COMANDO DA AERONÁUTICA

CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE ACIDENTES AERONÁUTICOS

FINAL REPORT
A - 159/CENIPA/2015

OCCURRENCE:	**ACCIDENT**
AIRCRAFT:	**PT-VNC**
MODEL:	**EMB-720D**
DATE:	**06DEC2015**

NOTICE

According to the Law nº 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 nº 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 06DEC2015 accident with the EMB-720D aircraft, registration PT-VCN. The accident was classified as “[CFIT] Controlled Flight Into Terrain”.

During a shuttle flight, the aircraft crashed into the ground near the city of Trindade - GO.

The aircraft was destroyed.

The pilot and two passengers perished at the site of the crash.

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

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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
APP	Approach Control
ARC	Area Route Chart
ATS	Air Traffic Services
BT	Technical Bulletin
CA	Airworthiness Certificate
CAVOK	Ceiling and Visibility OK
CENIPA	Aeronautical Accident Investigation and Prevention Center
CFIT	Controlled Flight Into Terrain
CG	Center of Gravity
CIV	Pilot's Flight Logbook
CM	Registration Certificate
CMA	Aeronautical Medical Certificate
CNPAA	Aeronautical Accidents Prevention National Committee
CNT	National Training Commission
CVR	Cockpit Voice Recorder
IAM	Annual Maintenance Inspection
IFR	Instrument Flight Rules
IFRA	Instrument Flight Rating - Airplane
MCA	Aeronautics Command Manual
METAR	Meteorological Aerodrome Report
MNTE	Airplane Single Engine Land Rating
PCM	Commercial Pilot License – Airplane
PPR	Private Pilot License – Airplane
RAB	Brazilian Aeronautical Registry
RBHA	Brazilian Aeronautical Certification Regulation
SIGWX	Significant Weather Chart
SIPAER	Aeronautical Accident Investigation and Prevention System
SPECI	Selected Special Aeronautical Weather Report
TSN	Time Since New
TSO	Time Since Overhaul
TPP	Registration Category of Private Service Aircraft
UTC	Universal Time Coordinated
VFR	Visual Flight Rules

1. FACTUAL INFORMATION.

Aircraft	**Model:** EMB-720D **Registration:** PT-VNC **Manufacturer:** NEIVA	**Operator:** Private
Occurrence	**Date/time:** 06DEC2015 - 1310 UTC **Location:** Planalto Farm **Lat.** 16°39'12"S **Long.** 049°36'34"W **Municipality – State:** Trindade – GO	**Type(s):** [CFIT] Controlled Flight Into Terrain **Subtype(s):** NIL

1.1 History of the flight.

The aircraft took off from Palmeira de Goiás Aerodrome (SWGP) - GO, to the National Aviation Aerodrome (SWNV), Goiânia - GO, at about 1300 (UTC), in order to transport personnel, with a pilot and two passengers on board.

Approximately ten minutes after takeoff, the aircraft began to fly in adverse weather conditions, colliding against the ground.

The aircraft was destroyed.

The pilot and two passengers perished on the spot.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	1	2	-
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	44:36
Total in the last 30 days	16:30
Total in the last 24 hours	03:00
In this type of aircraft	44:36
In this type in the last 30 days	16:30
In this type in the last 24 hours	03:00

N.B.: The data related to the flown hours were obtained through ANAC's records.

1.5.2 Personnel training.

The pilot took the PPR course at AVH – Civil Aviation School, Goiânia – GO, in 2015.

The Investigation Team analyzed the pilot's flight records and it was found that a single instructor conducted all instructional flights. The pilot, who was the aircraft's owner, hired this instructor as a freelancer pilot.

1.5.3 Category of licenses and validity of certificates.

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

1.5.4 Qualification and flight experience.

The pilot was eligible to fly under the Visual Flight Rules (VFR) and had no flying experience en route. He had approximately 45 total hours of flight.

1.5.5 Validity of medical certificate.

The pilot had valid CMA.

1.6 Aircraft information.

The aircraft, serial number 720280, was manufactured by Neiva Aeronautical Industry, in 1991 and it was registered in the TPP category.

The aircraft had valid Airworthiness Certificate (CA).

The airframe, engine and propeller logbooks records were updated.

The last inspection of the aircraft, the "IAM" type, was performed on 29OCT2015 by the maintenance organization Goiás Aircraft Maintenance, in Goiânia - GO.

The aircraft left inspection having flown 3.079 hours and 48 minutes since new (TSN) and 649 hours and 42 minutes since the overhaul (TSO).

1.7 Meteorological information.

The Local Meteorological Bulletins (METAR) and the Selected Special Aeronautical Weather Report (SPECI) of the Goiânia Aerodrome (SBGO), away 9 nautical miles from the scene of the accident had the following information:

> METAR SBGO 061300Z 26003KT 9999 VCSH SCT025 FEW030TCU SCT100 25/19 Q1017
>
> METAR SBGO 061400Z 25012KT 8000 3000N -RA FEW025 SCT100 24/19 Q1017
>
> SPECI SBGO 061440Z 25006KT 9999 FEW010 SCT025 OVC090 22/20 Q1017

The conditions were not favorable for the visual flight, as reported by observers and the visualization of satellite images (Figures 1 and 2).

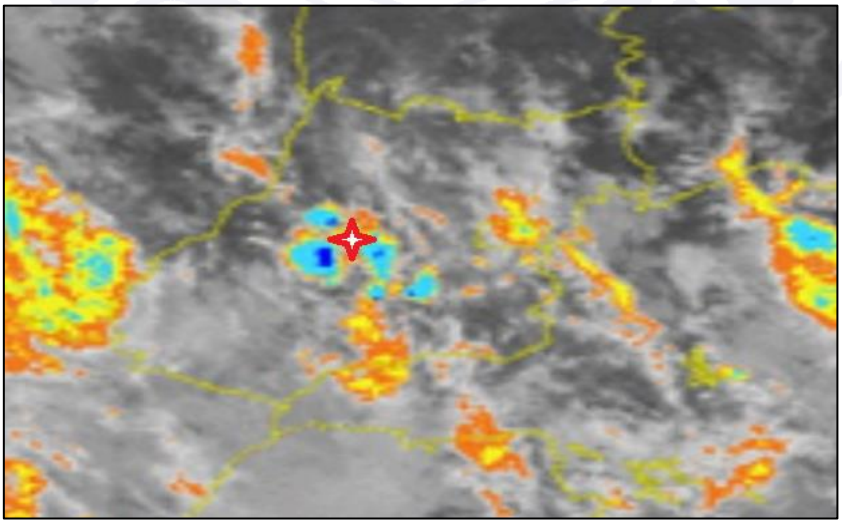

Figure 1 - Highlighted satellite image 13h30min (UTC).

