

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A - 070/CENIPA/2017

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PT-CHT
MODEL:	PA-30
DATE:	28APR2017



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 28APR2017 accident with the PA-30 aircraft, registration PT-CHT. The accident was classified as “[LOC-I] Loss of Control in Flight”.

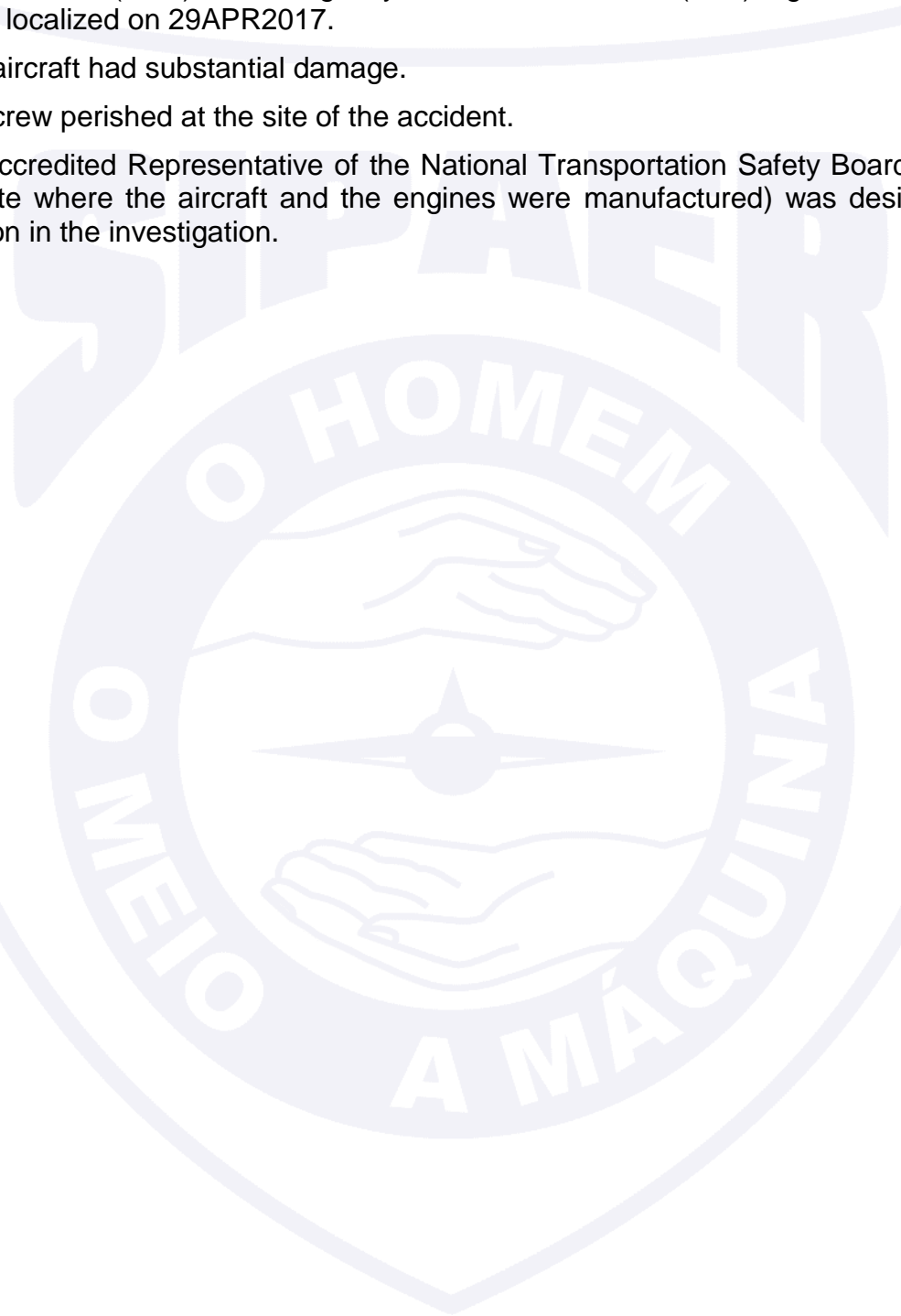
The aircraft took off from the Campos dos Amarais Aerodrome (SDAM), Campinas - SP, to conduct an instruction flight.

