

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



**FINAL REPORT**  
**A - 101/CENIPA/2020**

<b>OCCURRENCE:</b>	<b>ACCIDENT</b>
<b>AIRCRAFT:</b>	<b>PP-GMC</b>
<b>MODEL:</b>	<b>AB-115</b>
<b>DATE:</b>	<b>26AUG2020</b>



## 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 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 26AUG2020 accident with the AB115 aircraft model, registration PP-GMC. The accident was classified as “[ARC] Abnormal Runway Contact and [RE] Runway Excursion”.

During landing, the right main landing gear broke, causing the aircraft to lose directional control, causing it to leave the runway on the right side.

The aircraft had substantial damage.

The pilots left unharmed.

An Accredited Representative of the *Junta de Investigación de Accidentes de Aviación Civil* (JIAAC) - Argentina (State where the operator was registered/designed, and the aircraft/engine were 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
CA	Airworthiness Certificate
CAVOK	Ceiling and Visibility OK
CENIPA	Aeronautical Accident Investigation and Prevention Center
CIAC	Civil Aviation Instruction Center
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
CRM	Crew Resource Management
DAESP	São Paulo Air Department
EEAR	Aeronautics Specialists School
IFR	Instrument Flight Rules
INVA	Flight Instructor Rating - Airplane
IS	Supplementary Instruction
JIAAC	<i>Junta de Investigación de Accidentes de Aviación Civil</i>
METAR	Meteorological Aerodrome Report
MGQ	Quality Assurance Manual
MGSO	Safety Management Manual
MIP	Instructions and Procedures Manual
MNTE	Airplane Single-Engine Land Rating
PCM	Commercial Pilot License – Airplane
PPR	Private Pilot License – Airplane
PRI	Private Aircraft Registration Category - Instruction
RBAC	Brazilian Civil Aviation Regulation
SBGW	ICAO Location Designator - Guaratinguetá Aerodrome - SP
SIPAER	Aeronautical Accident Investigation and Prevention System
TGL	Touch and Go Landing
UTC	Universal Time Coordinated
VFR	Visual Flight Rules

## 1. FACTUAL INFORMATION.

<b>Aircraft</b>	<b>Model:</b> AB-115 <b>Registration:</b> PP-GMC <b>Manufacturer:</b> Aero Boero	<b>Operator:</b> Guaratinguetá Aerodrome
<b>Occurrence</b>	<b>Date/time:</b> 26AUG2020 - 1710 UTC <b>Location:</b> Guaratinguetá Aerodrome <b>Lat.</b> 22°47'30"S <b>Long.</b> 045°12'16"W <b>Municipality – State:</b> Guaratinguetá – SP	<b>Type(s):</b> “[ARC] Abnormal Runway Contact and [RE] Runway Excursion” <b>Subtype(s):</b> NIL

### 1.1 History of the flight.

The aircraft took off from the Guaratinguetá Aerodrome (SBGW) – SP at about 16:40 (UTC) to perform a local instruction flight, with two pilots on board.

During the landing, at the moment of touchdown, the right main landing gear broke, causing the aircraft to lose directional control and the consequent excursion from the runway on the right side until its stop, in the grassy escape area.

The aircraft had substantial damage.

The two crewmembers left unharmed.

### 1.2 Injuries to persons.

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

### 1.3 Damage to the aircraft.

The aircraft had substantial damage to the right main landing gear assembly and light damage to the right wingtip.

### 1.4 Other damage.

None.

### 1.5 Personnel information.

#### 1.5.1 Crew's flight experience.

Flight Hours		
	Pilot under Instruction	Flight Instructor
Total	70:06	290:00
Total in the last 30 days	10:50	23:00
Total in the last 24 hours	00:40	00:00
In this type of aircraft	15:06	109:00
In this type in the last 30 days	10:50	23:00
In this type in the last 24 hours	00:40	00:00

**N.B.:** The data relating to the flown hours was obtained through the Pilots' CIVs.

#### 1.5.2 Personnel training.

The Instructor (IN) took the PPR course at the Taubaté Aeroclub – SP, in 2012.