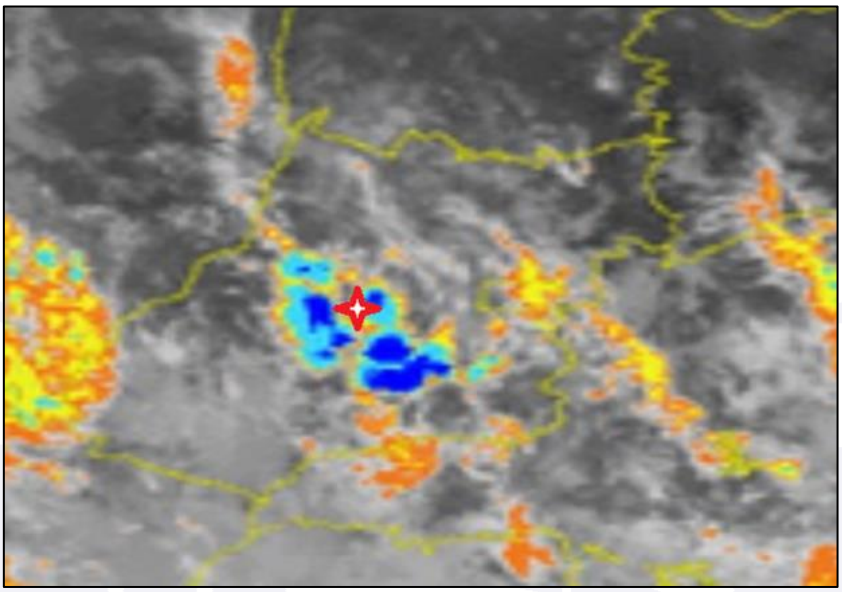

Figure 2 - Highlighted satellite image 14:00h (UTC).

The Significant Weather Chart (SIGWX) generated at 09:57 (UTC), valid until 00:00 (UTC), illustrated the presence of Towering Cumulus clouds (TCU) based on 2,500ft and top in the FL230.

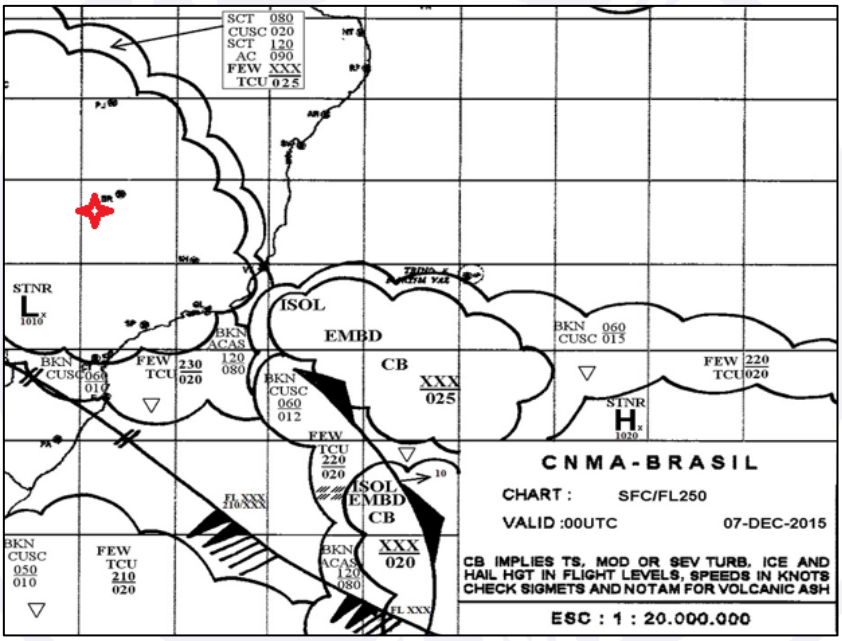

Figure 3 - SIGWX valid till 07DEC2015 00:00 (UTC).

1.8 Aids to navigation.

The aircraft took off from the Palmeiras de Goiás Aerodrome - GO (SWGP), where there was no aid to navigation or approach.

The accident occurred about 20 nautical miles away from SWNV (Figure 4), that is, still within the limits of the Anápolis Terminal Control Area (TMA).

Figure 4 - Distance between the impact site and SWNV.

It should be noted that the flight was under visual flight rules (VFR), the destination Aerodrome (SWNV) did not operate by instrument and the pilot was not enabled to fly by instruments.

1.9 Communications.

According to the analysis of the dialogues recorded between the aircraft and the air traffic control bodies, it was verified that the pilot had difficulties in maintaining a clear and coherent communication with those bodies during his first flight of that day, between SWNV and SWGP.

The transponder code allocated by the air traffic control body (4422) was delayed to be activated and the initial control instructions, which were flying at the head of the city of Trindade - GO, were not fulfilled.

PLANO DE VOO

061215

MATRICULA	REGRA DE VÔO	TIPO DE VÔO
PTVNC	V	G

TIPO DE AERONAVE	ESTEIRA DE TURB.	EQUIPAMENTO
PA32	L	S/C

PARTIDA	HORA
SWNV	1045

VELOCIDADE	NIVEL	ROTA
N0130	F045	DCT

DESTINO	TOTAL	AD ALTN	AD ALTN2
SWGP	0020	SBGO	

PROCEDÊNCIA	OUTROS DADOS
SWNV	

Figure 5 - Plan between SWNP and SWGP.