At 19h30min (UTC) an Emergency Locator Transmitter (ELT) signal was detected, which was localized on 29APR2017.

The aircraft had substantial damage.

The crew perished at the site of the accident.

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



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

AGL	Above Ground Level
ANAC	Brazil's National Civil Aviation Agency
ANP	National Agency of Petroleum, Natural Gas and Biofuels
CA	Airworthiness Certificate
CAVOK	Ceiling and Visibility OK
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CMA	Aeronautical Medical Certificate
ELT	Emergency Locator Transmitter
FAB	Brazilian Air Force
GRPAe	Air Patrol Group
IAM	Annual Maintenance Inspection
ICA	Command of Aeronautics' Instruction
IFR	Instrument Flight Rules
IFRA	Instrument Flight Rating - Airplane
INVA	Flight Instructor Rating - Airplane
METAR	Meteorological Aerodrome Report
MGT	General Training Manual
MLTE	Airplane Multi Engine Land Rating
MNTE	Airplane Single Engine Land Rating
NTSB	National Transportation Safety Board (USA)
PCM	Commercial Pilot License – Airplane
PPR	Private Pilot License – Airplane
PRI	Private Aircraft Registration Category - Instruction
RELPREV	Prevention Report
RPM	Rotations per Minute
RS	Safety Recommendation
SAR	Search and Rescue
SBKP	ICAO Locator Designator – Viracopos Aerodrome, Campinas - SP
SDAM	ICAO Locator Designator - Campos dos Amarais Aerodrome – Campinas, SP
TMA	Terminal Control Area
UTC	Universal Time Coordinated
VMC	Visual Meteorological Conditions

1. FACTUAL INFORMATION.

Aircraft	Model: PA-30	Operator: Campinas Aeroclub
	Registration: PT-CHT	
	Manufacturer: Piper Aircraft	
Occurrence	Date/time: 28APR2017 - 1930 UTC	Type(s): [LOC-I] Loss of Control in Flight
	Location: Rural Area	
	Lat. 22°23'56"S Long. 046°50'00"W	Subtype(s): NIL
	Municipality – State: Itapira – SP	

1.1 History of the flight.

The aircraft took off from Campos dos Amarais Aerodrome (SDAM), Campinas - SP, at about 1800 (UTC), for a local instruction flight, with an instructor (IN) and a student (AL) on board.

With about one hour and thirty minutes after takeoff, the signal from the Emergency Locator Transmitter (ELT) was detected. The aircraft was localized on 29APR2017.

The aircraft suffered substantial damage.

The two crewmembers suffered fatal injuries.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	2	-	-
Serious	-	-	-
Minor	-	-	-
None	-	-	-

1.3 Damage to the aircraft.

The aircraft suffered substantial damage throughout its structure.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

	Hours Flown	
	Instructor	Student
Total	673:00	86:00
Total in the last 30 days	47:00	14:00
Total in the last 24 hours	01:30	01:30
In this type of aircraft	105:40	01:30
In this type in the last 30 days	06:40	01:30
In this type in the last 24 hours	01:30	01:30

N.B.: The data related to the flown hours were obtained through the ANAC's databank (digital CIV) and through the operator's flight records.

1.5.2 Personnel training.

The IN took the PPR course in the Campinas Aeroclub - SP, in 2009.

The AL took the PPR course in the Americana Aeroclub - SP, in 2014.

1.5.3 Category of licenses and validity of certificates.

The IN had the PCM License and had valid MNTE, MLTE, IFRA and INVA Ratings.

The AL had the PPR License and had valid MNTE Rating.

1.5.4 Qualification and flight experience.

The instructor was qualified and had experience in that kind of flight.

The AL was qualified and it was his first flight in Multi Engine aircraft.

1.5.5 Validity of medical certificate.

The pilots had valid CMA.