The Pilot under Instruction took the PPR course at the Bragança Paulista Aeroclub – SP, in 2020.

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

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

The Pilot under Instruction had the PPR License and a valid MNTE Rating.

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

The pilots were qualified to perform the type of flight.

The IN had about 290 total hours, of which 109 hours were on the aircraft model. The pilot under instruction had about 71 hours total, of which 15 hours were on the aircraft model, having little experience in the equipment.

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

The pilots had valid CMAs.

### **1.6 Aircraft information.**

The aircraft, serial number 303-B, was manufactured by Aero Boero in 1992 and was registered in the PRI category.

The aircraft had a valid CA.

The airframe, engine, and propeller logbook records were updated.

The last inspection of the aircraft, the "50 hours" type, was carried out on 05JUL2020 by the maintenance organization AXIAL AVIATION, in Bragança Paulista - SP, with 125 hours and 48 minutes flown after the inspection.

The last more comprehensive inspection of the aircraft, the "RCA" type, was carried out on 27SEPT2019 by the maintenance organization AXIAL AVIATION, in Bragança Paulista - SP, with 180 hours and 12 minutes flown after the inspection.

The Aero Boero 115 was an Argentine-manufactured, single-engine, monoplane, high-wing, fixed-gear, mixed-construction trainer aircraft with accommodation for two occupants.

The landing gear was of the conventional type with a nose wheel attached to the fuselage with the possibility of turning 360°.

In its Flight Manual, it was specified, in section 4 - normal procedures, paragraph 4.19, that before landing, a speed of 55 MPH with calm wind or 60 MPH with turbulence should be used, and the flap on the third stage, which corresponded to 45°.

The aforementioned manual emphasized the maximum crosswind limit for taxi, take-off, and landing operations:

#### **4.28.3 - Landing**

Align the plane's approach trajectory with the runway, lowering the wing on the windward side and applying the opposite foot. When getting close to the ground, align progressively, to touch with a slight inclination of the wing to the side that comes the wind. With the plane on the ground, use the brake on the upwind side to maintain a straight line.

NOTE: The pilot's ability to operate with crosswind varies with the control he has over the plane. Poorly maintained planes, where the nose or brakes may be faulty, also influence maneuverability on the ground. Other factors that can influence are gusts or turbulence. As an operational limit, taking a properly functioning airplane, and a medium-capacity pilot can land with a 15 to 19 mph (24-30 km/h) crosswind on grass runways and a 12 to 15 mph (20 to 24 km/h) crosswind on paved runways.



### 1.7 Meteorological information.

The Guaratinguetá Aerodrome's METAR had the following information:

METAR SBGW 261700Z VRB04KT CAVOK 07/24 Q1020=

It was found that the conditions were favorable for the visual flight with visibility above 10 km and the absence of cloud cover. The wind had a variable direction and intensity of 4 kt.

### 1.8 Aids to navigation.

Nil.

### 1.9 Communications.

Nil.

### 1.10 Aerodrome information.

The Aerodrome was public and military, managed by the DAESP and the EEAR, and operated under VFR and IFR, day and night.

The runway was made of asphalt, with 02/20 thresholds, dimensions of 1,551 x 30 m, with an elevation of 1,761 ft.

### 1.11 Flight recorders.

Neither required nor installed.

### 1.12 Wreckage and impact information.

After the rupture of the right landing gear towbar, the aircraft leaned on the wingtip and the lower edge of the right side of the fuselage and swerved to the right, according to the marks left on the runway (Figures 1 and 2).



Figure 1 - Aircraft stopping position to the right of the runway 02 axis of SBGW.





Figure 2 - Marks left on the runway by the right side of the aircraft structure in contact with the ground.

### **1.13 Medical and pathological information.**

#### **1.13.1 Medical aspects.**

Nil.

#### **1.13.2 Ergonomic information.**

Nil.

#### **1.13.3 Psychological aspects.**

No evidence was found that problems of physiological nature or incapacitation could have affected the flight crew's performance.

