

**COMANDO DA AERONÁUTICA**  
**CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE**  
**ACIDENTES AERONÁUTICOS**



**FINAL REPORT**  
**IG - 099/CENIPA/2014**

<b>OCCURRENCE:</b>	<b>SERIOUS INCIDENT</b>
<b>AIRCRAFT:</b>	<b>PT-WHT</b>
<b>MODEL:</b>	<b>210N</b>
<b>DATE:</b>	<b>13MAY2014</b>



## NOTICE

*According to the Law n° 7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination and execution of the activities of investigation and prevention of aeronautical accidents.*

*The elaboration of this Final Report was conducted taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document which reflects the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.*

*The document does not focus on quantifying the degree of contribution of the different factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.*

*The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.*

*This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with Appendix 2, Annex 13 to the 1944 Chicago Convention, which was incorporated in the Brazilian legal system by virtue of the Decree n° 21713, dated 27 August 1946.*

*Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.*

*Consequently, the use of this report for any purpose other than that of preventing future accidents, may induce to erroneous interpretations and conclusions.*

**N.B.: This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Taking into account the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.**

## SYNOPSIS

This is the Final Report of the 13MAY2014 serious incident with the 210N aircraft, registration PT-WHT. The serious incident was classified as "With Landing Gear".

During the run after landing, there was the breakdown of the auxiliary landing gear and the lower part of the front fuselage touched the ground.

The aircraft had limited damage in the propeller, engine and landing gear.

The occupants were unharmed.

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



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**GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS**

ANAC	(Brazil's) National Civil Aviation Agency
ATS	Air Traffic Services
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CHT	Technical Qualification Certificate
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
DCTA	Aeronautics' Science and Technology Department
IAM	Annual Maintenance Inspection
IFR	Instrument Flight Rules
IFRA	Instrument Flight Qualification - Airplane
INFRAERO	Brazilian Airport Infrastructure Company
LAT	Latitude
LONG	Longitude
METAR	Meteorological Aerodrome Report
MNTE	Qualification Type – Airplane Single-Engine Land
PCM	Commercial Pilot - Airplane
PPR	Private Pilot License – Airplane Category
RBHA	Brazilian Aeronautical Homologation Regulation
RELPREV	Prevention Report
RS	Safety Recommendation
SWSI	ICAO location designator – Sinop Aerodrome
SWWB	ICAO location designator – Fazenda Rio Azul Aerodrome
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
TPP	Private Air Service
UTC	Universal Coordinated Time
VRF	Visual Flight Rules

## 1. FACTUAL INFORMATION.

Aircraft	<b>Model:</b> 210NI	<b>Operator:</b> Private
	<b>Registration:</b> PT-WHT	
	<b>Manufacturer:</b> Cessna Aircraft	
Occurrence	<b>Date/time:</b> 13MAY2014 -1550 UTC	<b>Type(s):</b> "With Landing Gear"
	<b>Location:</b> Sinop Aerodrome (SWSI) <b>Lat.</b> 11°53'06"S <b>Long.</b> 055°35'10"W	
	<b>Municipality – State:</b> Sinop - MT	<b>Subtype(s):</b> NIL

### 1.1 History of the flight.

The aircraft took off from Fazenda Rio Azul, MT (SWWB), to the SINOP Aerodrome, MT (SWSI), in order to carry out a transport flight with one pilot and three passengers on board.

During the run, after landing on SWSI runway 21, the auxiliary landing gear was retracted and the nose of the aircraft touched the runway, dragging itself until full stop.

The aircraft stopped on the runway and interdicted the Aerodrome.

### 1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	1	3	-

### 1.3 Damage to the aircraft.

The aircraft had limited damage in the propeller, engine and landing gear.

### 1.4 Other damage.

Nil.

### 1.5 Personnel information.

#### 1.5.1 Crew's flight experience.

Hours Flown	
	Pilot
Total	3.000:00
Total in the last 30 days	01:50
Total in the last 24 hours	00:30
In this type of aircraft	1.000:00
In this type in the last 30 days	00:50
In this type in the last 24 hours	00:30

**N.B.:** The Data on flown hours were obtained from the Pilot.

#### 1.5.2 Personnel training.

The pilot took the Private Pilot course - Airplane (PPR) at the *Aeroclube de Votuporanga*, in 2003.

