

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A-050/CENIPA/2022

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PR-AUG
MODEL:	SR22
DATE:	17ABR2022



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 considering 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 distinct 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 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. Considering 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 17 April 2022 accident involving the SR22 aircraft, registration marks PR-AUG. the accident was typified as “[SCF-NP] System/Component Failure or Malfunction and [RE] Runway Excursion”.

During a ferry flight from SWGN (Aerodrome of *Araguaína*, State of Tocantins) bound for (SSUI Fazenda Novo Horizonte Aerodrome, Santa Fé do Araguaia, State of Tocantins), the aircraft presented abnormal vibration, and a precautionary landing was made on an unregistered runway in the municipality of *Piçarra*, State of Pará.

During the run after landing, the aircraft veered off the runway.

The aircraft sustained substantial damage.

The pilot suffered no injuries.

Being the United States of America, the State of design and manufacture of the aircraft, the USA's NTSB (National Transportation Safety Board) appointed an Accredited Representative for participation in the investigation of the accident.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

AD	Airworthiness Directive
ANAC	Brazil's National Civil Aviation Agency
CENIPA	Brazil's Aeronautical Accidents Investigation and Prevention Center
CIV	Pilot Logbook
CMA	Aeronautical Medical Certificate
CPTEC	Weather Forecast and Climate Studies Center
CVA	Certificate of Airworthiness-Verification
FAP	Pilot-Evaluation Form
ICA	Command of Aeronautics' Instruction
IFRA	IFR Flight Rating - Airplane
INVA	Flight Instructor Rating - Airplane
METAR	Routine Meteorological Aerodrome Report
MNTE	Single-Engine Land Airplane Class Rating
NTSB	National Transportation Safety Board
OM	(Abbreviation in Portuguese for Maintenance Organization)
PCM	Commercial Pilot License - Airplane
PIC	Pilot in Command
PLA	Airline Transport Pilot License - Airplane
POB	Persons on Board
PPR	Private Pilot License - Airplane.
SIPAER	Brazil's Aeronautical Accidents Investigation and Prevention System
S/N	Serial Number
SIGWX	Significant Weather Chart
SSUI	ICAO location designator - <i>Fazenda Novo Horizonte Aerodrome, Santa Fé do Araguaia, State of Tocantins</i>
SWG N	ICAO location designator - <i>Aerodrome of Araguaína, State of Tocantins</i>
TPP	Private Air Services Aircraft Registration Category
UTC	Universal Time Coordinated
VMC	Visual Meteorological Conditions
VFR	Visual Flight Rules

1. FACTUAL INFORMATION.

Aircraft	Model: SR22	Operator: <i>Kothe Logística Ltda</i>
	Registration: PR-AUG Manufacturer: <i>Cirrus Design</i>	
Occurrence	Date/time: 17ABR2022 - 16:00 (UTC)	Type(s): [SCF-NP] System/component failure or malfunction (non-powerplant) [RE] Runway excursion
	Location: <i>Reserva Escapole</i>	
	Lat. 06°38'29"S Long. 048°40'19"W Municipality – State: <i>Piçarra – Pará.</i>	

1.1. History of the flight.

At around 15:45 UTC, the aircraft took off from SWGN (Aerodrome of Araguaína, State of Tocantins) bound for SSUI (Aerodrome of *Fazenda Novo Horizonte, Santa Fé do Araguaia*, State of *Tocantins*) for a ferry flight with 01 POB (pilot).

Approximately 15 minutes into the flight, the aircraft presented abnormal vibration, and a precautionary landing was made on an unregistered runway of *Reserva Escapole* (an indian reservation) in the municipality of *Piçarra*, State of *Pará*.

During the landing run, the aircraft veered off the runway via the left side.

The aircraft sustained substantial damage, whereas the pilot suffered no injuries.



Figura 1 - Aeronave após o acidente.

1.2. Injuries to persons.

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

1.3. Damage to the aircraft.

The aircraft sustained substantial damage. The main and auxiliary landing gears broke and there was minor damage to the wings, fuselage, and tips of the propeller blades.

1.4. Other damage.

NIL.