After flying a few minutes in a direction opposite to the ideal one, the aircraft took the SWGP head, where, according to radar images and witnesses statements, made the landing and remained on the ground for a few moments.

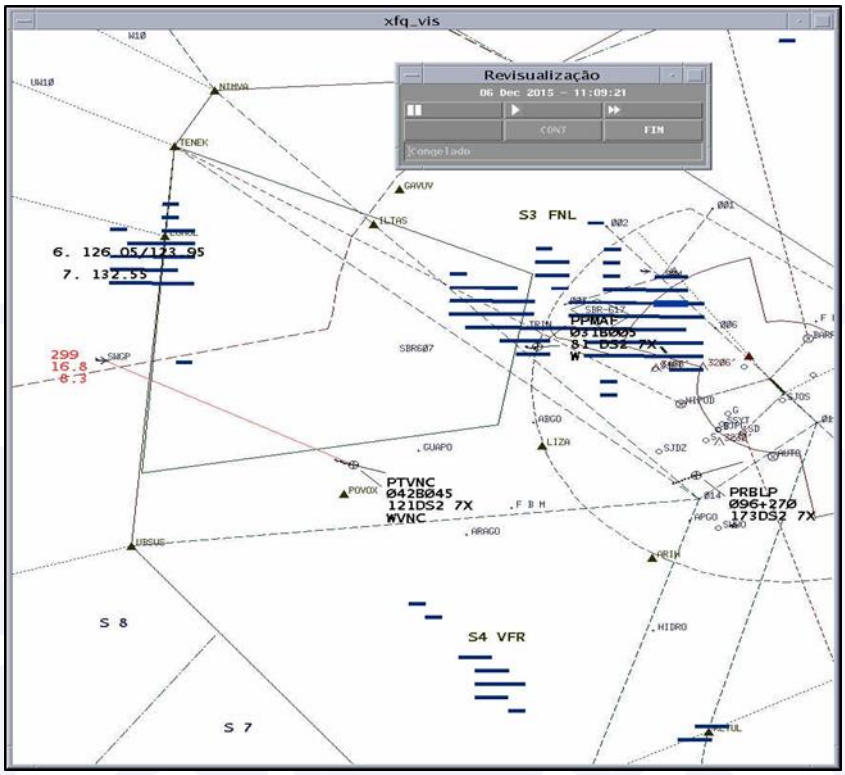

Figure 6 - Aircraft flying on the opposite head of the flight plan.

In order to support the analysis of the sequence of events that preceded the collision of the aircraft against the ground, the Investigation Team highlighted some radar images that could help in understanding the dynamics of the accident.

At 1124 UTC, the Approach Control (APP) Anápolis was informed of the aircraft's landing in SWGP, according to information from ground observers and the print of the radar screen.

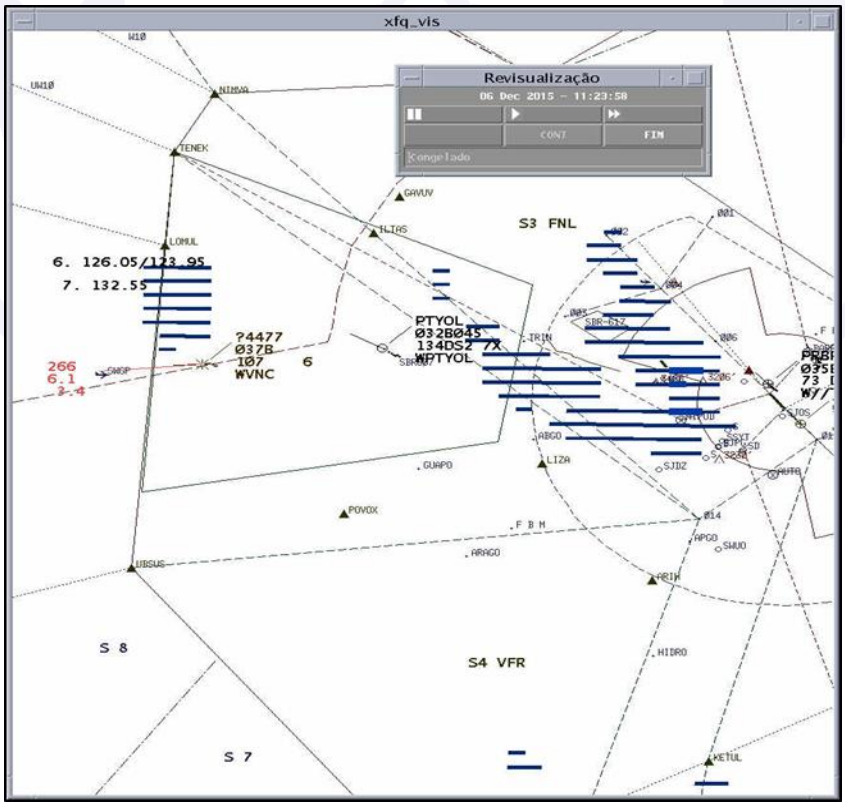

Figure 7 - Print of the radar screen with the approximate landing time in SWGP.

At 1257 (UTC), a copy of the radar screen of Anápolis was made, moments after the aircrafts' takeoff from SWGP to SWNV. The aircraft did not contact the air traffic control agencies, but had made a return flight plan (Figures 8 and 9).

061215

MATRICULA	REGRA DE VÔO	TIPO DE VÔO
PTVNC	V	G

TIPO DE AERONAVE	ESTEIRA DE TURB.	EQUIPAMENTO
PA32	L	S/C

PARTIDA	HORA
SWGP	1245

VELOCIDADE	NIVEL	ROTA
N0130	F055	DCT

DESTINO	TOTAL	AD ALTN	AD ALTN2
SWNV	0020	SBGO	

PROCEDÊNCIA	OUTROS DADOS
SWNV	

Figure 8 - Return flight plan (SWGP for SWNV).