### **1.5.3 Category of licenses and validity of certificates.**

The pilot had the license of Commercial Pilot License (PCM) and had valid Aircraft Technical Qualification for Airplane Single-Engine Land (MNTE) and Instrument Flight Qualification - Airplane (IFRA).

### **1.5.4 Qualification and flight experience.**

The pilot was qualified and had experience on this kind of flight.

### **1.5.5 Validity of medical certificate.**

The pilot had valid Aeronautical Medical Certificate (CMA).

### **1.6 Aircraft information.**

The aircraft, serial number 21063466, was manufactured by Cessna Aircraft in 1979 and was registered in the Private Air Services Category (TPP).

The aircraft had valid Airworthiness Certificate (CA).

The airframe, engines and propellers logbooks records were updated.

The maintenance program, established by the manufacturer, provided that inspections were divided into four phases and did not establish a general overhaul of the aircraft.

The last inspection of the aircraft, the "50 hours / IAM type", was performed on 12MAY2014 by the HAR3 Ltd. shop, in Santo Antônio do Leverger, MT, having flown 02 hours and 40 minutes after the inspection.

### **1.7 Meteorological information.**

The meteorological conditions were favorable for the visual flight.

### **1.8 Aids to navigation.**

Nil.

### **1.9 Communications.**

Nil.

### **1.10 Aerodrome information.**

The Aerodrome was public, administered by the Government of the State of Mato Grosso and operated VFR (visual flight) during daytime and nighttime.

The runway was made of asphalt, with thresholds 03/21, dimensions of 1,630m x 30m, with elevation of 1,227.

### **1.11 Flight recorders.**

Neither required nor installed.

### **1.12 Wreckage and impact information.**

During the run, after landing on runway 21 of SWSI, just after the tire of the nose landing gear wheel touched the runway, there was the touch of the propeller blades on the ground. Then, the lower part of the fuselage, in the nose region of the aircraft, also touched the ground, dragging itself until full stop (Figures 1 and 2)



Figure 1 - Indicative arrows of the marks left by the propeller blades on the runway.



Figure 2 - Aircraft after full stop.

### 1.13 Medical and pathological information.

#### 1.13.1 Medical aspects.

There was no evidence that physiological or disability issues affected the performance of the flight crewmember.

#### 1.13.2 Ergonomic information.

Nil.

#### 1.13.3 Psychological aspects.

Nil.

### 1.14 Fire.

There was no evidence of fire in flight or after impact.

### 1.15 Survival aspects.

Belts and suspenders worked properly, preventing the pilot and passengers from being injured. All left the aircraft by their own means, through the exit doors.

### 1.16 Tests and research.

During the Initial Action, the investigation team found that the nose landing gear actuator was damaged (Figures 3, 4 and 5).



Figure 3 - Damaged nose landing gear actuator (PN 9882020-1).



Figure 4 - Damaged nose landing gear actuator (PN 9882020-1).

The actuator was referred for laboratory analysis at the DCTA, in São José dos Campos - SP.

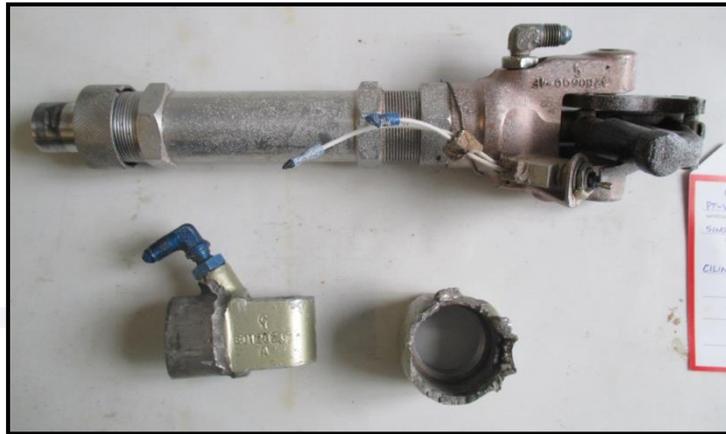


Figure 5 - Damaged nose landing gear actuator (PN 9882020-1).