1.5. Personnel information.**1.5.1. Crew's flight experience.**

FLIGHT EXPERIENCE	
	PIC
Total	2.087:00
Total in the last 30 days	24:40
Total in the last 24 hours	01:30
In this type of aircraft	385:45
In this type in the last 30 days	23:40
In this type in the last 24 hours	01:30

Obs.: Data on the flight hours based on the records of the Pilot Logbook (CIV)

1.5.1 Personnel training.

The Pilot in Command (PIC) did his PPR course (Private Pilot – Airplane) in 2012, at *Aeroclub EJ Aviação Civil, Jundiaí, State of São Paulo*.

1.5.2. Category of licenses and validity of certificates.

The PIC held a PLA License (Airline Transport Pilot - Airplane) and valid ratings for MLTE (Multi-Engine Land Airplane) and IFRA (IFR Flight - Airplane).

1.5.3. Qualification and flight experience.

The electronic CIV records indicated that the pilot had been operating the PR-AUG aircraft since February 2022, having logged approximately 60 flight hours after being hired by the owner/operator.

The pilot had already flown the intended route once, two days before the accident flight.

His Pilot-Evaluation Forms (FAP) did not show any deficiencies during the check-rides for revalidation of his ratings.

The pilot was qualified and had experience in the type of flight.

1.5.4. Validity of medical certificate.

The pilot had a valid CMA (Aeronautical Medical Certificate).

1.6. Aircraft information.

The SN 2386 aircraft, was a product manufactured by Cirrus Design in 2007, and registered in the Private Air Services Registration Category (TPP).

The aircraft's CVA (Airworthiness-Verification Certificate) was valid.

The records of the airframe, engine, and propeller logbooks were up to date.

The aircraft underwent its latest inspection ("100 hours/CVA" type) on 03 March 2022 on the premises of a certified Maintenance Organization (OM) in *Sorocaba, State of São Paulo*. It logged 46 hours and 5 minutes of flight time after the inspection.

The Maps concerning Compliance with Bulletins and Airworthiness Directives were up to date, and so was the Map of Components.

1.7. Meteorological information.

The METARs of SWGN (Aerodrome of Araguaína), aerodrome of departure, located at a distance of 32 NM from SSUI (intended destination), and 42 NM from the accident site, contained the following information:

METAR SWGN 171500Z AUTO 0000KT 9999 BKN007 24/23 Q1013

METAR SWGN 171600Z AUTO 03005KT 9999 -RA FEW007 BKN016 BKN037 24/24 Q1012

The 171500Z METAR shows that the prevailing conditions at the takeoff from SWGN were visibility greater than 10 km and a ceiling of broken clouds (5 to 7 oktas) at 700 ft. The wind was calm.

The 171600Z METAR showed light rain, with few clouds at 700 ft. and broken clouds (5 to 7 oktas) at 1,600 ft. and 3,700 ft. The wind was 030° at 5 kt.

The Significant Weather Chart (SIGWX) generated at 09:55 UTC on the day of the occurrence, valid until 00:00 (UTC) of the following day, forecasted the presence of isolated and embedded Cumulonimbus (CB) clouds with base at 3,000 ft. and a top above FL250 (Figure 2).

