COMANDO DA AERONÁUTICA CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE ACIDENTES AERONÁUTICOS



FINAL REPORT A – 120/CENIPA/2017

OCCURRENCE: AIRCRAFT: MODEL: DATE: ACCIDENT PP-FGQ AB-115 26SEPT2017



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 26SEPT2017 accident with the AB-115 aircraft, registration PP-FGQ. The accident was classified as "[LOC-G] Loss of Control - Ground".

The aircraft started take-off at the Bacacheri Aerodrome (SBBI) - PR, at about 1900 (UTC) to conduct local flight instruction, with a pilot-instructor and a pilot-student on board.

During the run using threshold 18, the aircraft missed the straight to the right. When returning to the center of the runway the nose was lowered and the propeller touched the ground.

The aircraft had substantial engine and propeller damage and minor damage to the spinner and exhaust.

The two crewmembers left unharmed.

An Accredited Representative of the *Junta de Investigación de Accidentes de Aviación Civil* (JIAAC) - Argentina, (State where the aircraft was designed/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			
CENIPA	Aeronautical Accident Investigation and Prevention Center			
CG	Center of Gravity			
CIV	Pilot's Flight Logbook			
CMA	Aeronautical Medical Certificate			
CRM	Crew Resource Management			
IAM	Annual Maintenance Inspection			
IFR	Instrument Flight Rules			
IFRA	Instrument Flight Rating - Airplane			
INFRAERO	Brazilian Airport Infrastructure Company			
INVA	Flight Instructor Rating - Airplane			
MNTE	Airplane Single Engine Land Rating			
PCM	Commercial Pilot License – Airplane			
PPR	Private Pilot License – Airplane category			
PMD	Maximum Take Off Weight			
PRI	Private Aircraft Registration Category - Instruction			
PS	Pre-solo			
RS	Safety Recommendation			
SBBI	ICAO Locator Designator – Bacacheri Aerodrome - PR			
SERIPA V	Fifth Regional Aeronautical Accident Investigation and Prevention Service			
SIPAER	Aeronautical Accident Investigation and Prevention System			
UTC	Universal Time Coordinated			
VRF	Visual Flight Rules			

1. FACTUAL INFORMATION.

Aircraft	Model:	AB-115	Operator:	
	Registration:	PP-FGQ	Paraná Aeroclube	
	Manufacturer:	Aero Boero		
Occurrence	Date/time: UTC	26SEPT2017 – 1901	Type(s):	
	Location: Baca (SBBI)	acheri Aerodrome	[LOC-G] Loss of Control – Ground	
	Lat. 25°24'07"S	Long. 049°14'00"W	Subtype(s):	
	Municipality –	State: Curitiba – PR	NIL	

1.1 History of the flight.

The aircraft started take-off at the Bacacheri Aerodrome (SBBI) - PR, at about 1900 (UTC) to conduct local flight instruction, with a pilot-instructor and a pilot-student on board.

During the run using threshold 18, the aircraft missed the straight to the right. When returning to the center of the runway the nose was lowered and the propeller touched the ground.

The aircraft had substantial damage.

The two crewmembers left unharmed.



Figure 1 - Position of the aircraft after full stop.

1.2 Injuries to persons.

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

1.3 Damage to the aircraft.

The aircraft had substantial engine and propeller damage and minor damage to the spinner and exhaust.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Hours Flown			
	Pilot-Instructor	Pilot-Student	
Total	460:00	09:40	
Total in the last 30 days	52:00	09:40	
Total in the last 24 hours	00:00	01:00	
In this type of aircraft	275:30	09:40	
In this type in the last 30 days	20:50	09:40	
In this type in the last 24 hours	00:00	01:00	

N.B.: The data related to the flown hours were obtained through the Pilot's Flight Logbook (CIV) records.

1.5.2 Personnel training.

The pilot-instructor took the Private Pilot course – Airplane (PPR) at the Paraná Aeroclube - PR, in 2014.

The pilot-student was taking the Private Pilot course to obtain the PPR License.

1.5.3 Category of licenses and validity of certificates.

The pilot-instructor had the PCM License and had valid MNTE, IFRA and INVA Ratings.

The pilot-student did not have any License.

1.5.4 Qualification and flight experience.

The pilot-instructor was qualified and had experience in that kind of flight.