1.6 Aircraft information.

The aircraft, serial number 30907, was manufactured by Piper Aircraft, in 1966 and was registered in the PRI category.

The aircraft had valid Airworthiness Certificate (CA).

The airframe, engines and propellers logbooks records were updated.

The last inspection of the aircraft, the "100 hours" type was performed on 21MAR2017 by the Nova Aeronáutica maintenance organization, in Rio Claro - SP, having flown 18 hours and 6 minutes after inspection.

1.7 Meteorological information.

The METAR from the Viracopos Aerodrome (SBKP), Campinas - SP, 31 nautical miles away from the scene of the accident, provided the following information:

METAR SBKP 281800Z 14016KT 9999 FEW030 19/// Q1021=

METAR SBKP 281900Z 14016KT 9999 FEW025 18/// Q1021=

The Significant Time Chart (SIGWX) generated at 1635 (UTC), valid until 0600 (UTC) of 29APR2017, illustrated the possibility of Stratus (ST) and Stratocumulus (SC) clouds with a base at 1,000ft and top in FL035.

The wind chart (layer wind), generated at 1800 (UTC), valid until 0000 (UTC) of 29APR2017, indicated predominant wind in the region of the accident of east direction and intensity of 15kt, at FL050, flight level close to the one in which happened the flight (Figure 1).

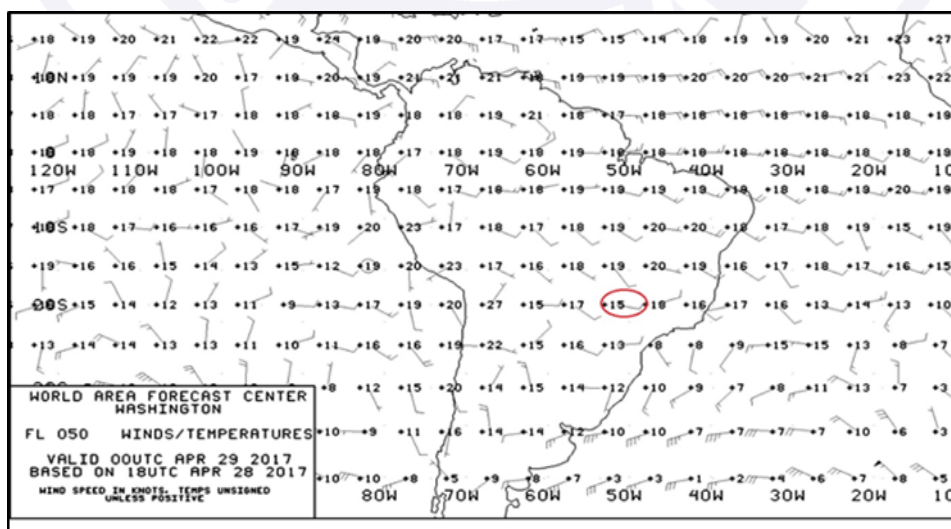


Figure 1 - Wind chart on FL050.

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 in a riparian forest area, on the banks of the Peixe River, in the municipality of Itapira - SP, and there was no evidence of previous impact. The wreckage distribution was the concentrated type.

The impact occurred in a pitch down attitude, causing the collision of the inferior side of the fuselage and the wings against the treetops and then against the ground.

The left wing broke close to the middle portion, and its end, along with the wingtip tank, moved to the vicinity of the pilots' cockpit. The right wing had extensive damage, but remained fixed to the fuselage.

The empennage also broke, tilting up and crashing against the upper section of the aircraft. The fuselage showed evidence of torsion to the right side and deformation.

On the impact, the trunk of one of the trees entered the passenger cabin. The engines and their fairings were partially buried in the ground, presenting a downward deformation in their structures.

The fuel tanks of the left wing and the inner tank of the right wing were broken on the impact. The outer tank of the right wing remained with fuel. The wingtip tanks were not being used on the day of the occurrence and were empty. There was no fire.