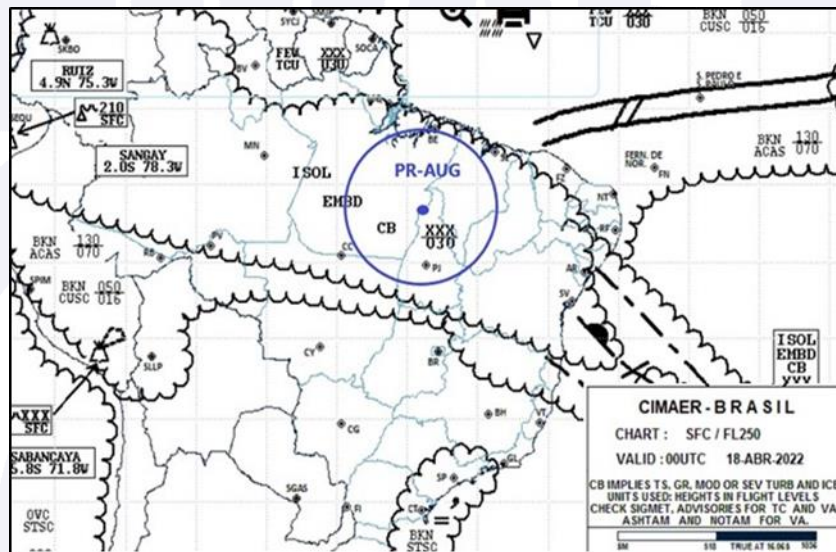


Figure 2 - SIGWX chart generated at 09:55 UTC on the day of the occurrence and valid until 00:00 UTC of the following day.

Source: Integrated Center for Aeronautical Meteorology.

In addition to the above, the satellite image generated at 15:50 UTC by the Weather Forecast and Climate Studies Center (CPTEC) showed the presence of significant meteorological formations (Figure 3) along the route and in the surroundings of the destination aerodrome.

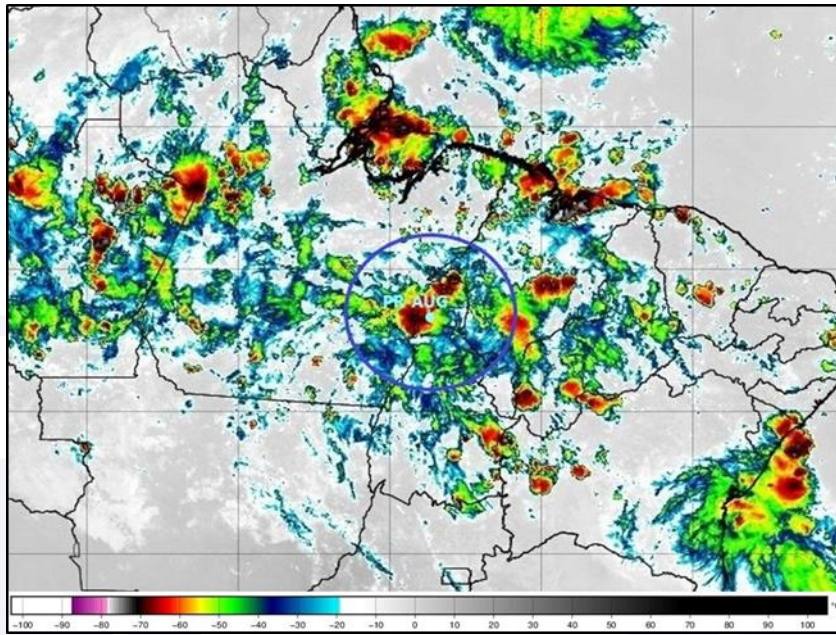


Figure 3 - Enhanced satellite image, showing the meteorological conditions around the time of the occurrence. Source: CPTEC.

According to reports from the pilot, there were layers of clouds on the route below 2,500 ft., which impaired maintaining visual contact with the terrain, and presence of light rain.

The item 5.1.2 of the Command of Aeronautics' Instruction (ICA) 100-12 provided that:

Except when authorized by the ATC unit to accommodate a special-VFR flight, VFR flights are not allowed to land, take off, or enter the ATZ or the traffic pattern of the aerodrome if:

- a) the ceiling is below 450 m (1,500 ft.); or
- b) ground visibility is less than 5 km.

One verified that, according to the METAR in effect at the time of takeoff from SWGN, the ceiling conditions forecast for landing/takeoff were below the minima for VFR flights, due to the ceiling of broken clouds at 700 ft.

1.8. Aids to navigation.

NIL.

1.9. Communications.

NIL.

1.10. Aerodrome information.

The asphalt-paved airstrip where the precautionary landing took place was not registered. It measured 1,000 m x 14 m at an elevation of 479 ft. The magnetic azimuths of the thresholds were 310° and 130° (Figure 4).



Figure 4 - Length of the Escapole Reserve airfield.
Source: adapted from Google Earth.

There were loose rocks along the entire length of the runway (Figure 5). Furthermore, according to reports from the pilot, the runway surface was wet at the time of the accident due to the rain in the region.