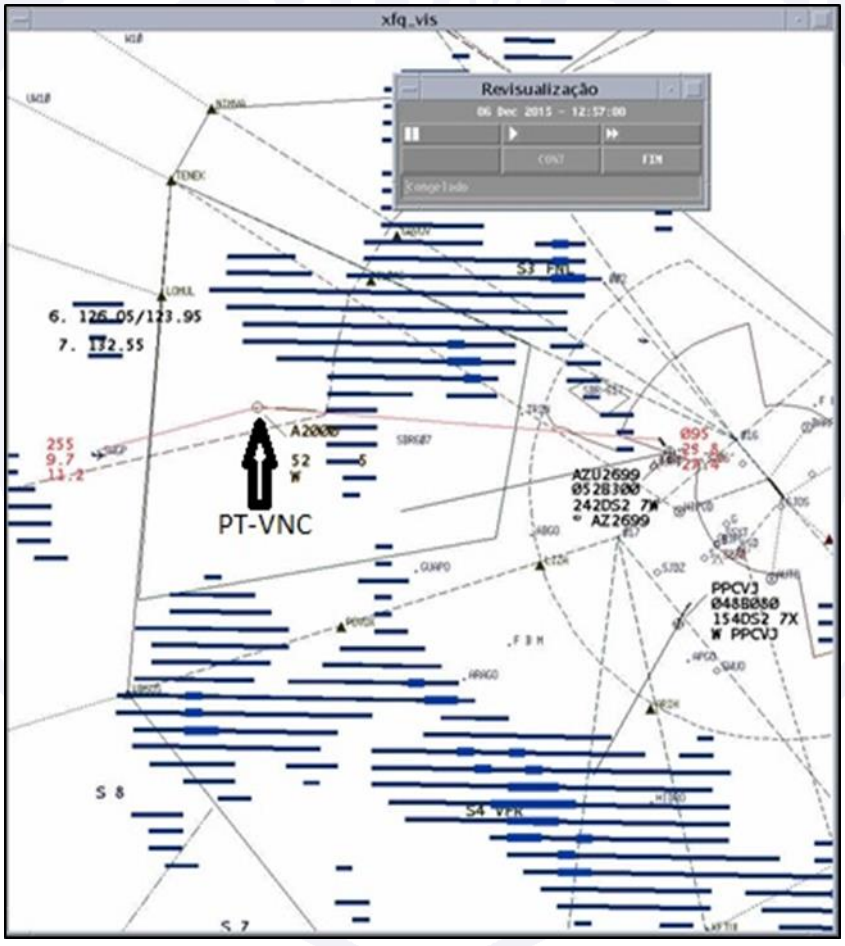

Figure 9 - Moment of the aircraft's radar visualization at the beginning of the return.

At 1305 (UTC), with the 2000 code on the transponder, PT-VNC was flying within adverse weather formations (convective formations). The aircraft performed flights in circles until it disappeared from the radar screen (Figure 10).

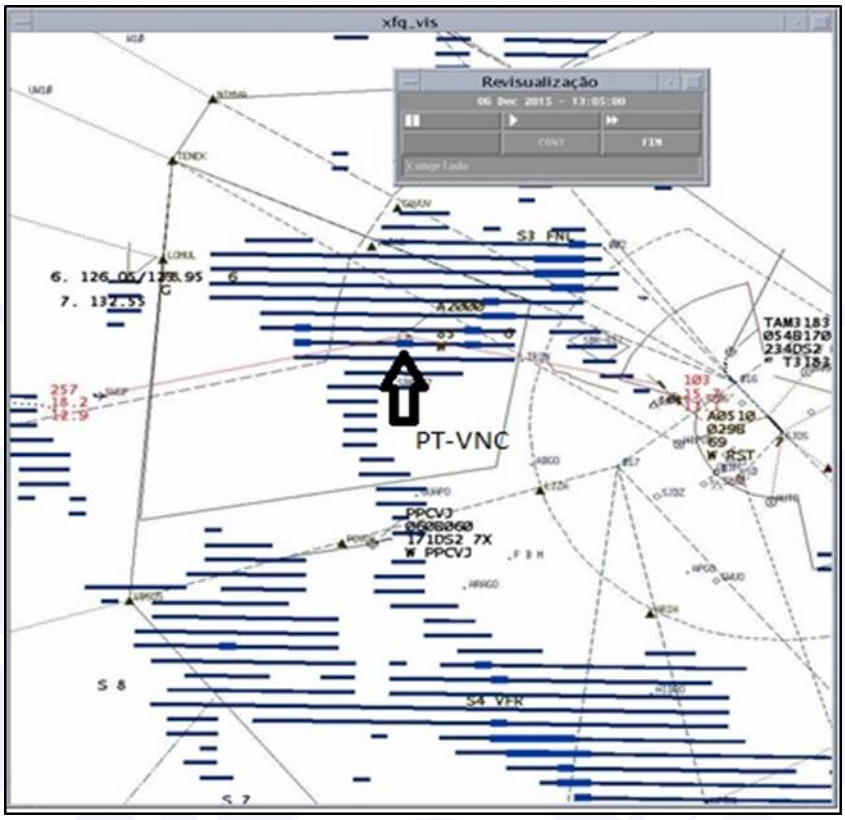

Figure 10 - Last view of the aircraft on the radar screen.

At 1306 (UTC), the air traffic control lost radar contact with the aircraft. (Figure 11).

