

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A - 052/CENIPA/2020

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PR-DTY
MODEL:	PA-25-260
DATE:	18APR2020



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 by taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document that 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 Final Report has been made available to the ANAC and the DECEA so that the technical-scientific analyses of this investigation can be used as a source of data and information, aiming at identifying hazards and assessing risks, as set forth in the Brazilian Program for Civil Aviation Operational Safety (PSO-BR).

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 into the Brazilian legal system by 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 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

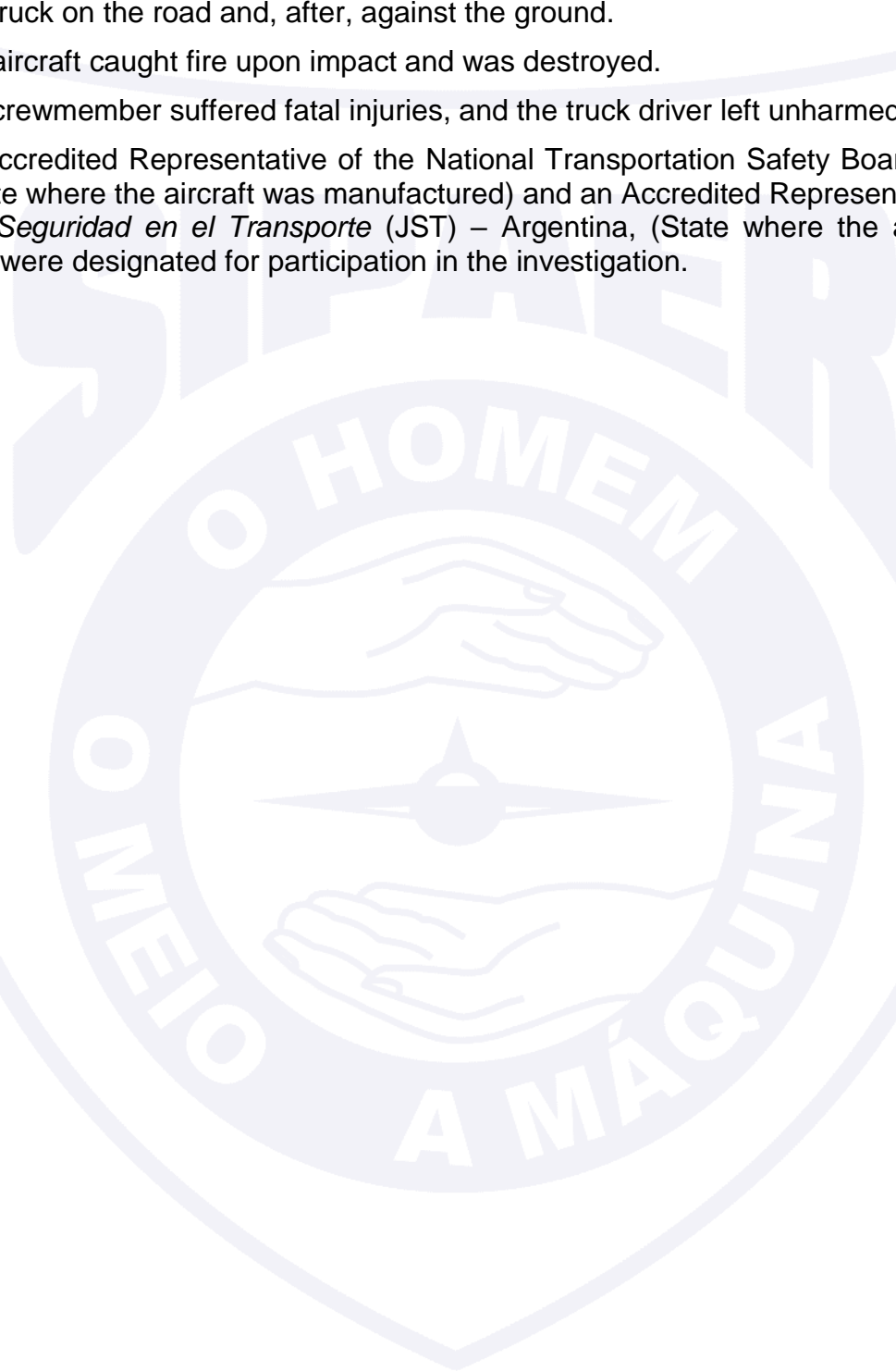
This is the Final Report of the 18APR2020 accident with the PA-25-260 aircraft model, registration PR-DTY. The accident was classified as “[LALT] Low Altitude Operation”.