Figure 5 - Asphalt runway with loose rocks.

1.11. Flight recorders.

Not required and not installed.

1.12. Wreckage and impact information.

The wreckage was located outside of the unregistered runway of Reserva Escapole in the southern sector.

The approach and landing were performed at a heading of approximately 310° , and it was not possible to determine the point of touchdown on the runway. However, when the brakes were applied, at about 240 m past the landing threshold, the aircraft veered to the left at a distance of 53 m and exited the runway.

The aircraft then traveled another 52 m through an area of vegetation (Figure 6), rotating and skidding laterally (Figure 7), breaking its main and auxiliary landing gears, until coming to a complete stop aligned with the azimuth 056° .

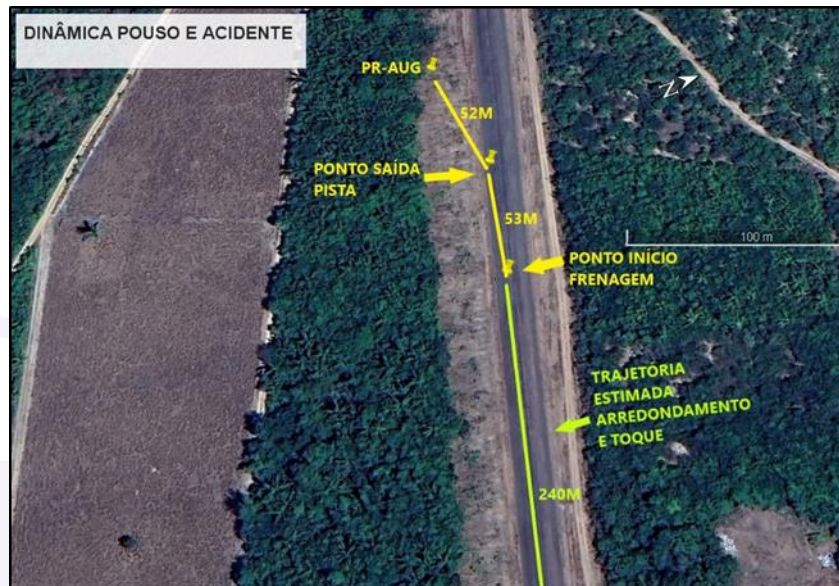


Figure 6 - Dynamic of the landing and subsequent accident.
Source: adapted from Google Earth.



Figure 7 - Vegetation marked by the aircraft leaving the runway and skidding before coming to a complete stop.

The inspection window indicating the temperature of the right main landing gear was black, while the corresponding window of the left main landing gear was white (Figure 8).



Figure 8 – Sequentially, the inspection windows for the left and right main gear.

There were no aquaplaning marks either on the runway or on the landing gear tires.

The inner and outer surfaces of the wing flaps were intact and deflected at a position corresponding to 32°. The flap lever in the cockpit was in the 100% position and the parking brake was in the released position.

The power, propeller, and fuel levers were in fully reduced position.

It was possible to observe that the instrument panel of the pilot's station had not been damaged due to the impact of the aircraft.

The speedometer had no visible marks capable of indicating the speed of the aircraft at the time of impact.

1.13. Medical and pathological information.

1.13.1. Medical aspects.

No evidence was found that issues of a physiological nature or incapacitation might have affected the pilot's performance.

1.13.2. Ergonomic information.

NIL.

1.13.3. Psychological aspects.

The PIC began his activities in aviation in 2012. After graduating, he was hired as a flight instructor at the very training school where he graduated. In 2019, he worked as a coordinator and instructor at *SAFE Escola de Aviação* in São José dos Campos, State of São Paulo. In addition to these activities, he flew private flights as a freelancer.

In March 2022, the PIC was formally hired by the company that owned/operated the accident aircraft, for the purpose of piloting private flights, after being recommended by a friend who also worked at the company. However, he had already arrived in the region in February 2022, performing flights to get familiarized with the location, its characteristics, and weather conditions.

According to accounts, the PIC was described as being communicative, good-humored and easy to get along with, in addition to being a technical, cautious, and committed professional.