The ailerons, flaps, elevators and trims of the elevators presented damages in all their extensions, not allowing an accurate observation about their respective positions.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

Not investigated.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

The student was described by people from his conviviality as being friendly and cheerful. He had some relatives who worked in the air sector, so he was familiar with this context and was motivated as a pilot. He was considered a safe, emotionally balanced person who was in good health.

According to the interviewees' perception, he was anxious to complete the Commercial Pilot course and, in the morning of the accident, expressed satisfaction in knowing that the aircraft was available and that he could carry out his instruction flight.

According to reports, he was enthusiastic about aviation and was very involved with his professional pilot plans.

According to the Investigation Team, the student had previously made flights with the instructor of the incident. He had said to people of his acquaintance that he trusted him, for he was dedicated and serious in what he did.

The IN had a rapid evolution in his theoretical and practical proficiency in instruction, passing from one equipment to another easily. Described as dedicated and flexible, he was responsible for giving theoretical and practical instructions.

According to the statements, he had good personal relations with the students, as well as with his employers and the other instructors.

At the time of the accident, the Aeroclub flight coordination had left the instructor in charge of organizing and scheduling PT-CHT flights, whose aircraft he was the instructor.

It was found that the IN used to take several flights a day, being the instructor of the Aeroclub that has ministered more instruction flights. During the last month he worked, he performed two to three instructions a day. Sometimes these flights took place in the morning, afternoon and evening, which was unusual in the Aeroclub's operational routine.

According to people's perception of his professional life, the instructor gained a great deal of self-confidence in his progression as a pilot and instructor, which made his level of attention to doctrinal and safety aspects diminish.

As reported, the more experience gained, the more he sought new experiences, even if it was necessary to disregard safety standards. In this regard, one of the interviewees said that "it seemed like he always wanted something more."

The IN came to participate in the pilot selection process at an airline company four months before the accident, at which time he was reprovved at the psychological evaluation stage.

It was found that the instructor had previously performed unauthorized maneuvers for the aircraft in question during the instruction. He had even recorded these maneuvers to show the proof of his proficiency, which earned him, in the work group, the fame of "the man", "the king of the stall."

The Investigation Team had access to one of these videos, in which it was possible to see a stall, in the same aircraft of the accident, out of the Aeroclub's established standards, with a rather pitch up attitude to the type of maneuver (Figure 2).



Figure 2 - Stall exercise performed by the instructor of the occurrence, in the same aircraft, in a previous flight.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

A Search and Rescue (SAR) aircraft of the Brazilian Air Force (FAB) and one of the Air Patrol Group (GRPAe) from the Military Police of the São Paulo State participated in the searches.

The wreckage was found one day after the occurrence.

There were no survivors.

1.16 Tests and research.

An Investigation was carried out on Lycoming engines, model IO-320-B1A, n/s L-1946-55A and n/s L-1929-55A, that equipped the aircraft and also in its components.

In relation to the engine n/s L-1946-55A, firstly the spark plugs were analyzed, which had normal coloration. Both magnetos worked normally when bench tested.

In the engine lubrication system, no discrepancies were found.

As for the fuel injector system, all four injectors were analyzed, with only one being partially obstructed.

The fuel distributor was not tested because its connection was damaged, due to the impact. The servo-injector was bench-tested and showed a flow rate within the limits established by the manufacturer.

The observation of the cylinders' interior showed an operation with normal mixing and temperature.

The valve control shaft was free from damage and the crankshaft had a fracture on the coupling flange with the propeller. One of the propeller blades was deformed backwards and there was a kneading in the spinner.

Regarding the engine n/s L-1929-55A, the same methodology was used. All spark plugs were color compatible with normal operation. Both magnetos also worked normally when bench tested.

The lubrication system showed no discrepancies. All four nozzles of this engine were unobstructed. The simulation of pressure in the fuel distributor showed normal results.

The servo-injector was not tested, due to the damages that it suffered with the impact, but an internal analysis of this one showed that its components were normal and without the presence of contaminants.

The observation of the cylinders' interior also showed an operation with normal mixing and temperature.

The camshaft and the crankshaft had no malfunctions. The marks of the propeller were the same as the other engine: one of the blades deformed backwards and there was kneading in the spinner.