During a private flight, with about thirty minutes of operation, according to reports, the pilot made an approach to BR-135 Highway, colliding with a single-phase cable power grid against a truck on the road and, after, against the ground.

The aircraft caught fire upon impact and was destroyed.

The crewmember suffered fatal injuries, and the truck driver left unharmed.

An Accredited Representative of the National Transportation Safety Board (NTSB) - USA, (State where the aircraft was manufactured) and an Accredited Representative of the *Junta de Seguridad en el Transporte* (JST) – Argentina, (State where the aircraft was designed) were designated for participation in the investigation.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

AEHC	Hydrated Ethyl Alcohol Fuel
AEV	Special Flight Authorization
ANAC	Brazil's National Civil Aviation Agency
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
COA	Air Operator Certificate
CTR	Control Zone
CVA	Airworthiness Verification Certificate
DCTA	Department of Science and Airspace Technology
EO	Operating Specifications
IAM	Annual Maintenance Inspection
ICA	Command of Aeronautics' Instruction
JST	<i>Junta de Seguridad en el Transporte</i>
MNTE	Airplane Single-Engine Land Rating
NTSB	National Transportation Safety Board (USA)
OM	Maintenance Organization
PAGA	Agricultural Pilot Rating
PCM	Commercial Pilot License – Airplane
PIC	Pilot in Command
PN	Part Number
PPR	Private Pilot License – Airplane
RBAC	Brazilian Civil Aviation Regulation
SACI	Integrated Civil Aviation Information System
SAE-AG	Specialized Air Service Registration Category – Aero Agricultural
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
SN	Serial Number
TBO	Time Between Overhaul
TLV	Terminal Control Area
TSN	Time Since New
TSO	Time Since Overhaul
UTC	Universal Time Coordinated
VTI	Initial Technical Survey

1. FACTUAL INFORMATION.

Aircraft	Model: PA-25-260 Registration: PR-DTY Manufacturer: Piper Aircraft	Operator: AEROBRAS <i>Aviação Agrícola Eireli</i>
Occurrence	Date/time: 18APR2020 - 1300 UTC Location: BR 135 Highway Lat. 03°53'35"S Long. 044°29'08"W Municipality – State: Matões do Norte – MA	Type(s): “[LALT] Low Altitude Operation” Subtype(s): NIL

1.1 History of the flight.

The aircraft took off from a landing area for agricultural use, located at Outeiro Farm, São Mateus do Maranhão - MA, at around 1230 (UTC) to perform a local flight with a pilot on board.

After about thirty minutes of flight, the pilot made, according to reports, an approach to BR-135 Highway, colliding with a single-phase cable power grid, against a truck that was traveling on the highway and, subsequently, against the ground.

The aircraft caught fire upon impact and was destroyed.



Figure 1 - General view of the PR-DTY wreckage.

The crewmember suffered fatal injuries and the truck driver left unharmed.

1.2 Injuries to persons.

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

1.3 Damage to the aircraft.

The aircraft was destroyed.

1.4 Other damage.

There was damage to a single-phase cable and a truck traveling on the highway.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Flight Hours	PIC
Total	236:57
Total in the last 30 days	Unknown
Total in the last 24 hours	Unknown
In this type of aircraft	236:57
In this type in the last 30 days	Unknown
In this type in the last 24 hours	Unknown

N.B.: The Investigation Team did not have access to the PIC's CIV. The data relating to the flown hours were obtained through the records contained in the CIV's Digital system of the ANAC.

1.5.2 Personnel training.

The PIC took the PPR course at the Piracicaba Aeroclub - SP, in 2013.

1.5.3 Category of licenses and validity of certificates.

The PIC had a PCM License and had a valid MNTE Rating.

1.5.4 Qualification and flight experience.

The PIC was qualified and had experience in the kind of flight.