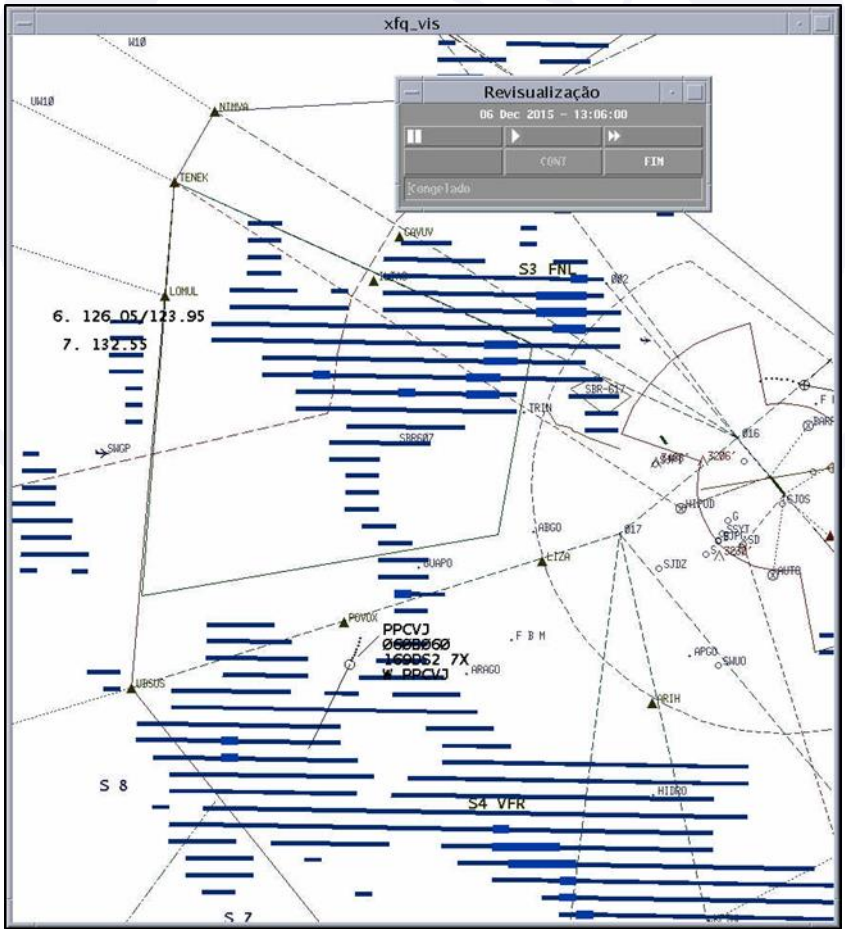

Figure 11 - Time when the APP loses the radar contact with the aircraft.

After taking off from SWGP, the aircraft involved in this occurrence did not make any kind of radio contact with the air traffic control. The APP Anápolis monitored the entire last flight of the aircraft because it occurred in controlled airspace.

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 dense forest area, with no evidence of previous impact. Residents of a farm, near the city of Trindade - GO, heard the collision.

The first impact was between the right wing and a tree in the forest where the aircraft crashed. After the first impact, the right wing detached itself from the fuselage and, after the impact to the ground, the engine detached itself from the fuselage. The degree of destruction prevented the verification of equipment and instruments (Figures 12 and 13).

Figure 12 - View of the aircraft without the wings and without the engine, after the occurrence.

Figure 13 - View of the aircraft engine after the occurrence.

The impact against the terrain and how the wreckage was found indicated that a violent collision occurred on the ground, cutting large trees, which demonstrated that the aircraft hit the ground with a large amount of kinetic energy.

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 pilot was described by people close to him as motivated, energetic and enthusiastic about aviation. He reported to the family that aviation was his way of dealing with the anxiety of his routine, and in recent months he had reported that he "had to fly" when he felt anxious.

According to information gathered during the investigation, the pilot began his aviation bond through the partnership of an aircraft that he established with a person of his acquaintance. At that time, they shared the aircraft as a means of transportation for personal activities and professional commitments.

As none of the partners had the required training, they had hired a pilot to perform the intended flights. Subsequently, the company was disbanded and the pilot acquired, in 2014, the PT-VNC registration aircraft, involved in the accident in question.

Prior to his qualification as a private pilot, flights on that aircraft were also conducted by a contracted pilot, similar to what happened when he had the aircraft in partnership.

According to family information, the pilot's motivation in relation to aviation had increased in the last year and, encouraged by his contracted pilot, decided to take the private pilot training course.

There was a friendly relationship between the pilot involved in the accident and this hired pilot, who, informally, also acted as an instructor on the flights they performed together. Even after joining the training course, the professional bond in the executive aviation field was maintained.

According to reports, the pilot was motivated and eager to command his aircraft without the presence of the instructor. This behavior had already been observed during his training course, but was more pronounced in the weeks that preceded the accident.

People who lived with the pilot at the time of the crash reported that, as a student pilot, he had tried to fly solo with his family on board, which was not authorized by the civil aviation school.

According to the information obtained, the pilot reported to people close to him that he felt prepared to command the aircraft alone. This perception was also shared by the hired pilot who accompanied him on private flights, which confirmed that the pilot was qualified even before the training course had been completed.

In the week preceding the accident, the pilot had invited several people to accompany him on the first flight upon receiving his license. However, he had received several denials.

Due to a scheduling conflict, one of the pilot's relatives had suggested the flight to be postponed to another date. However, the pilot stated that he "had to fly" and thus maintained his schedule.

On the day of the occurrence, two passengers, laymen in aviation accompanied the pilot. Initially, he had made a short flight, moving to the Palmeiras de Goiás Aerodrome (SWGP) successfully. According to the data obtained, shortly after the landing in SWGP, there was degradation of the meteorological conditions, which made it difficult to perform the return flight to Goiânia - GO.

Interviewees reported that the weather was unfavorable for the flight, because it was raining that day and there were many clouds. This perception was shared by both laymen in aviation and those who had knowledge in the area.

Due to these unfavorable conditions for the flight, the pilot had been undecided as to whether or not carry out his flight to Goiânia - GO. He had made contact with his family, informing that he would not return at the agreed time.

According to reports, the friend who aided the pilot in SWGP also expressed his concern with the weather, directing him to return by land and, in another opportunity, come back for the aircraft.

Despite the statement made to the family, the pilot made the return flight. Approximately ten minutes after takeoff, the aircraft crashed into the ground near the city of Trindade - GO.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

There were no survivors.

1.16 Tests and research.

According to the examination performed on the engine during the research, it was evidenced that it was operational and did not present mechanical problems. The development of power could be observed in at least two propellers, which presented a slight folding forward.

1.17 Organizational and management information.

The aircraft belonged to the pilot involved in the occurrence. Due to the fact that he did not have a private pilot license at the time of the acquisition of the aircraft, a hired pilot conducted the flights prior to the accident.

The aircraft owner had extensive involvement with the aircraft's management, including maintenance issues. The hired pilot, who also acted as a flight instructor at the same civil aviation school where the owner of the aircraft conducted his private pilot training course, assisted him.