#### **1.14 Fire.**

There was no fire.

#### **1.15 Survival aspects.**

Nil.

### 1.16 Tests and research.

In the analysis of the structural failure at the landing gear attachment point, it was found that the fracture in the affected component occurred due to overload in the attachment region.

### 1.17 Organizational and management information.

On the date of the occurrence, Amendment No. 01 of the RBAC No. 141, published on 04MAR2020 and applicable to Civil Aviation Instruction Centers, was in force, which required that a system of manuals should be prepared and implemented containing: a MIP, an MGSO and an MGQ.

The aforementioned RBAC established in section 141.63 - Ground and flight instructors, letter (e) that:

In addition, the instructor must receive periodic training every twelve months of his/her relationship with the CIAC, in order to keep his/her knowledge updated on the subjects set out in paragraph (d) of this section.

In addition to these requirements, the IS No. 141-007 Revision A, published on 12JUN2020, provided guidance on the preparation of the Instruction Program and Instruction Manuals and Procedures.

### 1.18 Operational information.

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

The pilot under instruction had little experience in the aircraft, having about 15 hours of flight time and 84 landings on the model. However, in the records of previous flights, there were no reports of difficulties with the operation of the aircraft.

During the interview for the Investigation Team, the trainee demonstrated knowledge of the aircraft and its limitations.

On the day of the accident, a briefing was carried out by the instructor, in which aspects related to the intended maneuvers for that phase of the Touch and Go Landing mission was addressed, with some possible slipping maneuvers.

According to the IN, during the mission, the pilot under instruction had made approaches and landings with little need for intervention. During the landing and take-off maneuvers, both the IN and the instructor noticed variations in the wind that were predominantly coming from the right.

According to statements, the aircraft entered the downwind leg and the pilot under instruction reduced the engine power to maintain the speed of 70 MPH, selected the flaps at 15°, and opened the carburetor heating. On the base leg, he reduced the engine to maintain a speed of 55 MPH and selected flaps at 30° and then at 45°.

After completing the base leg, the IN returned the flap to the 30° position, because, according to his perception, the aircraft had lost altitude beyond normal, possibly when performing a “slip”, which would have resulted in a ramp of lower final approach.

According to the interview, the flap configuration change was made suddenly by the IN, without announcing it to the trainee.

According to reports, the trainee proceeded to the landing in an attempt to make corrections due to the change in configuration and the incidence of wind. In the judgment of the IN, the final approach ramp would still be within the acceptable limit, which is why he allowed the student to proceed to the final landing.

At the moment of touchdown, the right main landing gear broke, causing the aircraft to lose directional control and the consequent excursion from the runway on the right side until its stop, in the grassy escape area.

### 1.19 Additional information.

From the ANAC's dictionary, the following definition of "*glissada*" was extracted:

Definition 1 - "slipping"

Loss of airplane height due to side slipping, without any change in the flight trajectory.

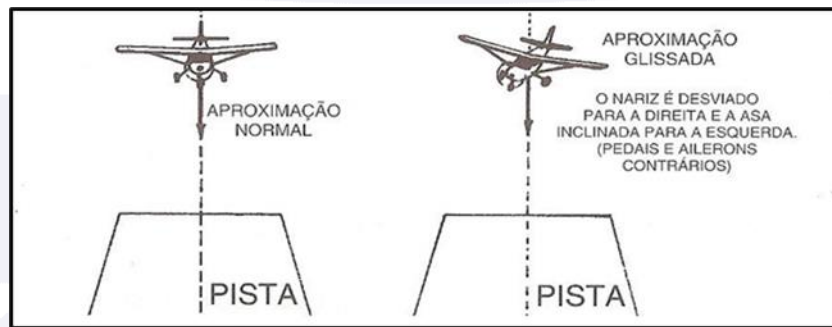


Figure 3 - Normal and "slipping" approach image.

The use of the flap causes an aerodynamic effect altering the behavior of the aircraft.

Typically, flap deflection up to 15° produces increased lift with minimal drag. Flap deflection beyond 15° also produces a significant increase in drag.