A physical-chemical test was performed on the sample of the aviation gasoline collected from the fuel tank of the left wing of the aircraft. The appearance, corrosiveness to copper, specific mass and distillation were analyzed, in order to determine the presence of contaminating agent.

Only the distillation test presented a result slightly above the specified by the National Agency of Petroleum, Natural Gas and Biofuels (ANP), indicating the loss of the lighter fractions of the sample. All other tests presented results within the normal margins.

1.17 Organizational and management information.

The Campinas Aeroclub conducted the pilots' training, ministering, among others, the courses of Private Pilot, Commercial Pilot and Instrument Flight.

It was reported that the instructors followed the assessment sheets of the students and used to observe the information written in the previous files, in order to follow their operational development.

The evaluation of the instructors, however, was conducted informally, based on the insight of the most experienced instructors and the course coordinator, as well as student opinion and feedback from the instructor himself.

There was informality, too, in the transmission of specific guidelines on the performance of exercises.

In the case of stall maneuvers, there was no formal definition of parameters such as the maximum angle of attack that the aircraft would take and the timing of recovery, and this information was informally provided by the most experienced instructors responsible for coordinating the aircraft courses, to the less experienced one.

In the Aeroclub, there was an attempt to standardize instruction through meetings, but the people's adhesion was low. There was no record of such meetings and no effective training and supervision mechanisms for instructors were observed.

With regard to supervising the progress of the instructions, it was pointed out that less standardized students, when faced with charging by more demanding instructors, sought to schedule their instructions with the instructor of the occurrence, since he was considered an instructor with a lower demanding pattern to the other instructors, regarding doctrinal aspects of the flight.

Regarding the supervision of the occurrence flight instructor's conduct, it was stated that the activity supervisors had learned, through informal feedback from students, of possible violations of that instructor.

As of the date of the occurrence, however, no fact about the instructor in question has been formally communicated to the persons in charge of the training area. As an example, we can cite the video from which Figure 2 was extracted, which was only made public within the Aeroclub after the accident.

The Aeroclub was going through a low volume of operations. Therefore, it was sought to make the most number of opportunities for flights. As a result, the occurrence instructor, who was available, was often required to take flights.

1.18 Operational information.

The aircraft was within the weight and balance limits specified by the manufacturer.

The mission to be performed was the MLTE 01. This was the student's first mission in multi-engine aircraft. He had already completed the entire instrument flight phase in flight simulator and single-engine aircraft, having been approved. On his last flight, he had a satisfactory performance, which made him able for multi-engine aircraft training.

For this mission, there were basic exercises in aircraft conduction and basic instrument flight exercises, as well as aspects related to standardization and familiarization with the new type of aircraft. Among the maneuvers that would be performed were the stall

in landing configuration (without engine power) and the stall in cruise configuration (with engine power).

According to information gathered by the Aeroclub, these exercises, for the flight in multi-engine aircraft, were only demonstrated by the instructor, that is, the student was not required to execute and train the maneuvers.

As described in the Aeroclub Visual General Training Manual (MGT VFR), the stall exercise should be performed as follows:

"Obtain a visual reference, aligning the aircraft with the wind and always having a support field; perform a full area check (minimum altitude of 2,500ft above ground level (AGL) - 4,500ft in the Campinas Aeroclub maneuvering area); configure the aircraft for landing without engine power (carburetor heating open); gently reduce all power; as the aircraft loses speed and tends to descend, maintain altitude; for this, the angle of attack must be increased, in order to maintain the lift constant until reaching the critical angle and the aircraft stalls; when stalling the aircraft, put the stick in a pitch up attitude and then immediately regain level flight; for this, it is necessary to neutralize the elevator, to recover the attitude of level flight and to adjust gently the power of cruise; configure the aircraft for level flight, always remembering to close the carburetor heating".

The stall exercise with engine power, according to the same manual, should be performed in a similar way, except that the clean configuration and the use of power were prevised.