1.5.5 Validity of medical certificate.

The PIC had a valid CMA.

1.6 Aircraft information.

The aircraft, model PA-25-260, Serial Number (SN) 25-45095, was manufactured by Piper Aircraft in 1968 and was registered in the SAE-AG Category.

The aircraft was imported on 10MAY2019, and customs clearance took place on 15MAY2019.

The last inspections of the aircraft, the "100 hours" and "IAM" types, were carried out on 15OCT2019 by the Maintenance Organization (OM) Tangara Aero center Ltd., in Orlandia - SP, with a total of 7,168 hours.

Part II of the Textron Lycoming engine logbook, model O-540-GIA5, (SN) L-18550-40A, dated 15OCT2019, noted that its TSN was 2,399 hours and 20 minutes, with 1,019 hours and 20 minutes since the last TSO.

On 21OCT2019, a test flight was registered in the Flight Logbook after maintenance performed at Mosquito Farm (SDOR), located in Orlandia - SP.

On 05NOV2019, due to nationalization, the ANAC performed the Initial Technical Survey (VTI) in the SAE-AG category. It was verified that the PR-DTY was airworthy, in accordance with the legislation in force.

On 10MAR2020, Form SEGV00 001 was issued referring to the aircraft's declaration of conformity for the operation of the Textron Lycoming engine, model O-540-GIA5, (SN) L-18550-40A, with AEHC, Ethanol, as aircraft fuel. On that occasion, according to Part II, the engine had 2,404 total hours and 1,024 hours after the general overhaul.

The flight was authorized by the ANAC through the AEV No. 23/2020/SP/GTAR/GAEM/GGAC/SAR, valid starting on 11MAR2020 and ending on 05NOV2025.

The CVA was valid until 05NOV2020.

On the accident day, there was no transcription of hours in the Logbooks or in the Flight Logbook that attested to the difference between the total hours recorded on

10MAR2020 (2,404 hours) and 15OCT2019 (2,399.3 hours). However, it was found that the PR-DTY had more than 2,404 total hours due to its displacement to the location where the accident occurred.

The Investigation Team was informed that there had been a breakdown and replacement of the carburetor, upon receiving of the aircraft after its purchase. Thus, it was considered the possibility that this component could have been exchanged before the transfer of the PR-DTY to São Mateus do Maranhão - MA. Yet, such replacement was not included in Part IV of the engine log.

The engine registration only indicated that the carburetor, Part Number (PN) 10-4404-1, (SN) MSE88905, was overhauled on 07NOV2017, being within its TBO of 1,500 hours and TLV of 8,668 hours or 10 years. Nevertheless, it was not possible to identify the SN of the carburetor installed in the PR-DTY due to the degree of destruction caused by the fire after the accident.

1.7 Meteorological information.

Based on footage obtained from third parties at the accident site, it was found that the weather conditions were favorable for the visual flight, with visibility above 10 km.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

The occurrence took place out of the Aerodrome.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

The first impact occurred against a single-phase medium voltage cable, with the aircraft heading at approximately 176°. The second impact occurred when the left wing collided with a truck traveling on the highway.

After the second impact, the aircraft traveled approximately 110 meters and hit the ground near the shoulder of the highway, dragging and leaving the road, stopping at 90° in relation to the axis of the BR-135 (Figure 2).

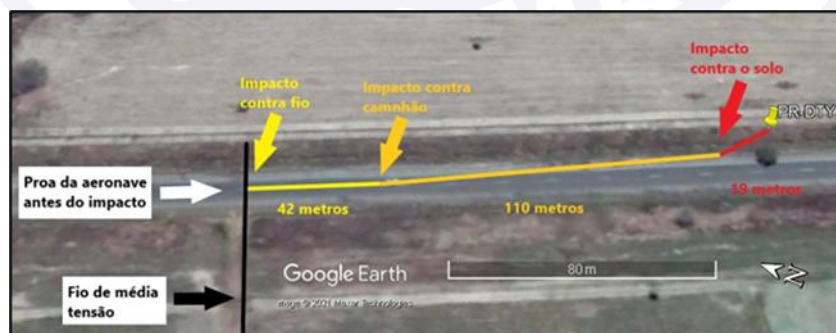


Figure 2 - Sketch of the accident. Source: adapted from Google Earth.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

Nil.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

Although it was not possible to prove all his professional experience, it was obtained information that the pilot had already operated in agricultural aviation in his region of origin, however, without holding an Agricultural Pilot Rating - PAGA.

