he was usually late in his appointments.

There was no information on the pilot's routine regarding the last 48 hours before the accident and it was not possible to evaluate the workload to which he was subjected or his rest conditions.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

The search was performed by the Search and Rescue alert aircraft (SAR), activated by the SALVAERO - Curitiba.

The SAR aircraft was called approximately two hours after the accident.

The searches began the next morning, due to weather restrictions.

There were no survivors.

The pilot was located next to the wreckage of the cabin, while the passenger was located one day after the accident, approximately 100m from the cabin.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

The aircraft was operated by AM Transportes Ltd. ME, being used privately, according to its category of registration, for the transportation of the operator.

1.18 Operational information.

According to reports, because the crewmember had completed all his training at the school where the owner of the aircraft had a partner, a strong bond was created between them.

Pilot colleagues reported that the owner of the helicopter, who was not a pilot, did not "request" to conduct the aircraft, but always arrived late in the schedules and wanted to take off "immediately".

On the day of the occurrence, the pilot would make a shuttle flight between SSMW and SBMT. The total course would be of 54 NM at a cruising speed of 90kt.

The starting Aerodrome was on the southern coast of the state. The runway was made of grass, with 650m of extension. It had two hangars of 600m², maintenance shop, gasoline tank for aviation, restaurant and piloting school.

Observers said that the pilot did not fueled the aircraft at the site and that, for a few moments, he talked to another helicopter pilot who was in the place.

It was not possible to determine the exact amount of fuel but, due to the absence of load, it was possible to infer that the weight and balance were within the limits specified by the manufacturer.

It was reported that the passenger went to the location to deal with the acquisition of another helicopter. Reports indicate that the weather situation, on the day of the occurrence, changed suddenly.

The searches were conducted in the morning of the day after the accident. In spite of the activation of SALVAERO - Curitiba in the afternoon of the day of the accident, the weather prevented the beginning of the searches.

Aircraft from the Brazilian Air Force and the Air Patrol Radio Group of the São Paulo Military Police (PM) took part in the operation, as well as some civilian helicopters.

The Investigation Team received an e-mail from the GRPAe informing that, during the time of the accident, it was going to perform a mission at the coast of São Paulo, and when it began to cross the Serra do Mar, the mission was aborted due to weather conditions.

It is known that the transfer from the baixada Santista to the airports or heliports located in the plateau of São Paulo was a routine, with the majority of these traffics being carried out by helicopters under visual flight conditions.

As verified by pilots performing these flights, it was common to analyze the meteorology in the mountains through the site of the concessionaire that administered the road system Anchieta - Imigrantes (www.ecovias.com.br).

Through the cameras online, the pilots visualized the weather conditions, to decide on the crossing of the Serra do Mar.

The overflight at Serra do Mar using road systems as a visual reference was common to be used as a tool to evaluate the ascent on the hillside towards the plateau, then, with visual references, proceed directly to the landing field or enter a visual corridor.

Pilots from other aircraft, who had crossed the mountains hours before the accident, coming from the coast, reported having followed with visual references the Anchieta and Imigrantes highways, further to the west, because the visibility was better in that sector.

The R44 aircraft was not certified for instrument flights.

The pilot had no instrument flight Rating.

1.19 Additional information.

Nil.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

The pilot and the owner of the aircraft had already performed several flights together as well as had a previous relationship, due to the fact that the pilot had carried out his aeronautical training in the school where the owner had corporate participation.

According to the reports obtained, these conditions had provided a relationship of mutual trust, which favored a good relationship between them.

Regarding the meteorological conditions, pilots who flew on the day of the accident, reported that the conditions on the coast and on the plateau of São Paulo were visual, but the top of Serra do Mar was not in visual conditions. A dense layer of mist, characteristic of the region at that time of the year, covered the top of the mountain.

The search and rescue operations could not start immediately after the calling, because of the prevailing weather conditions.