According to reports, before beginning the training course, the aircraft’s owner already received instructions from the pilot he hired, informally.

Situations have been reported on flights where the owner of the aircraft, not yet qualified, assumed the flight commands and was instructed by the hired pilot. A relative of the aircraft’s owner, who was a passenger on such occasions, witnessed some of these situations.

The relationship between the instructor and the pilot in training was known to the civil aviation school. In the perception of the school owner, the instructor was very professional and able to discern about the different functions. He also considered the relationship between the student and the instructor good.

The same instructor, who was responsible for the theoretical and practical training of this school for years, gave all the instructions received by the pilot at the civil aviation school.

The instructional program implemented at the school had been developed by the instructor, who was also responsible for the theoretical and practical evaluations of this program. In accordance with what was envisaged for the private pilot training course, the program did not include flight instruction under Instrument Flight Rules (IFR).

As the informally established instructions were not recorded on assessment sheets, it was not possible to determine if the pilot received any instruction on IFR flight during the private flights that he performed.

1.18 Operational information.

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

It was a personal transport flight, from SWGP to SWNV. The pilot did not have the IFRA Rating. The conditions were not favorable for the visual flight.

1.19 Additional information.

During the practical training of the private pilot course, the pilot's performance had been recorded in his "Pilot-Student Assessment Papers in Flight Practice of the Private Pilot Course - Airplane (PP-A)", commonly referred to as "flight forms".

Such a registration practice was provided by the Aeronautics Command Manual 58-3 (MCA 58-3), whose fulfillment was mandatory, according to the Brazilian Aeronautical Certification Regulation nº 141 (RBHA 141), item 141.53, item "a ".

MCA 58-3, in its item 9.1.2.2, established that:

> "... pilot-student assessment in flight practice requires an accurate and detailed record of their performance and behavior, in duly standardized forms and designed for each of the phases of this practice, whose completion must be guided in strict compliance with the criteria and the parameters set forth in this manual ".

According to the flight records recovered during the investigation process, in all the exercises carried out during the training course, the pilot obtained degrees of performance that ranged from "3 - satisfactory" to "5 - excellent", according to the concept adopted by MCA 58-3.

The flight records used by the training school did not contain fields intended to meet the levels of learning that the student should achieve at the end of the instruction. These levels were used to mark the evaluation carried out by the instructor, regarding each instruction exercise. According to MCA 58-3, item 9.1.2.2.1, levels of learning:

> "These are conceptualizations that correspond to the gradual acquisition, in increasing complexity, of the learning that the pilot-student must carry out along the course. They also indicate to the flight instructor, step by step, the progress he should expect from the pilot-student. "

The learning levels proposed by MCA 58-3 are shown in Figure 14.

NÍVEIS DE APRENDIZAGEM	CÓDIGOS	DESCRIÇÃO
MEMORIZAÇÃO	M	O aluno tem informação suficiente sobre o exercício e memoriza os procedimentos para iniciar o treinamento em duplo comando.
COMPREENSÃO	C	O aluno demonstra perfeita compreensão do exercício e o pratica com o auxílio do instrutor.
APLICAÇÃO	A	O aluno demonstra compreender o exercício, mas comete erros normais durante a prática. Dependendo da fase da prática de vôo, poderá treinar solo.
EXECUÇÃO	E	O aluno executa os exercícios segundo padrões aceitáveis, levando-se em conta a maior ou menor dificuldade oferecida pelo equipamento utilizado.
	X	Prevê a execução atingida em missão anterior.

Figure 14 - MCA 58-3 Learning levels.

It should be noted that the flight record used by the training school was identical to the model set out in MCA 58-3, Annex H, "Pilot-student assessment sheets in the PP-A flight practice", which also did not contain a column for filling learning levels (Figure 15).

AVALIAÇÃO DO PILOTO-ALUNO NA PRÁTICA DE VÔO DO CURSO DE PP-A

FICHA 1

FASE I – PRÉ-SOLO (PS)

PILOTO-ALUNO: _____ DATA DO VÔO: _____
INSTRUTOR: _____ MISSÃO: _____ GRAU: _____
AERONAVE/TIPO: _____ PREFIXO: _____ TEMPO DE VÔO: _____
Nº DE POUSOS NA MISSÃO: _____ Nº TOTAL DE POUSOS: _____ TOTAL DE HORAS DE VÔO: _____

Definição de Graus: 1 – Perigoso 2 – Deficiente 3 – Satisfatório 4 – Bom 5 – Excelente

EXERCÍCIOS	GRAUS	EXERCÍCIOS	GRAUS
01 - Livro de bordo e Equip° de Vôo		23 - Vôo planado	
02 - Inspeções		24 - Pane simulada alta	
03 - Partida do motor		25 - Pane simulada a baixa altura	
04 - Cheques		26 - "S" sobre estrada	
05 - Fraseologia		27 - Glissagem alta	
06 – Rolagem (taxiamento)		28 - Glissagem em aprox. final	
07 - Decolagem		29 - "8" ao redor de marco	
08 - Saída do tráfego		30 - Curva de grande inclinação	
09 - Subida para área de instrução		31 - Descida para o tráfego	
10 - Nivelamento		32 - Entrada no tráfego	
11 - Identificação da área de instrução		33 - Circuito de tráfego	
12 - Uso dos comandos de vôo		34 - Enquadramento da pista	
13 - Uso de motor		35 - Aproximação na final	
14 - Uso de compensador		36 - Arremetida no ar	
15 - Retas e curvas subindo		37 - Pouso	
16 - Retas e curvas descendo		38 - Reta após o pouso	
17 - Vôo nivelado		39 - Arremetida no solo	
18 - Orientação por referências no solo		40 - Arremetida na aprox. final	
19 - Curvas de pequena inclinação		41 - Procedimentos após o pouso	
20 - Curvas de média inclinação		42 - Estacionamento	
21 - Estol sem motor		43 - Parada do motor	
22 - Estol com motor		44 - Cheque de abandono	

Figure 15 – MCA 58-3 Instruction Sheet.