The pilot stated that, in the year of the accident, he was enjoying a good phase of his life and was satisfied with his new job. Furthermore, there was a friendly atmosphere among the employees, which fostered good interpersonal relationships, and he had the intention to pursue a career in the company.

Furthermore, from his perspective, he maintained a regular and active routine, practicing regular physical activities and maintaining a good diet. His nights of sleep were usually peaceful and restful. He did not use prescription drugs and only consumed alcoholic beverages at social events.

According to reports, he had a strong professional profile, staying constantly updated with the regulations and technical knowledge of the aircraft, as well as being adequately proficient in its operation. He routinely used checklists during operations and always performed pre-flight and post-flight inspections with the aim of establishing barriers to the risks present in the operations.

The night before the accident, the pilot had a good night's sleep, resting an average of 8 hours. It was also reported that the company encouraged adequate work hours, allowing for sufficient rest time.

The pilot reported that during the occurrence, he remained calm in the face of the situation, which helped in identifying a possible mechanical or structural failure to avoid further damage.

1.14. Fire.

There was no fire.

1.15. Survival aspects.

NIL.

1.16. Tests and research.

Due to reports of abnormal aircraft vibrations suspected to have originated from the engine, fuel tests were performed in a certified laboratory, and no evidence of fuel contamination was found.

The Investigation Committee also conducted an analysis the Serial Number 1042642 powerplant, model IO-550-N (47), at a maintenance organization certified by the ANAC, in which the integrity was found to be consistent with the normal operation of its peripheral systems and accessories, with no evidence of engine failure.

In addition, one found no evidence of fire, biological contamination, or damage attributable to impact from a foreign object.

However, the rubber of one of the engine support shock absorbers was found cracked, and it was not possible to determine when such damage had occurred (Figure 9).



Figure 9 - Cracked rubber of one of the engine support shock absorbers.

Given the report of a malfunction in the right main landing gear brake and the fact that, during the Initial Action of the investigation, its temperature indicator window was found to be black, this component was also analyzed.

In this way, the wear of the brake discs, as well as the pads of both main landing gear wheels was measured, and all were within the parameters specified by the manufacturer, with no abnormalities found.

The hydraulic lines related to the braking system were also inspected, and their pressurization and pedal actuation tests for both brakes were conducted to check for any possible hydraulic fluid leaks, with no abnormalities detected.

After inspecting the items that comprised the aircraft's braking system, no discrepancies were found, and the inspected components were found to be in good condition.

However, according to the aircraft's operating manual, the black landing gear inspection window indicated that the system had overheated (Figure 10).

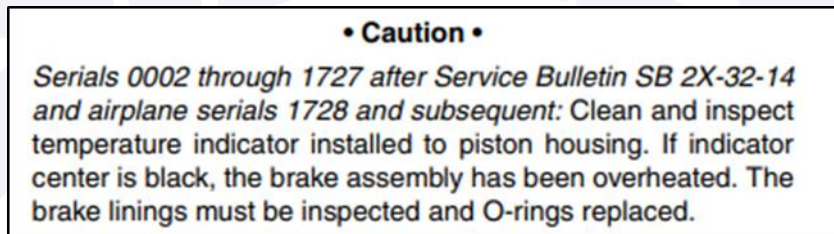


Figure 10 - Information from the aircraft operating manual with instructions for checking the landing gear brake temperature inspection window.

Source: Pilots Operating Handbook - Section 4.

1.17. Organizational and management information.

The owner and operator of the accident aircraft was a company that provided road logistics transportation services.

As for the management of the aircraft, its maintenance was coordinated by the Chief-Pilot and the very PIC, who monitored the services at the Maintenance Organization whenever required, such as the 50-hour inspections, or at headquarters, acting in accordance with the Manuals and Technical Bulletins.

1.18. Operational information.

According to accounts, it was a private ferry flight between SWGN and SSUI.

The aircraft was refueled in SWGN with 228 liters of fuel, reaching a total of 318 liters in the tanks.

According to the PIC, on that day he performed all pre-flight inspections on the aircraft, including the checking of the inspection windows indicative of overheat of the brakes, which presented a white color (normal). During the taxi, he carried out checks of the brakes, which functioned normally.