He was described as a lively, fun, and humble person who tried to be helpful to everyone around him and help his family. It was also reported that he had a history of being daring and sometimes flying low over vehicles. In the view of acquaintances, he was considered a fighter and a dedicated person. However, he presented a self-confident and audacious profile, when in flight.

There were reports that, during aero-agricultural operations, it was common to consume alcoholic beverages in regions of the farm, which was also a pilot's habit.

It was reported that, on the eve of the event, the pilot had 5 hours of sleep and at night he consumed alcohol socially. Nevertheless, it was not possible to confirm the amount of alcohol consumed.

1.14 Fire.

According to observers, the fire started after the impact with the ground.

The fire consumed much of the aircraft and its components, also reaching the pilot, who was charred.

1.15 Survival aspects.

Nil.

1.16 Tests and research.

The Textron Lycoming engine, model O-540-GIA5, (SN) L-18550-40A, which equipped the PR-DTY aircraft, was inspected, and dismantled at the TEMA Technology Aircraft Maintenance shop, based in Belém - PA. The work was carried out by professionals from that company and accompanied by representatives of the operator, from the SERIPA I, and from the DCTA.

The analysis showed that the engine was exposed to temperatures above 820°C, leading components of the lubrication systems, fuel supply, cylinders, pistons, and semi-casings to be consumed in their entirety or in part.

Several items such as magnetos, carburetor, and tailgate were directly hit. Therefore, there was no condition to analyze them.

A part of the crankcase was the only component of the lubrication system that was still in the engine. The other items such as the primary and main filters, as well as the oil pump, were destroyed by the fire. This engine's lubrication system could not be inspected and/or analyzed.

The fuel supply system was also not examined since the carburetor was consumed by the fire.

Initially, it was found that the engine had severe damage as a result of the fire that followed the collision of the aircraft with the truck, on the BR-135. It was also observed that a large part of the engine was consumed by the fire (Figure 3).



Figure 3 - Aircraft engine overview.

The propeller was the component that provided evidence that the engine was not stationary at the instant of the aircraft collision. Figure 4 shows an overview and the backward-facing bending in both blades.



Figure 4 - General view of the propeller with the blade tips facing backwards.

Figure 5 shows a propeller blade with transverse scratches. It can be seen, in the highlight, a small bend facing forward, at the end of the blade.

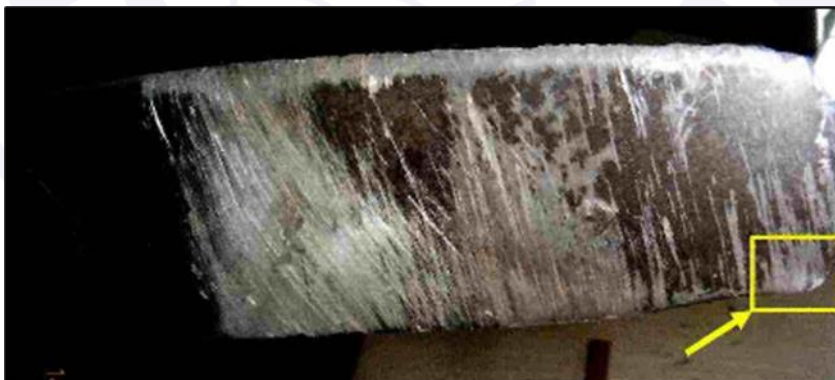


Figure 5 - View of a propeller blade showing transverse scratches, impact marks and forward-facing bending.

The investigation regarding the aircraft's powertrain system concluded that the engine was not stopped the moment the plane impacted the ground, and signs were observed that it was at medium to low power.

It was not possible to identify the primary cause that could have resulted in power reduction during the flight due to the destruction of its components by fire.

1.17 Organizational and management information.

According to data obtained during the investigation, on the flight that gave rise to this occurrence, the pilot was not performing an agricultural flight and was operating according to the requirements established in the RBAC No. 91 - General Operating Requirements for Civil Aircraft.