Within the training school, there was no instructional coordinator and therefore the assessments performed by the instructor were not checked. In the field assigned to the instruction coordinator, there was no opinion or signature, corroborating this fact.

It was also noted that flight records did not include detailed registers of student performance during flights. Despite this fact, according to the training school, there were no factors that compromised the performance of the pilot-student during the course.

On the flight record of 11AUG2015, corresponding to the first flight of instruction (PS 01), the following record was recorded in the "comments" part, done in handwriting:

"Adaptive maneuvers with satisfactory performance".

It was not possible to determine the pilot's expected level of learning during that flight. However, according to MCA 58-3, it was previsted that, in this flight, the exercises would be performed only at memorization level.

The solo flight was performed when the pilot counted 11 flight hours recorded. According to MCA 58-3, item 7.4.2.1, "Phase I - Pre-Solo (PS)" had a forecast of at least 20 flight hours.

The evaluation of the flights performed by the pilot after the solo flight continued to be recorded in flight forms corresponding to the "File 1 of the pilot-student evaluation in the

PP-A flight practice" model, indicated for "Phase I - Pre - Solo (PS) ", according to MCA 58-3.

Thus, there were no records of the student's performance in some of the "Phase III - Navigation (NV)" exercises, such as flight planning, meteorological analysis, flight traffic rules and visual navigation, among others . These exercises were previsted in the "File 3 of the pilot-student evaluation in the practice of flight of the course PP-A" model.

Regarding the pilot and instructor relationship, during the practical training of the private pilot course, the pilot had been instructed by a single instructor, with whom he already had a previously established relationship, due to the professional bond in the employer condition.

According to the Flight Instructor's Manual, published in 2016 by the National Training Commission (CNT) of the Aeronautical Accidents Prevention National Committee (CNPAA), conducting instruction by a single instructor throughout the training process consisted of in an unadvisable practice (Figure 16).

7.3.5 ROTATIVIDADE DE INSTRUTORES

Por mais didático, profissional e competente que seja um determinado instrutor, ninguém é perfeito. A identificação instrutor-aluno, sob vários aspectos que por vezes transcendem o treinamento técnico, pode criar uma verdadeira sinergia no aprendizado. Não obstante e por mais padronizada que seja a instrução, é sempre válido ser submetido a diferentes maneiras e pontos de vista ao se transmitir conhecimento.

Quando a instrução se processa por inteiro com um instrutor somente, o aluno é formado a imagem e semelhança daquele piloto, carregando consigo todos os vícios e virtudes daquele instrutor. Pensando mais à frente, as cabines de comando das grandes aeronaves (futuro de muitos alunos) serão compostas por personalidades distintas e, por vezes, antagônicas. Assim, além de técnicas diferentes, os alunos desde cedo devem aprender a socialmente conviver com comportamentos e ideias diferentes, em um ambiente confinado e sem espaço para conflitos de temperamento. Resumindo, a rotatividade de instrutores, além de técnica, é também psicossocial!

Por fim e a título de sugestão, a instituição de ensino pode designar um mentor para cada aluno e investir nos processos de padronização de instrutores, por meio de reuniões, voos e outras práticas, tanto quanto possível. Contudo, e como demonstram as estatísticas de acidentes, essa organização não será eficiente e eficaz, se a supervisão da instrução for deficiente.

Figure 16 - Guidance in the Flight Instructor Manual.

According to this manual, it would be advisable for the training process to include instructions given by different professionals, in order to provide the pilot in training with more opportunities to develop his technical and socio-affective skills.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

According to reports, the aircraft took off for a transfer flight between SWGP-SWNV, in celebration for the private pilot's license acquisition, by the aircraft's owner.

The owner had made the check to obtain his PPR license a few days before the accident, and on the day of the occurrence, he made his first flight as commander without accompaniment of another pilot or instructor and out of an instructional context.

Due to this circumstance, during the investigation process, information about the pilot training process was collected. According to his flight records, at his training school, he had always been instructed to fly with the same instructor.

Such a practice was not recommended because it could lead to a conducive context to the acquisition of professional manias or even favor informality, which possibly worsened in the case in question, due to the previous employment relationship established between the instructor and the pilot.

Although the pilot has always obtained high grades in his assessments, it is possible that, due to the informal relationship between the two of them, the instructor did not observe the levels of learning according to the performance presented by the contractor.

In the training school, the evaluations carried out by the instructor were not checked by other professionals, since he was the only instructor responsible, for both theoretical and practical classes.

Thus, the relationships established out of the context of the training school, together with the absence of a formal follow-up of the institution and the instructions given, might have hindered the validity and reliability of its evaluations.

This hypothesis is further corroborated by reports that the pilot was already receiving flight instructions when performing private flights on his aircraft.

It was observed that, in the flight records, the content of the registers was insufficient and superficial, which made it impossible for the Investigation Team to adequately understand the performance presented by the pilot during his training process.

However, the possible flaws in the pilot training process, arising from an informal learning context, may have resulted in insufficient training to provide an adequate conditioning of practices consistent with flight safety.

On the day of the occurrence, the pilot was motivated to perform the flight, due to having received his license, after approval in the flight of check. He had waited for that moment all week, and even in the face of unfavorable weather, he chose not to cancel his schedule.

This decision may have been influenced by his high level of motivation and strong confidence in his skills and piloting ability, leading him to disregard relevant aspects that would compromise the safety of the operation.

As shown in satellite images and even by the observation of the team that carried out the initial investigation, the weather conditions were degraded, with rain and cloudiness.

During the first leg, between SWNV and SWGP, the pilot flew on the opposite heading and had difficulty in complying with the instructions given by the control, according to the recordings of APP Anápolis.

This difficulty may have been due to the pilot's lack of experience (45 hours of flight time) and, because of his first flight in command, without another pilot at his side.

Although it took a while to comply with the instructions of the air traffic control, at 1124 (UTC) the pilot made the landing in SWGP.

Weather conditions have degraded a lot between landing and takeoff in SWGP. Some people who talked with the pilot at the time, advised him to go back to Goiânia – GO by car.