Secondly, the Aeroclub General Training Manual, the planning of the flight, the choice of the region to be flown and the locations where the procedures would be carried out were left to the crew, who, at this stage, should consult all aeronautical documentation necessary for a good planning.

The chosen flight area was the Northeast area of the Aerodrome, near the southern limit of the Terminal Control Area of the Air Force Academy (TMA Academy), as a region free of intense air traffic.

The preparation for the flight was affected by a last-minute change of the flying student. The student of the scheduled instruction was missing and the instructor, aiming not to fail to make the flight, phoned the student of the event, calling him to fly. It was not possible to determine whether, due to this student change, all planning and preparation procedures, including the mission briefing, were carried out properly.

The takeoff occurred without any abnormalities, the aircraft being within the weight and balance limits specified by the manufacturer. The expected duration of the flight was of one hour and thirty minutes. Because the aircraft was not equipped with flight recorders, it was not possible to reconstruct the entire sequence of exercises performed.

About one and a half hours after takeoff, the signal from the Emergency Locator Transmitter (ELT) was detected, which was later found to have occurred due to the collision of the aircraft against the ground.

The Investigation Team had access to a footage made by residents of the region near the accident site, where it was possible to visualize the final trajectory of the aircraft before the impact (Figures 3 and 4).



Figure 3 – Final trajectory of the aircraft.



Figure 4 – Final trajectory of the aircraft.

It was possible to see in the filming that the final trajectory of the aircraft happened in spin. The aircraft in question was not approved for the execution of this exercise.

1.19 Additional information.

Nil.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

It was an instruction flight.

Regarding the experience in the type of flight and the qualification of the pilots, no factor was found that could have contributed to the occurrence.

The instructor had already performed this type of flight other times and the student, despite being in his first multi-engine aircraft instruction, had a satisfactory performance in the previous stages of the Commercial Pilot training course.

As for the aircraft, there was also no contribution. Its airworthiness certificate was valid, the records were current and the maintenance was considered periodic.

As for the research carried out on the Lycoming engines model IO-320-B1A n/s L-1946-55A and n/s L-1929-55A, which equipped the aircraft, the following analysis was possible:

- in all items of both engines that could be analyzed and/or tested, there were no discrepancies or faults that could have contributed to a malfunction;
- the engines were operational, however, the evidence indicated that they did not develop power at the time of the collision occurred against the ground. With this, it could be said that there was no contribution of the engines to the occurrence; and
- no relevant changes were found in the physicochemical tests of the fuel sample collected from the aircraft that could have contributed to the occurrence.

Regarding the meteorology, the conditions were favorable for the visual flight. There was little cloudiness in the region where the flight took place, which allowed pilots to conduct instruction out of the clouds and in visual contact with the ground.

The intensity of the wind in layer was of 15kt, which allowed the accomplishment of the flight in a satisfactory way. However, according to the perception of the Aeroclub's more experienced flight instructors, in the analysis performed after the accident, the wind was slightly above the intensity for the region and for the flights of instruction.

Regarding the individual psychological aspects of the pilots, it was possible to describe the student as a balanced, healthy person, very motivated for the flight and happy with the professional stage in which he was.

The instructor was described as a hardworking and quite proficient person on the Aeroclub's aircraft. His operational progression had been very rapid, since it was easy for him to assimilate the techniques of flight and was always available to fly, coming to make several flights per day.

These circumstances further increased his self-confidence, leading him to take more risks during the flights he was performing. According to the data obtained, the IN was prone to transgress safety rules and his daring profile had conferred the recognition between peers as the "stall king", "the man".

The collective acceptance and valorization of these behaviors indicated an organizational culture that was not focused on flight safety, which promoted insecure practices and complacent attitudes within the Aeroclub.

Nevertheless, the number of flights carried out by the instructor and the lack of supervision and effective evaluation of his actions contributed to the maintenance of these non-standardization practices, denoting flaws in the existing organizational processes for managing the air activity.

Although the Aeroclub's oversight had received informal feedback regarding the instructor's actions, there was no formalized report on his conduct. Likewise, the Aeroclub took no corrective action.