According to information obtained from the Aeroclub, the pilot had 155 hours of flight in his career. Although it may have flown in the leg where the accident occurred, the pilot's lack of experience may have contributed to the poor assessment of the weather, since flight conditions were visual whenever he made this stretch.

The condition of entry in the treetops showed that the aircraft was in level flight condition. The first collision of the helicopter occurred with the front of the skis, being its lowest part.

The cutting characteristic of the top of the trees denoted normal rotation in the main rotor and, consequently, normal engine power.

The hypothesis considered was that the pilot was flying under instrument flight conditions (IMC) at the time of the accident, trying to obtain visual references with the ground.

In this way, the existing circumstances may have restricted the flight conditions with which the pilot was accustomed, resulting in the loss or limitation of visual references that could be used for the flight.

In this scenario, flight continuity may have been based on an inaccurate assessment of adverse weather conditions, raising the risk of disorientation and collision with obstacles in the external environment.

Since the aircraft was not certified for instrument flight, such conditions may have led the pilot to reduce his flight altitude, flying lower and nearer to the point of collision against the cliff in level flight.

After the impact that separated the tail cone from the rest of the aircraft, it was not possible to perform any operations on the controls that could prevent the accident.

Considering meteorological conditions reported by observers who report sudden change, evidence of wreckage and vegetation at the impact, it is likely to have occurred CFIT, depending on the marginal conditions for the visual flight.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilot had valid Physical Capacity Certificate (CCF);
- b) the pilot had valid RHBS aircraft type (which included the R44 model) and INVH Ratings;
- c) it was not possible to verify if the pilot was qualified to perform the flight;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the aircraft was within the limits of weight and balance;
- f) the airframe and engine logbooks records were outdated;
- g) weather conditions at the top of the mountain were not favorable for the flight;
- h) the aircraft took off from SSMW under visual conditions;
- i) the aircraft collided, after fifteen minutes of flight, against the top of large trees, in a region at the top of Serra do Mar;
- j) according to observers, there was a lot of fog in the mountains at the time of the accident;
- k) searches started the next morning, due to restrictions in meteorology;
- l) the wreckage was located the day after the accident;
- m) the aircraft was destroyed; and
- n) the pilot and the passenger suffered fatal injuries.

3.2 Contributing factors.

- Adverse meteorological conditions – a contributor.

The prevailing meteorological conditions, of dense humid mist, covering the top of the mountain, reported by observers and the crew contributed to the occurrence in question.

- Piloting judgment – a contributor.

The pilot attempted to proceed to the destination, even after encountering adverse weather conditions after take-off, believing that he could keep visual references to the terrain, demonstrating inadequate assessment of the risks involved in that operation.

- **Perception – undetermined.**

The weather conditions at the crash site were characterized by flying under instrument rules. These circumstances may have resulted in impairments in the proper perception of obstacles in the external environment to the aircraft, inducing the pilot to perform the flight lower and lower until the collision against the treetop.

- **Flight planning – a contributor.**

The operational conditions of the route were not adequately evaluated in the work preparation performed, since it was believed that cloud cover at Serra do Mar, which prevented the view of the top of the hillside (Aerodrome view), would not be an impediment to the fulfillment of the mission.

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

Possibly, the pilot's little flight experience under the circumstances of the operation may have contributed to a poor assessment of the weather, leading him to continue under adverse conditions.

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

Flight continuity in adverse weather conditions and obstructive to visual flight may have been based on an inadequate assessment of the operating context, contributing to the promotion of critical circumstances that reduced the margin of the flight's safety.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation, made with the intention of preventing 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 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):

A-507/CENIPA/2018 - 01

Issued on 09/03/2019

Disseminate the lessons learned from this Investigation, in order to alert Brazilian civil aviation pilots and operators to the risks arising from flight under instrument flight conditions, when aircraft or crews are not certified or qualified to operate under such conditions.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On September 3rd, 2019.