Moments before takeoff, according to information, the pilot evaluated whether or not to proceed with the flight on account of the weather and, after judging it to be adequate, he decided to carry out the flight.

After the takeoff from *Araguaína*, the pilot continued heading for *Fazenda Novo Horizonte*, maintaining an altitude of 2,500 ft. There was light rain in the region. He noticed that in the direction of the planned route there were layers of low clouds, without any empty spaces, in such a way that in order to maintain visual contact with the terrain, he made deviations to the right.

He deviated laterally until reaching the vertical of the Araguaia River, approximately 28 NM laterally to the right of the destination, where he would decide whether to return to the origin (SWG N) or descend along the river, where there were no obstacles, to verify the correct height of the cloud base.

At that moment, approximately 15 minutes after takeoff, he felt an abnormal vibration in the aircraft, and suspected that the engine was malfunctioning. According to him, no other signs were noticed, such as loss of power or abnormalities in the parameters prescribed for his instruments.

However, the PIC reported having sighted the runway of *Reserva Escapole*, and decided to make a precautionary landing at that location.

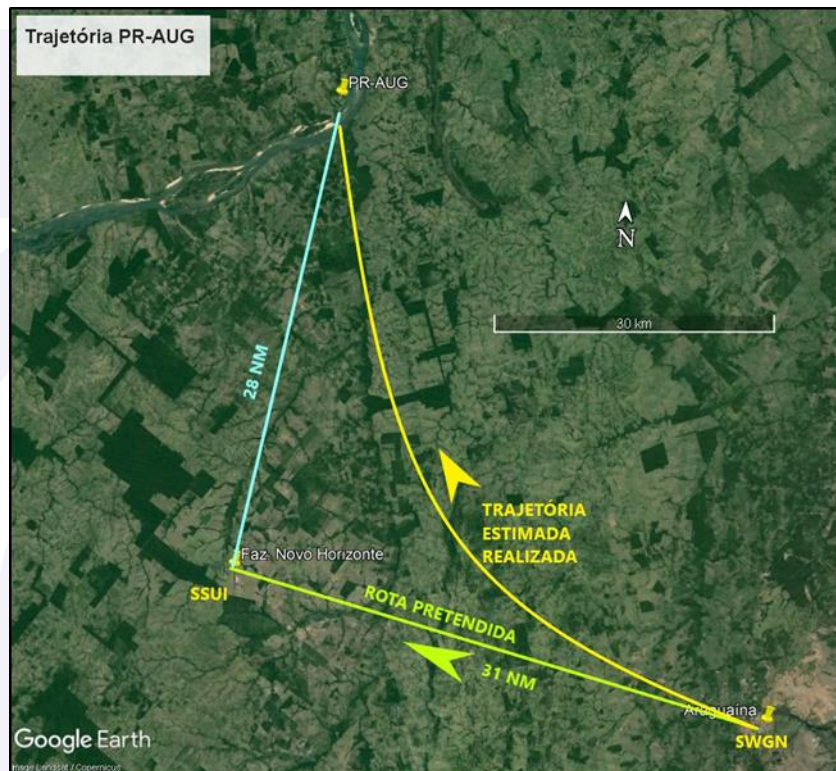


Figure 11 - Intended trajectory and trajectory performed according to the PIC.
Source: adapted from Google Earth.

The aircraft made the long final approach with the flaps down. Although it was not possible to identify the point of touchdown on the runway, it is estimated that the brakes began to be applied 240 m past the landing threshold.

The PIC reported that the brakes were applied with the aircraft “still fast”, when he noticed a failure in the right-hand brake. Even when depressing the corresponding pedal all the way down, there was a loss of directional control, causing the aircraft to veer off the runway via the left-hand side.

The following data was collected for calculation of the distance required for landing:

- aircraft weight: 3,400 lb.;
- wind calm;
- temperature 25° C; and
- runway altitude 500 ft.