1.5.5 Validity of medical certificate.

The pilots had valid Aeronautical Medical Certificates (CMA).

1.6 Aircraft information.

The aircraft, serial number 102-B, was manufactured by Aero-Boero, in 1988, and it was registered in the PRI category.

The aircraft had valid Certificate of Airworthiness (CA).

The airframe, engine and propeller logbook records were outdated.

The last inspection of the aircraft, the "50 hours" type, was carried out on 25SEPT2017 by the Paraná Aeroclube, in Curitiba - PR, having flown 1 hour and 10 minutes after the inspection.

The last overhaul of the aircraft, the "IAM" type, was carried out on 18OCT2016 by the Paraná Aeroclube, in Curitiba - PR, having flown 478 hours and 05 minutes after the overhaul.

1.7 Meteorological information.

The weather 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/military, operated by the INFRAERO and operated under visual flight rules (VFR) and by instrument (IFR) in daytime and nighttime.

The runway was made of asphalt, with thresholds 18/36, dimensions of 1390m x 31m, with elevation of 3,058 ft.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

There was the impact of the propeller, sudden stop of the engine and the aircraft stopped with the nose leaning on the ground.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

Not investigated.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

Not investigated.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

Nil.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

Nil.

1.18 Operational information.

The aircraft was not within the weight and balance parameters specified by the manufacturer. The weight of the aircraft at the time of the accident was 806.30 kg, extrapolating the maximum takeoff weight (PMD) of 770 kg.

Item	Peso (Kg)	Braço (mm)	Momento
Aeronave	584,6	529,86	309.757
Piloto	82	873	71.586
Aluno	80	156	12.480
Combustive	54	650	35.100
Óleo	5,7	-1000	-5700
TOTAL	806,3	-	423.223
LIMITE DO CG A FRENTE		390 r	nm
LIMITE DO CG ATRAS		514 r	nm

Figure 2 - Weight and balance calculation table.

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In addition, the aircraft was exceeding the rear limit of the CG, according to the weight and balance calculation shown below:



Figure 3 - CG calculation.

At the time of the accident there was side wind of 06kt, being within the limits foreseen for the type of aircraft.

The instructor and the student had already flown together in the morning, to perform the PS-10 mission and, according to them, the flight occurred normally.

The student would perform the Pre-Solo-11 (PS-11) mission, provided in the Mission Plan, consisting of a local flight in the training area for high slope curves training and subsequent return to SBBI. According to the crew, a mission briefing was held, where aspects of the take-off procedure, common mistakes and their corrections were discussed.

The instructor reported having instructed the student to raise the tail only after reaching the speed of 40mph, due to the characteristic of the conventional aircraft in being more susceptible to approach the side wind with the tail wheel out of the ground when in conditions of low speed.

In this condition (low speed), the rudder is less effective to counteract the wind yaw effect.

According to the flight records, of the ten instructions made by the student, in nine of them the grade 3 was obtained in the takeoff item and in only one flight was obtained grade 4. The flight records reported mainly the difficulty of the student in counteracting the influence of the crosswind during the run-offs.

According to information from the instructor, the student raised the tail at the correct speed during the take-off run, but with little effectiveness in the commands. The aircraft tended to lose the straight line to the right, coming near the lateral limit of the runway. The instructor stated that he guided the student only verbally and did not interfere in the commands at any time, intending to let the student make the corrections alone for a better learning.

1.19 Additional information.

When analyzing some design characteristics of the AB-115 aircraft, it is observed some relevant aspects that bring certain control difficulties, especially for students in the initial stages of instruction:

- brakes on the pedals are made with the heels and not with the tip of the feet, as in most airplanes;

- in conventional landing gear and high wing aircraft, the steering rudder is often ineffective shortly after the pilot raises the tail in the take-off run; and

- the short distance between the wheels of the landing gear (narrow gauge) hinders directional control and stability during landings and take-offs.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

Although the logbooks were outdated, the Investigation Team considered there was no technical influence that contributed to the occurrence.

Regarding the operational aspect, it was observed that the instructor had the necessary qualification and his experience in the instruction, using that model of aircraft, was also considered satisfactory.