It was also reported that the pilot had considered the possibility of waiting for the improvement of the conditions, and even reported to relatives about a possible delay. However, the pilot chose to make the return flight, even without the necessary improvements to the visual flight.

SWGP take-off was normal and, throughout the return route to SWNV, the air traffic control monitored the aircraft, although no radio contact was established at any time.

According to the satellite images and the radar screen, the aircraft entered an area of heavy rain cloudiness, generating an IFR flight condition. It should be noted that the profile planned for the flight was under visual flight rules, since the pilot had no instrument flight rating.

The circumstances present at that time of the flight possibly restricted the visual flight conditions with which the pilot was accustomed, due to the loss or limitation of visual references that could be used for the flight.

Moments before the collision, the aircraft circled the clouds, indicating that the pilot might be trying to get out of that formation. Due to the fact that he was not able to perform instrument flights, the pilot possibly reduced his flight altitude.

Chapter 3 of the Instrument Flying Handbook (FAA-H-8083-15B) described many types of illusion for instrument flying pilots, which warned of fog flight conditions.

In this condition, the pilot not being accustomed to this type of sensation understood that the aircraft was rising, tending to make abrupt corrections down:

> "Flying into fog can create an illusion of pitching up. Pilots who do not recognize this illusion often steepen the approach quite abruptly. "

The aircraft circled before it collided with the ground. Pilots not enabled in instrument flight tend to go down as far as possible to seek visual references.

Thus, the trajectory traversed by the aircraft in the moments that preceded the accident led the Investigation Team to consider the hypothesis that, when flying in circles, in an attempt to obtain visual references, the pilot has performed an increasingly lower flight, coming to collide against the ground.

As the pilot was unfamiliar with the sensations of instrument flight, the loss of visual references may have led to a context of overwork, as he made his first out-of-school flight, was not enabled for instrument flying, and possessed little flight experience.

No traces of mechanical problems were found on the aircraft and all maintenance logbook registrations were up-to-date in accordance with current legislation.

The impact against the terrain and how the wreckage was found indicated that a violent collision occurred on the ground, cutting large trees, which demonstrated that the aircraft hit the ground with a large amount of kinetic energy.

In this way, the most likely hypothesis is that the pilot has lost visual references, entering into instrument flight conditions.

3. CONCLUSIONS.

3.1 Facts.

a) the pilot had valid Aeronautical Medical Certificate (CMA);

b) the pilot had valid MNTE Rating;

c) the pilot was qualified and did not have experience in that kind of flight;

d) the aircraft had valid Airworthiness Certificate (CA);

e) the aircraft was within the limits of weight and balance;

f) the airframe, engine and propeller logbooks records were updated;

g) the weather conditions were not favorable for the flight;

h) the aircraft took off from SWGP and did not make contact with the Anápolis control;

i) APP Annapolis followed the entire flight of the aircraft;

j) the pilot got into adverse meteorological conditions and collided with the ground;

k) the aircraft was destroyed; and

l) the pilot and the two passengers perished at the site.

3.2 Contributing factors.

- **Attitude – a contributor.**

Flight performance in adverse weather conditions revealed overconfidence on the pilot's ability to fly, compromising his ability to critically analyze the conditions surrounding the flight, leading him to act without prior planning and in a way that was uncommitted with rules and procedures.

- **Training – undetermined.**

In the context of the civil aviation school, there was only one instructor responsible for the theoretical and practical lessons related to the pilot.

Thus, evaluations performed by the instructor were not checked by other professionals, which may have compromised the reliability of such assessments and provided inadequate training for the air activity.

- **Adverse meteorological conditions – undetermined.**

The meteorological conditions during the flight were not favorable for the visual flight, according to the information of the control organs, because the cloudiness in the region was intense and, at the moment of the occurrence, there was the presence of rain, which probably contributed to the loss of height and collision against the ground.

- **Instruction – undetermined.**

The flight with the same instructor, who was also a freelancer pilot of the aircraft's owner, contributed to a climate of leniency, since on his flight evaluation sheets there was no observation whatsoever, only that the flight had been well accomplished.

This link between student and pilot may have contributed to a possible deficiency of instructional aspects.

- **Motivation – a contributor.**

The high motivation of the pilot to make his first solo flight, after receiving his license, influenced the decision to proceed with the flight, despite adverse weather conditions.

- **Perception – undetermined.**

The loss of visual references, due to adverse weather conditions, may have prevented the pilot from correctly perceiving the position of the aircraft and the obstacles present in the external environment, inducing him to perform the flight lower and lower, until the collision against the ground.

- **Insufficient pilot's experience – a contributor.**

Despite being qualified and licensed to perform VFR flight, the pilot had approximately 45 total hours of flight, that is, practically the minimum required by the regulatory agency.

This little experience was a factor that contributed to the decision to take off from SWGP to SWNV in the presented meteorological conditions.

- **Decision-making process – a contributor.**

The accomplishment of the flight even under adverse weather conditions denoted a failed decision process, which was affected by the personality characteristics of the pilot and by his little experience in the air activity.

- **Interpersonal relationship – undetermined.**

During the training process, the pilot received instructions from a single instructor.

This professional also acted as a hired pilot of the aircraft's owner and, informally, instructed him on private flights on the PT-VNC aircraft.

The aforementioned context may have favored the instructor's complacency towards the student and may have impaired the performance evaluation of the pilot involved in this event.

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-159/CENIPA/2014 - 01 **Issued on 04/08/2019**

Act together with the AVH - Civil Aviation School Ltd., in order to verify the criteria adopted by that operator for the completion of students' assessment sheets.

A-159/CENIPA/2014 - 02 **Issued on 04/08/2019**

Act together with AVH - Civil Aviation School Ltd., in order to alert that School about the importance of observing what is provided in the Flight Instructor Manual of the CNPAA, especially regarding the instructors' turnover.

A-159/CENIPA/2014 - 03 **Issued on 04/08/2019**

Update Annex H, "Pilot-Student Assessment Papers in PP-A Course Practice" from MCA 58-3, introducing a column to fill in the learning levels to be achieved in each flight phase.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On April 08th, 2019.