Landing Distance							
WEIGHT: 3400 LB Speed over 50 Ft Obstacle: 77 KIAS Flaps: 100% Power: Idle Runway: Dry, Paved, Level				Headwind: Subtract 10% for each 13 knots headwind. Tailwind: Add 10% for each 2 knots tailwind up to 10 knots. Runway Slope: Reference Notes Dry Grass: Add 20% to Ground Roll Wet Grass: Add 60% to Ground Roll			
PRESS ALT FT	DISTANCE FT	TEMPERATURE ~°C					ISA
		0	10	20	30	40	
SL	Grnd Roll	1082	1121	1161	1200	1240	1141
	Total	2262	2316	2372	2428	2485	2344
1000	Grnd Roll	1122	1163	1204	1245	1286	1175
	Total	2317	2374	2433	2492	2551	2391

Figure 12 - Landing Distance Table, Section 5 - Figure 5-20.
Source: adapted from the Pilots Operating Handbook.

Using the values immediately above the ones mentioned in the previous paragraph, i.e., 1,000 ft. for runway altitude and 30° C for temperature, in the Landing Distance Table (Figure 12), the landing distance on a dry paved runway was 2,492 ft. (759 m).

After the stop, the full aircraft shut-down and abandonment procedure was carried out.

The estimated takeoff weight of the aircraft was 3,251.7 lb. (within the weight and balance limits stipulated by the manufacturer).

1.19. Additional information.

According to the *Section 3A* of the aircraft operating manual, after a high-speed aborted takeoff, the temperature of the brakes would be elevated; subsequent aborted takeoffs or other high-energy use of the brakes might cause overheating, failure, and even possibly fire (Figure 13).

After a high-speed aborted takeoff, brake temperatures will be elevated; subsequent aborted takeoffs or other high-energy use of the brakes may cause brake overheat, failure and possibly even fire. A 25-minute cooling time is recommended following high-energy use of the brake system before attempting to conduct operations that may require further high-energy braking. Brake temperature indicator should be inspected prior to flight following a high-energy brake event (refer to Preflight Walk-Around Checklist for detail).

Figure 13 - Information from the aircraft operating manual that warned about the use of the brakes. Source: Pilots Operating Handbook - Section 3A.

In addition, the *Section 10* of the manual provided guidance on operating precautions during aircraft taxiing, steering, and use of the brakes, highlighting the recommendation to avoid unnecessary high-speed taxiing, as this could result in excessive demands on the brakes, increasing their wear and the possibility of brake failure or fire. (Figure 14).

- Avoid unnecessary high-speed taxiing. High-speed taxiing may result in excessive demands on the brakes, increased brake wear, and the possibility of brake failure or fire.

Figure 14 - Information from the aircraft operating manual that instructed on precautions to be taken during taxi, steering, and use of the brakes.
Source: Pilots Operating Handbook - Section 10.

1.20. Useful or effective investigation techniques.

NIL.

2. ANALYSIS.

It was a private ferry flight between SWGN and SSUI.

The information relative to the pilot's psychological aspect showed no evidence that issues of psychological nature might have affected his performance.

As for the weather conditions, although the pilot stated that they were consistent with visual flights, there was presence of mist at the takeoff aerodrome, along the route, and at the intended destination. Even the METAR of SWGN indicated that, although visibility was adequate, the ceiling was below the minima prescribed for VFR flights.

Furthermore, there were reports of cloud layers below the altitude of flight maintained by the aircraft (2,500 ft.), which impaired sight of the terrain, leading to deviations to the right, which reached approximately 28 NM laterally in relation to SSUI.

According to a highlighted satellite image around the time of the occurrence, there were significant cloud formations in almost the whole region.

Thus, it is possible to infer that there was an inadequate assessment of the meteorological conditions during planning of the flight and a consequent failure to comply with the operating procedures in force.

The PIC arrived at the vertical of the *Araguaia* River, and remained at that point while striving to decide whether to return to the point of origin (SWGN) or descend along the river, where there would be no obstacles, to identify the correct height of the base of the clouds.

According to the meteorological data collected, it would not be feasible to return to the point of origin (SWGN) for landing. Furthermore, descending below the cloud layers along the river would be a high-risk action, given the adverse weather conditions in the region.