Retracting the flap decreases the aerodynamic surface and causes the airplane to have its lift reduced during a configuration change.

### 1.20 Useful or effective investigation techniques.

Nil.

## 2. ANALYSIS.

It was an instruction flight of the PCM course.

During a "slipping" approach, the flaps were retracted from 45° to 30°, which reduced lift and caused the plane to perform a slope lower than normal.

There was no communication between the pilots about the retraction of the flaps. This fact resulted in inefficiency in the use of human resources available to operate the aircraft.

This sudden change in configuration may also have made it difficult for the pilot under instruction to perceive and execute the necessary corrections and, thus, stabilize the aircraft, contributing to a sudden touchdown on the runway.

Based on the METAR information and reported by the crew, it was found that the wind was varying in direction on the right side in relation to the direction of landing.

The Flight Manual described the technique to be used in case of landing with crosswind and informed in a note that the pilot's ability to operate with crosswind varied with the control he had over the plane.

In this sense, the pilot's little experience in instruction, associated with an unexpected configuration change, minimized the possibility of the landing being performed within the structural limits of the aircraft.

In addition, that manual recommended landing with 45° of flaps, differently from what was provided by the flight instructor who performed a retraction on the final approach to 30°.

denoting an inadequate piloting judgment by the IN, which believed that the steepest ramp low would still be within the acceptable range.

Given the sequence of events evidenced in this accident, it is likely that the CIAC had not implemented the risk management culture required by the system of manuals required by the RBAC 141, nor had it developed, at the time of the occurrence, the instruction program prevised in the IS published in JUN2020.

### **3. CONCLUSIONS.**

#### **3.1 Facts.**

- a) the pilots had valid CMAs;
- b) the instructor had valid MNTE and INVA Ratings;
- c) the pilot under instruction had a valid MNTE Rating;
- d) the pilots were qualified, however, the pilot under training had little experience in the aircraft model;
- e) the aircraft had a valid CA;
- f) the aircraft was within the weight and balance limits;
- g) the airframe, engine, and propeller logbook records were updated;
- h) the weather conditions were favorable for the flight;
- i) the aircraft was performing a local instruction flight;
- j) there was a change in the wind direction;
- k) on the final approach, the IN changed the aircraft's landing configuration, retracting the flaps from 45° to 30°, without announcing it to the trainee;
- l) l) during landing, the right main landing gear broke;
- m) there was a loss of directional control of the aircraft and the consequent excursion from the runway on the right side;
- n) the aircraft had substantial damage; and
- o) the pilots left unharmed.

#### **3.2 Contributing factors.**

##### **- Control skills – a contributor.**

During a “slipping” approach, the flaps were retracted from 45° to 30°, which reduced lift and caused the plane to perform a slope lower than normal.

##### **- Crew Resource Management – a contributor.**

The lack of communication between the pilots about the retraction of the flaps to 30° in the final approach denoted inefficiency in the use of the human resources available for the operation of the aircraft.

##### **- Piloting judgment – a contributor.**

The Flight Manual recommended landing with 45° of flaps, differently from what was provided by the instructor who performed the retraction on the final approach to 30°, denoting inadequate piloting judgment.

In addition, the IN believed that the lowest ramp was still within the acceptable limit, which is why he allowed the student to proceed to the final landing, which contributed to the outcome of this occurrence.

- **Managerial oversight – undetermined.**

It is likely that the risk management culture has not been fully implemented within the CIAC due to the time elapsed between the occurrence and the publication of the new requirements on the manual system and the guidance on the elaboration of an instructional program.

#### **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”.*

**Recommendations issued at the publication of this report:**

**To the Brazil's National Civil Aviation Agency (ANAC):**

**A-101/CENIPA/2020 - 01**

**Issued on 21/09/2022**

Work with the Guaratinguetá Aeroclub, to verify the implementation of the manual systems provided for in the RBAC 141, as well as the CRM training offered to its crew, especially with regard to standardization, established requirements, and correct instruction techniques.

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

None.

On September 21<sup>th</sup>, 2022.