Just after that, it started to circulate in a broader way, a footage on a flight of the occurrence instructor, on the same crashed aircraft, on a date prior to the accident. In this video, it was observed that a stall exercise was performed, with a rather pitch up attitude. This form of exercising differed greatly from what was stipulated by the Aeroclub.

This standardization of exercises, in turn, occurred informally. There was an attempt to better standardize the instruction through meetings, but the adherence was low. Important parameters of the instruction flight, such as, in the case of the stalls, the attitude of the aircraft and the time to start the recovery, were transmitted from the most experienced to the youngest, in an unwritten way.

This informality may also have contributed to the conduct of violations by the instructor, since it made it possible to interpret the rules in a divergent way from what was expected.

There was informality also in monitoring the performance of flight instructors. Their assessments were made based on the insight of the most experienced instructors and course coordinators, in the opinion of students and in the feedback of the instructor himself.

Thus, the Aeroclub did not have efficient mechanisms that allowed the monitoring of air activity, the evaluation of the instructors and students performance and the detection and correction of actions contrary to the procedures stipulated in that context.

The flaws related to these organizational processes contributed to the fact that the air activities conducted by the instructor assumed profiles different from those expected as standard.

The Aeroclub was going through a low volume of operations, in other words, there was a concern about the business needs of the organization. There was a perception that opportunities could not be wasted.

It is possible that this commercial concern interfered in the analysis to decide whether or not a given situation was appropriate for a flight.

In this context, we can cite the situation that occurred on the day of the flight. The student who had his instruction scheduled was absent. It was taken the decision to call the student of the occurrence, so that the flight was not lost.

The take-off happened later than planned. Changes in instructional activity planning, instructor personal characteristics, and delay suggested the possibility that steps to prepare for the flight have been suppressed.

It is also possible that, during the mission briefing, if it was carried out, important aspects of the flight, such as the meteorological conditions and the parameters for performing the exercises, were no longer discussed.

It was not possible to reconstruct the entire sequence of exercises performed on the flight, but it is known that the demonstration of stall exercises with engine power and stall without engine power was prevised. The possible use of excessively pitch up attitude in these exercises could cause the early reach of the maximum angle of attack, causing the stall of the aircraft before its recovery.

Failure to recover from the exercise on time, that is, the full stall of the aircraft, where there would be loss of aerodynamic effectiveness and control of the aircraft, could result in inadvertent spin entry.

After approximately one hour and thirty minutes of flight, that is, at the end of the flight, as this was its estimated duration, the emission of the Emergency Locator Transmitter (ELT) signal was detected.

The Investigation Team had access to a footage of the final instants of the flight, in which it was possible to visualize the final trajectory of the aircraft, in downward spin.

The damage to the aircraft and the concentration of the wreckage indicated that there was a collision against the treetops and then against the ground in a pitch down attitude.

The torsion signals from the fuselage corroborate with the images in which the aircraft descends in a spin way, out of control, until the collision against the ground.

Considering all the information analyzed, the main hypothesis is that, at the end of the flight, the instructor demonstrated the stall exercise for the student using different parameters than those recommended for this purpose.

As the student's first flight in the aircraft type, the instructor may have decided to perform the exercise in a more daring way and / or outside the safety standards

established by the Aeroclub to impress the student and feed his own yearning for challenging and risky situations.

The aircraft may have been placed in an excessively pitch up attitude, causing a stall to be struck completely in a short period of time, culminating with an abnormal attitude, thus making it impossible for the instructor to satisfactorily perform the recovery and stabilization of the aircraft.

Without aerodynamic effectiveness, the aircraft would have spinned and descended to the ground, without the instructor being able to reestablish control of it. In addition, the aircraft in question was not certified for the execution of spin.