The visual analysis showed a region with typical welded joint fracture aspect, as can be observed in Figure 6 (I).

In the stereoscopic analysis, typical characteristics of a welded joint fracture were observed, as can be seen in Figure 6 (II) and (III).

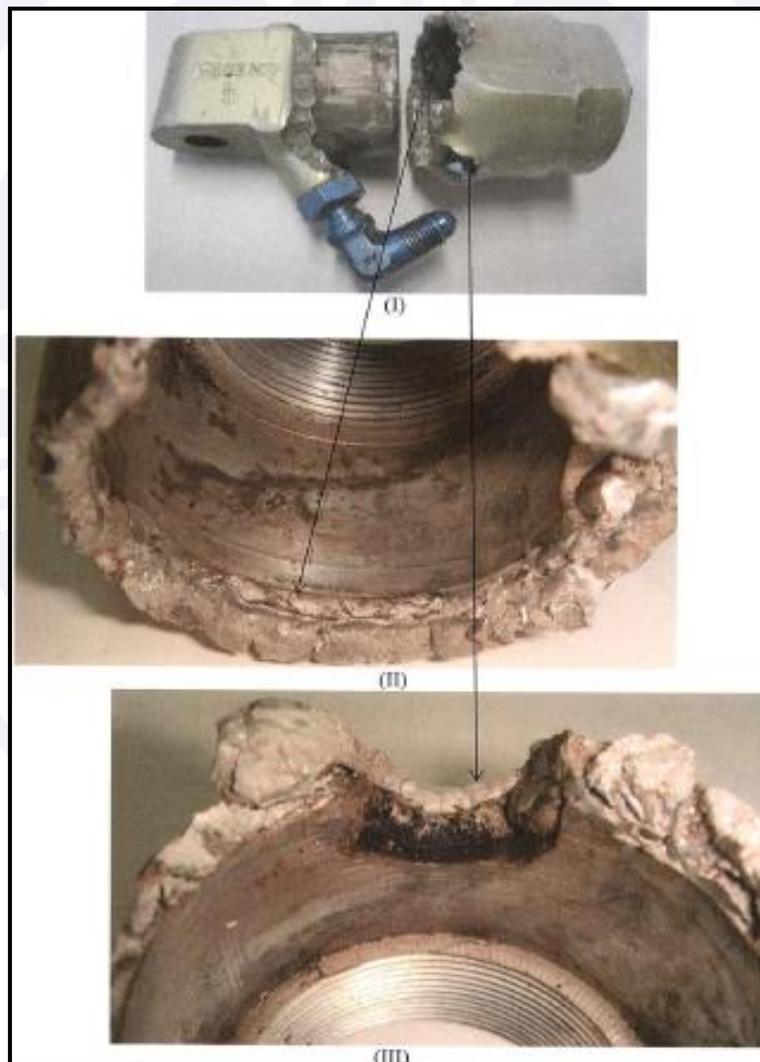


Figure 6 - In (I) the fractured component can be observed; and in (II) and (III) the details of the weld region.

A carving with horizontal and vertical scratches produced by sanding (Figures 7 and 8) was also observed in the region of the weld.



Figure 7 – Carving region.

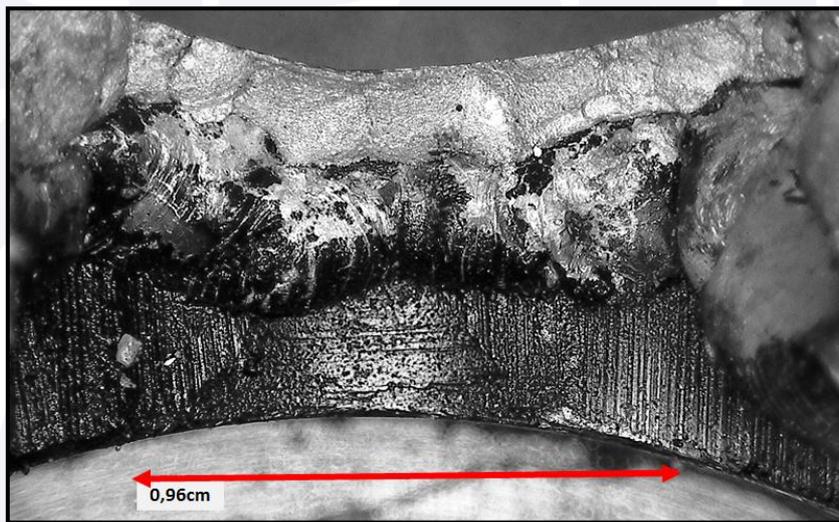


Figure 8 - Detail of the carving region showing weld bead.