On 25MAR2020, according to the records contained in the Full Content Certificate referring to the aircraft issued by the ANAC, the aircraft's purchase and sale with reservation of domain in the name of the pilot of this occurrence was registered, according to the contract dated 28FEB2020. The transfer of ownership with the RAB would only occur after the payment of the last installment, scheduled for 01JUN2021.

The purchase and sale agreement clauses, with reservation of title stated that the seller agreed and authorized that the aircraft be subject to a lease.

Also, on 25MAR2020, the Operating Lease of the PR-DTY branded aircraft was registered in the SAE-AG category, according to the contract dated 28FEB2020, agreed between the owner and the operator AEROBRAS Aviação Agrícola Eireli, which was based in São Mateus do Maranhão - MA. The lease would take place for a period of 12 months.

The operating company did not hold a COA, issued in accordance with the RBAC nº137 – “Operational Certification and Requirements: Aero agricultural Operations” and did not have authorization to operate. According to information, the operator was in the process of including the PR-DTY in its EO to complete the certification process.

Thus, there was the prospect of the aircraft being used in agricultural operations on plantations in the region.

In turn, the accident pilot had the prospect of operating the aircraft in agricultural operations, as required.

1.18 Operational information.

According to information obtained, the accident flight was a private local flight and during the Field Action, there were no indications that the pilot was performing aero agricultural flight at the time of the accident.

According to information from the pilot's partner, who was at the take-off location waiting for the aircraft to return, the reduction in engine power was noticed before the accident, despite the distance between the operator and the place of occurrence being approximately 5.4 NM. This fact, according to him, was identified by the characteristic noise of the engine.

According to reports, the pilot coordinated the fueling of the aircraft, with no information on the origin of the fuel or the place where the product was stored/stocked.

It was not possible to determine the amount of fuel remaining in the tanks due to the fire. However, it was informed by the operator that the aircraft would have taken off with approximately 140 liters of ethanol.

There were reports from people passing along the highway, at the time of the occurrence that the aircraft appeared to be “looking for a place to land”.

In a video posted by the pilot of this occurrence, at an earlier date, the presence of some plastic containers and a vehicle with characteristics similar to a fuel truck close to the PR-DTY, could be identified.

In that same video, despite not having a PAGA Rating, the pilot reported that he was prevented from making an agricultural flight because of adverse weather conditions.

1.19 Additional information.

Section 5.1.4 of the Aeronautics Command Instruction (ICA) 100-12 - Air Rules, in force at the time of the accident, provided that:

5.1.4 Except for takeoff and landing operations, the VFR flight will not be performed:

a) over cities, towns, inhabited places or over groups of people outdoors, at a height of less than 300 m (1000 ft) above the highest obstacle within a radius of 600 m around the aircraft; and

b) in places not mentioned in the previous paragraph, at a height of less than 150 m (500 ft) above the ground or water.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

It was a local private flight in which the pilot apparently made an approach to BR-135 Highway, colliding with a single-phase cable power grid, a truck and, subsequently, against the ground.

The aircraft caught fire after impacting the ground and was destroyed.

According to data obtained during the investigation, the flight that resulted in the accident was not intended for agricultural purposes. However, in a video recorded at an earlier date, the pilot reported that he was prevented from making an agricultural flight because of adverse weather conditions.

As he did not have a PAGA Rating, this revealed a low adherence to rules and regulations and, consequently, to the precepts of operational safety.

In this context, reports that the PIC was daring and sometimes flew low over vehicles reinforced the hypothesis that the pilot associated his motivation and flying skills with overconfidence, causing his exposure to risks to become high.

Thus, a possible low-altitude flight over the highway in which there was a collision with the power grid could not be disregarded. Yet, according to observers traveling along the highway at the time of the occurrence, it appeared that the aircraft was "looking for a place to land."

Likewise, there were reports that, during aero-agricultural operations, it was common for the pilot to consume alcoholic beverages in regions of the farm, which was also a habit. It was reported that, on the eve of the accident, the pilot had 5 hours of sleep, and at night, he consumed alcohol socially.