Thus, any inadvertent entry would have difficulty in recovery, and it was not possible to predict the aggressiveness with which the airplane would assume the turning characteristics.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilots had valid Aeronautical Medical Certificates (CMA);
- b) the IN had valid MNTE, MLTE, IFRA and INVA Ratings;
- c) the AL had valid MNTE Rating;
- d) the IN was qualified and had experience in that kind of flight;
- e) the student was qualified and it was his first multi-engine aircraft flight;
- f) the aircraft had valid Airworthiness Certificate (CA);
- g) the aircraft was within the limits of weight and balance;
- h) the airframe, engines and propellers logbook records were updated;
- i) weather conditions were favorable for the flight;
- j) it was prevised the demonstration of stall exercises with engine power and stall without engine power;
- k) the aircraft screwed and descended until it collided against treetops and then against the ground;
- l) the aircraft had substantial damage; and
- m) the pilots suffered fatal injuries.

3.2 Contributing factors.

- **Attitude – undetermined.**

The instructor demonstrated to be excessively self-confident and commonly adopted attitudes contrary to safety, such as performing stall maneuvers outside the standards established by the Aeroclub, characteristics consistent with an exhibitionist profile.

It is possible that this personal characteristic has contributed to a sequence of events that culminated in the loss of control of the aircraft.

- **Work-group culture – undetermined.**

The relations established between students and instructors, as well as between the instructors, were characterized by excessive informality, which promoted conditions conducive to the non-standardization of instructional activity.

The social recognition given to the instructor by his pilot profile and his low demanding standard in the instruction may have contributed to the promotion of complacency during the instructional activity.

- **Organizational culture – undetermined.**

There was a mistaken collective perception about the practice of flight indiscipline within the Aeroclub, to the extent that such actions were accepted as demonstrations of proficiency, and formal reporting tools for supervision were not used, denoting a fragile or absent safety culture.

This scenario may have reinforced the individual characteristics of the flight instructor and favored the reduction of the safety margin in the execution of the maneuvers in flight.

- **Flight indiscipline – undetermined.**

The most likely hypothesis is that the instructor has demonstrated stall exercise in a more daring way, out of the safety standards established by the Aeroclub, to impress the student and feed his own craving for challenging and risky situations, culminating with the spin of the aircraft.

- **Organizational processes – undetermined.**

The pilot's autonomy in flight management, as well as the lack of mechanisms for monitoring and evaluating instructors' performance, denoted flaws in existing organizational processes.

Such shortcomings have contributed to the maintenance of an operational profile in disregard to the standards of the civil aviation school and may have favored an operating performance lower than expected in the management of stall instruction.

- **Managerial oversight – undetermined.**

There was inadequate oversight regarding the standardization of instruction and, especially, the transgressor attitude of the flight instructor. It is possible that this contributed to his individual characteristics having gone unnoticed until culminating in the occurrence.

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-070/CENIPA/2017 - 01

Issued on 04/08/2019

Act together with the Campinas Aeroclub, in order that this operator improves its mechanisms of supervision, standardization and evaluation of the performance of its

instructors, aiming to mitigate eventual operational deviations or complacency in air instruction.

A-070/CENIPA/2017 - 02**Issued on 04/08/2019**

Act in conjunction with the Campinas Aeroclub, in order that the operator improve its mechanisms of formalization and standardization of the parameters for the accomplishment of air training exercises.

A-070/CENIPA/2017 - 03**Issued on 04/08/2019**

Act together with the Campinas Aeroclub, in order that the operator implement a change in the group of pilots culture that use its aircraft and in the organizational culture of the institution as a whole, aiming at consolidating the structure of the Safety of that organization.

A-070/CENIPA/2017 - 04**Issued on 04/08/2019**

Act in conjunction with the Campinas Aeroclub, in order to that operator to improve its mechanisms for receiving and handling feedback from students and instructors, aiming at providing a foundation for future improvements in the flight instruction process.

A-070/CENIPA/2017 - 05**Issued on 04/08/2019**

Act together with the Campinas Aeroclube, in order to encourage the operator to have a more effective action in the promotion of aeronautical occurrences prevention activity, such as, for example, the encouragement to fill in Prevention Reports (RELPREV).

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

The Campinas Aeroclub issued an Operational Technical Bulletin nº 03/2018, determining minimum safety standards and mandatory procedures for instructional flights.

On April 08th, 2019.