Another observed aspect was a region on the lateral surface of the component that presented work marks, probably milling, with the presence of generalized corrosion due to the absence of surface protection (Figure 9).

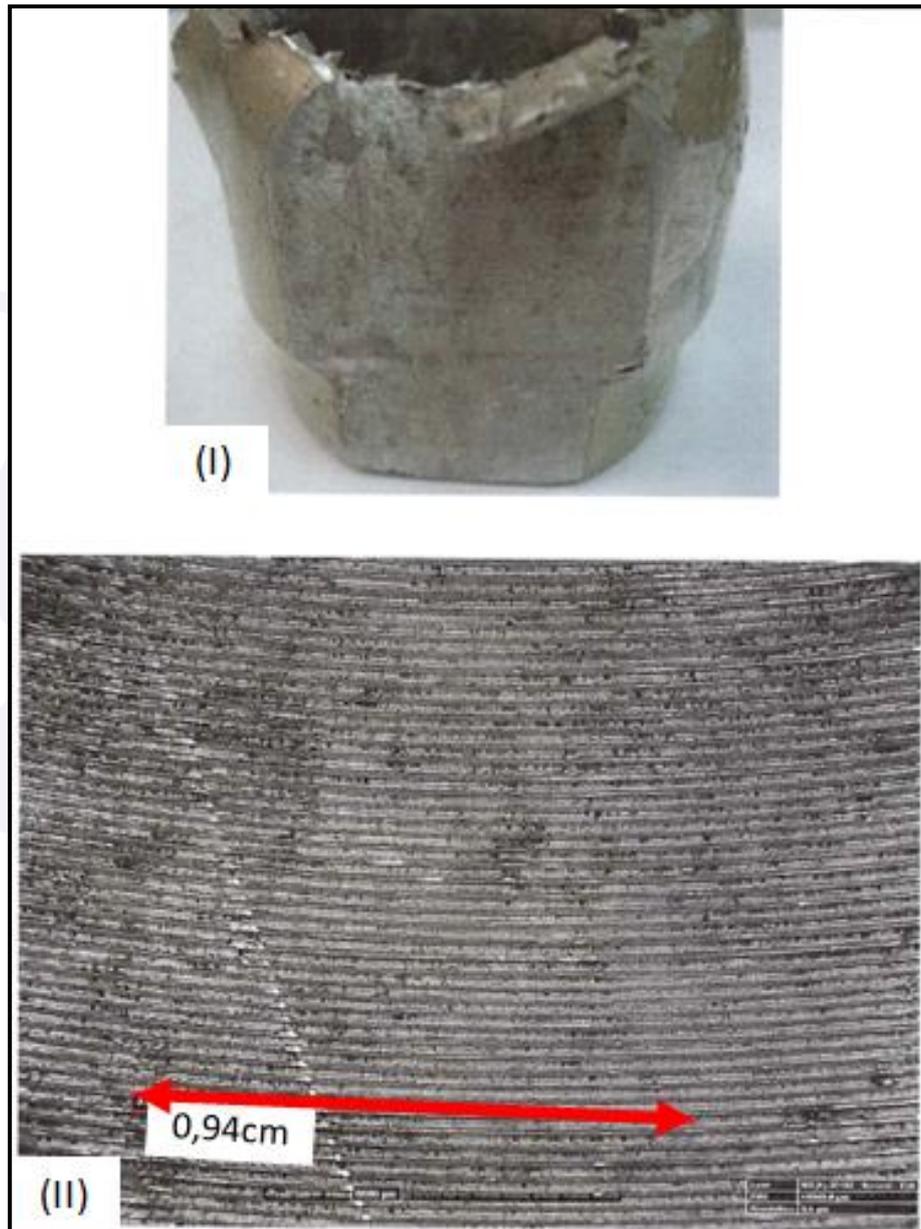


Figure 9 - In (I) the side of the component can be observed with the presence of coarse work on the surface (possibly milling); in (II) detail of the surface worked with the presence of generalized corrosion due to lack of surface protection.