The PIC reported that, approximately 15 minutes into the flight, he felt an abnormal vibration in the aircraft, and thought it was engine malfunction, although his instruments indicated normal parameters, with no loss of power. Despite these indications, upon seeing the unregistered runway of *Reserva Escapole*, he decided to make a precautionary landing there, making a long final approach.

Given that situation, the powerplant was analyzed by the Investigation Committee, which concluded that there was no evidence of abnormal operation at the time of the event, also corroborating the report that no other evidence was presented during the flight.

Notwithstanding, it was found that one of the shock-absorbing rubbers of the engine support was cracked, and it is possible that vibration in question was a result of this damage. However, it was not possible to determine when the damage had occurred.

The PIC reported that during landing, he realized the failure of the right-hand brake when he depressed it, causing the aircraft to veer off the runway via the left side.

Despite the PIC's report, the analysis carried out by the investigators did not find any discrepancies in the aircraft's brake system. Nevertheless, at the initial action of the investigation, it was found that the temperature indicator window of the right-hand landing gear was black, showing that the correspondent brake assembly had overheated.

Using the table for calculating the landing distance with a dry asphalt-runway and the conditions presented earlier in this final report, a required distance of approximately 759 m was obtained, which would allow the aircraft to stop within the runway limits.

However, according to the pilot, the runway surface was wet, in addition to featuring loose stones along its entire length, something which would increase the required landing distance.

The braking action is estimated to have begun approximately 240 m past the landing threshold and, according to reports from the PIC, the aircraft was relatively “fast”.

The operating manual provided instructions on the precautions regarding the use the brakes on occasions when it was necessary to apply them with more energy, as it might cause brake overheating, failure, or even fire.

In this way, it is possible that the brakes were applied improperly, which may have caused overheating, leading to the darkening of the inspection window of the right-hand brake and its loss of effectiveness, as reported by the PIC, with no time for corrective action, resulting in the aircraft veering off the left side of the runway.

3. CONCLUSIONS.

3.1. Findings.

- a) the pilot held a valid CMA (Aeronautical Medical Certificate);
- b) the pilot held valid ratings for MNTE (Single-Engine Land Aircraft) and IFRA (IFR Flight - Airplane);
- c) the PIC was qualified and had experience in the type of flight;
- d) the aircraft had a valid CVA (Airworthiness-Verification Certificate);
- e) the aircraft was within the weight and balance limits;
- f) the records of the airframe, engine, and propeller logbooks were up to date;
- g) the weather conditions at takeoff were below the minima for VFR flights;
- h) during the flight, the PIC reported that he felt vibration in the aircraft;
- i) a precautionary landing was made on an unregistered runway;
- j) during landing, the aircraft veered off the runway via the left side;
- k) there was no evidence of engine failure/malfunction in flight;
- l) the rubber of one of the shock absorbers of the engine support was cracked;
- m) during the initial action of the field investigation, it was observed that the inspection window indicating overheating of the right-hand brake was darkened, while the window of the left-hand brake was white;
- n) the aircraft sustained substantial damage; and
- o) the PIC received no injuries.

3.2. Contributing factors.

- **Attitude – a contributor.**

Despite reports that the pilot was constantly striving to keep up-to-date with the regulations and technical knowledge of the aircraft, his action of taking off in weather conditions below the VFR minima demonstrated an inadequate stance with regard to compliance with the operational procedures in force.

- **Adverse meteorological conditions – a contributor.**

Taking off in poor weather conditions resulted in deviation from the planned route, and limited the options for the management of a possible emergency, leading the pilot to choose a precautionary landing on an unregistered runway.

- **Handling of aircraft flight controls – undetermined.**

It is possible that the brakes were applied in an inadequate fashion, leading to the overheating of the right-hand side brake and to a failure, causing the aircraft to veer off the runway via the left side.

- **Flight planning – a contributor.**

There was an inadequate assessment of the operating conditions, culminating in the decision to continue the flight with the ceiling below the meteorological minima for VFR flights.

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

Difficulties were observed in analyzing and choosing alternatives, as well as in acting appropriately, on the occasion of the decision to start the flight with the existing meteorological conditions both at the aerodrome of origin and along the route, something which limited one's actions during the emergency.

4. SAFETY RECOMMENDATIONS

None.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On December 09th, 2024.