Nevertheless, it should be considered that there was an inadequate evaluation by the instructor not to retake the controls when the student began to present difficulties in directional control, especially considering that he (the student) had a history of difficulty in opposing the influence of the crosswind during the take-off runs.

When attempting to return to the central axis of the runway, it is possible that the student has used the brakes abruptly, causing the nose to fall and the propeller to touch the ground. Such inappropriate application of the brakes may be related to the fact that the student would need to use greater pedal amplitude, in order to have greater effectiveness in the directional rudder.

From this perspective, two factors must be taken into account. The first concerns the low effectiveness of the rudder control with the tail skid out of the ground, which is already a characteristic of this aircraft. The second point is that, with the CG exceeding the rear limit, this effectiveness becomes even more impaired, since the moment (arm x force) becomes smaller.

In this context, it can be concluded that the management of the organization had an inadequacy regarding the supervision of the planning and execution activities in the technical and operational areas, allowing the use of the aircraft outside the parameters recommended by the manufacturer.

Even though it is not possible to confirm the incorrect application of the brakes by the student, it must be considered that the improper use of the commands by the student, together with the absence of a timely intervention of the instructor, contributed to the accident.

According to the data obtained during the investigation, the instructor had the objective of having the student overcome his problem related to the take-off phase, which may have affected his reaction time at that moment.

Thus, the evaluation performed by the instructor in relation to the level of difficulty presented by the student proved to be inadequate, which led to a late decision that resulted in the loss of time to reassume the commands of the aircraft and to reverse the student's error.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilots had valid Aeronautical Medical Certificates (CMA);
- b) the pilot-instructor had valid MNTE, IFRA and INVA Ratings;
- c) the pilot-instructor was qualified and had experience in that kind of flight;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the aircraft was not within the weight and balance parameters specified by the manufacturer;
- f) the airframe, engine and propeller logbook records were outdated;
- g) the weather conditions were favorable for the visual flight;
- h) the pilot-student was taking the course to obtain the Private Pilot License (PPR);

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- i) during the take-off run the pilot-student had difficulty keeping the aircraft aligned with the central axis of the runway and the aircraft missed the straight line to the right;
- j) the instructor did not take over the commands and let the student correct it himself;
- k) the aircraft lowered the nose and touched the propeller on the ground;
- I) the aircraft had substantial damage; and

m) the pilots left unharmed.

3.2 Contributing factors.

- Control skills – a contributor.

Although it was not possible to confirm that the student had improperly applied the brakes, the Investigation Team considered that there was an inadequate use of the rudder controls by the student, which failed to reverse the aircraft's tendency to move to the right side, which came to contribute to the outcome of the occurrence.

- Piloting judgment – a contributor.

The instructor evaluated that the student was able to reverse the error and he took too long to take the commands, contributing to the occurrence.

Decision-making process – a contributor.

The evaluation of the instructor favored the occurrence of the accident, as far as it did lead to the decision of not intervene in the commands and apply corrective measures that could avoid this accident.

Managerial oversight – a contributor.

The fact that an aircraft is flying not within the weight and balance parameters indicated that there was an inadequate supervision, in the organization, in the planning and execution activities and in the execution of the technical and operational areas.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation, made with the intention of preventing accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident. In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from diverse sources, including safety studies.

In consonance with the Law n°7565/1986, recommendations are made solely for the benefit of the air activity operational safety, and shall be treated as established in the NSCA 3-13 "Protocols for the Investigation of Civil Aviation Aeronautical Occurrences conducted by the Brazilian State".

Recommendations issued at the publication of this report:

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

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Issued on 01/29/2019

Act together with the Paraná Aeroclube, in order to make that operator enhance the CRM training program, offered to its employees, especially with regard to standardization and the correct instructional techniques. Also, guide the instructors to be pro-active and conservative, in order to prevent students' mistakes from approaching the point of irreversibility of an accident.

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Act with the Paraná Aeroclube, in order to make that operator to improve its administrative mechanisms for bookkeeping the maintenance services performed on its aircraft, as a way to prevent aeronautical occurrences.

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Act together with the Paraná Aeroclube, in order to reassess the adequacy of the Safety Management System (SGSO) adopted by that operator, especially with regard to established management supervision mechanisms, aiming to increase the levels of competence and safety required for the performance of the activities for which such organization is certified.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On January 29th, 2019.

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