The metallographic tests carried out in a perpendicular section to the surface of the fracture showed the presence of two distinct regions corresponding respectively to the base metal and the weld material. In Figure 10, the voids can also be observed due to the inefficient welding process, as well as the cracking originated in the weld region and with advance in the base metal.

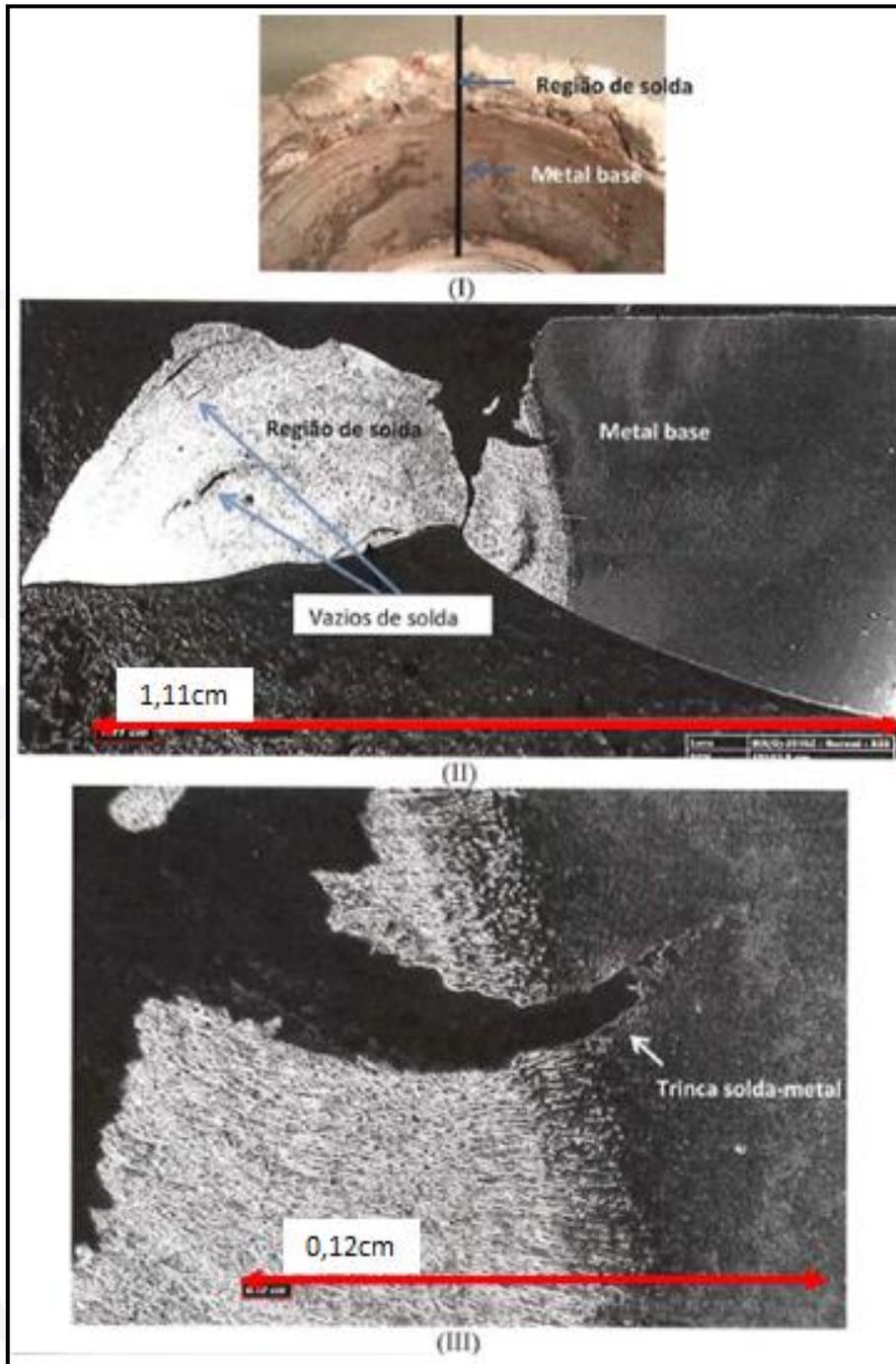


Figure 10 - In (I), a detail of the weld region and base metal. In (II), it can be observed the metallographic section of the weld and the base metal. The welding region is void due to the inefficient welding process. In (III), it is possible to observe a crack originated in the region of weld and with advance in the base metal.