Due to a possible loss of power, the engine that equipped the PR-DTY was subjected to tests that indicated exposure to temperatures above 820°C, taking the components of the lubrication systems, fuel supply, cylinders, pistons, and semi-carcasses to be consumed in whole or in part.

The propeller was the only component that provided evidence that the engine was not stationary at the moment of the aircraft's collision. One of the blades had transverse scratches, impact marks and forward-facing bending.

Thus, the investigation regarding the powertrain system concluded that the engine was not stopped the moment the aircraft was involved in the accident, and there were indications that it was developing medium to low power.

It was not possible to identify the factors related to the decrease in power during the flight because the engine had several components consumed by the fire.

Considering that the data related to the Flight Logbook and that the engine, airframe and propeller logbooks were outdated, it was raised the possibility that the monitoring of the aircraft maintenance services had not been adequate.

The failure to record the hours flown revealed an inappropriate supervision of the services provided for the aircraft, whether preventive or corrective.

This condition was also reinforced by the report of a possible replacement of the aircraft's carburetor, without the respective release in its logbooks, before going to the farm where it was based, in São Mateus do Maranhão - MA. However, it was not possible to examine and identify the SN of the carburetor actually installed in the PR-DTY, due to the degree of destruction caused by the fire after the accident.

The last flight recorded in the Flight Logbook was dated 21OCT2019. It was a test flight after maintenance and was carried out at Mosquito Farm (SDOR), located in Orlândia - SP. There is no register of any flights after that date, including the displacement to the landing area, where the plane was operating on the day of the accident.

According to reports, the pilot coordinated the fueling of the aircraft, with no information on the origin of the fuel or the place where the product was stored/stocked.

In this context, in view of the uncertainty regarding the origin of the fuel, its storage and refueling conditions, there is also the hypothesis that the ethanol used by the aircraft could, eventually, be contaminated. The presence of water in the fuel can cause in-flight engine failure or loss of power.

In short, the data collected during the investigation raised doubts about the airworthiness conditions of the aircraft, which may have caused the engine to malfunction and, consequently forced the pilot to attempt an emergency landing on a highway. Also, the possibility of procedures deviation motivated by the intention to perform an overflight on vehicles over the highway.

Both possibilities would have resulted in the aircraft colliding with the power cable and a truck, causing an uncontrolled impact against the ground.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilot had a valid CMA;
- b) the pilot had a valid MNTE Rating, but he did not have a PAGA Rating;
- c) there were no indications that the pilot was performing agricultural flight at the time of the accident;
- d) the pilot was qualified and had experience in the type of flight;
- e) the aircraft had its CVA valid until 05NOV2020;
- f) because the aircraft engine had been converted to operate with ethanol, the aircraft operated with an AEV, valid until 05NOV2025;
- g) the airframe, engine and propeller logbook records were outdated;
- h) the meteorological conditions were favorable for the visual flight;
- i) the aircraft collided with a cable, with a truck on the highway and, subsequently, with the ground;
- j) there were indications that the aircraft engine was operating at medium to low power at the time of the collision;
- k) there was fire and the aircraft was destroyed; and

l) l) the pilot suffered fatal injuries.

3.2 Contributing factors.

- **Alcohol – undetermined.**

It was reported that, on the eve of the event, the pilot had 5 hours of sleep and at night, he consumed alcohol socially, but it was not possible to confirm the amount allegedly consumed.

- **Attitude – undetermined.**

The pilot's behavior in relation to the aerial activity, described by observers as daring and audacious, showed that he was endowed with an excess of confidence in his own operational capacity, causing his exposure to risks to become high.

Reports that the PIC sometimes flew low over vehicles reinforced the hypothesis that he could have been performing this type of flight over the highway before the collision with the power grid.

- **Piloting judgment – undetermined.**

In the event of a possible loss of engine power and an attempt to make a highway landing, there may have been an inadequate assessment of the chosen landing site.

- **Aircraft maintenance – undetermined.**

The airframe, engine and propeller logbook records were outdated. Since 21OCT2019, when the last flight was registered in the Flight Logbook, there was no entry of flight hours. Thus, the failure to record the hours flown revealed inadequacy in monitoring the planned services, whether preventive or corrective, which may have contributed to a possible reduction in engine power.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation made intending to prevent 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 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”.

None.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On November 3th, 2022.