In the aircraft documentation, there were no records of abnormalities that could affect airworthiness. In addition, there was no maintenance service record on the nose landing gear actuator (PN 9882020-1).

The nose landing gear actuator (PN 9882020-1) is not an item of use controlled by hour, cycle or calendar. There was no record of the installation of this component in the aircraft.

#### 1.17 Organizational and management information.

Nil.

### **1.18 Operational information.**

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

The aircraft took off from SWWB with one crewmember in order to take three passengers to SWSI.

During the approach to land, the pilot informed that he had performed all the procedures foreseen in the checklist. The landing gear typically indicated the extended and locked condition.

According to the pilot, landing occurred normally until the contact of the nose landing gear's tire with the runway, when there was the touch of the tips of the propeller blades with the ground.

### **1.19 Additional information.**

The welding in the landing gear component was not a maintenance planned by the manufacturer, in view of the efforts to which the component was subjected.

### **1.20 Useful or effective investigation techniques.**

Nil.

## **2. ANALYSIS.**

During the investigation, the intervening factors of this serious incident were studied, highlighting aspects related to the origin of the failure of the actuator of the landing gear of the nose (PN 9882020-1).

The fracture in the actuator of the nose landing gear (PN 9882020-1) originated in the region of weld, probably by overload. This non-designed maintenance had welding voids and also cracks advancing on the base metal.

The inefficient welding process was responsible for the fracture of the component. Changes were observed in the geometry of the component, possibly to facilitate the welding performed.

Because the nose landing gear actuator (PN 9882020-1) is not an item of use controlled by hours, cycles or calendar, as well as because there is no record of the installation of this component in the aircraft it was not possible to identify the place and date of the irregular services.

## **3. CONCLUSIONS.**

### **3.1 Facts.**

- a) the pilot had valid Aeronautical Medical Certificate (CMA);
- b) The pilot had valid Aircraft Technical Qualifications (CHT);
- c) the pilot was qualified and had experience to perform the flight;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the aircraft was within the weight and balance parameters;
- f) the airframe, engines and propellers logbooks records were updated;
- g) during the approach to land in SWSI, the aircraft indicated normal conditions of the landing gear which was extended and locked;
- h) during the run after landing, there was the retraction of the auxiliary landing gear;
- i) the front lower fuselage dragged along the runway;

- j) during the Initial Action, the investigation team found that the nose landing gear actuator was damaged (PN 9882020-1);
- k) the performed analyzes indicated that the nose landing gear actuator (PN 9882020-1) had been subjected to non-designed maintenance;
- l) the aircraft had limited damage in the propeller, engine and landing gear; and
- m) all the occupants were unharmed.

### 3.2 Contributing factors.

#### **Aircraft maintenance – a contributor.**

Although the investigation was not conclusive regarding the origin of the welding of the actuator in nose the landing gear (PN 9882020-1), it was proved that this component was subjected to non-designed maintenance.

#### **- Managerial oversight – a contributor.**

The maintenance oversight services on the aircraft were not efficient to identify the execution of a non-designed maintenance activity.

### 4. SAFETY RECOMMENDATION.

*A measure of preventative/corrective nature issued by a SIPAER Investigation Authority or by a SIPAER-Link within respective area of jurisdiction, aimed at eliminating or mitigating the risk brought about by either a latent condition or an active failure. It results from the investigation of an aeronautical occurrence or from a preventative action, and shall never be used for purposes of blame presumption or apportion of civil, criminal, or administrative liability.*

*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):**

**IG-099/CENIPA/2014 - 01**

**Issued on 05/04/2018**

Disseminate the lessons learned in this report in order to raise the situational awareness of operators and owners, especially with regard to inadequate maintenance services or in disagreement with maintenance manuals.

### 5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On April 5<sup>th</sup>, 2018.