COMANDO DA AERONÁUTICA

CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE ACIDENTES AERONÁUTICOS

FINAL REPORT
A-057/CENIPA/2021

OCCURRENCE:	**ACCIDENT**
AIRCRAFT:	**PR-MLA**
MODEL:	**35A**
DATE:	**20ABR2021**

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 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 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 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 Final Report pertains to the accident involving aircraft PR-MLA, model 35A, which occurred on April 20, 2021, classified as “[ARC] Abnormal Runway Contact and [RE] Runway Excursion.”

During a touch-and-go training exercise, the aircraft contacted the runway with its landing gear retracted and overran the departure end.

The aircraft sustained substantial damage.

The pilot occupying the right seat suffered fatal injuries, the Pilot in Command (PIC) sustained serious injuries, and the passenger, who was designated as the Second in Command (SIC), was not injured.

Being the United States, the State of Manufacture of the aircraft, the USA’s NTSB (National Transportation Safety Board) designated an Accredited Representative for participation in the investigation of the accident.

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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ADC	Aerodrome Chart
AFM	Aircraft Flight Manual
ANAC	Brazil's National Civil Aviation Agency
ASDA	Accelerate-Stop Distance Available
CENIPA	Brazil's Center for the Investigation and Prevention of Aeronautical Accidents
CIAC	Civil Aviation Training Center
CMA	Aeronautical Medical Certificate
CRM	Crew Resource Management
CVA	Certificate of Airworthiness
CVR	Cockpit Voice Recorder
DECEA	Command of Aeronautics' Department of Airspace Control
IFR	Instrument Flight Rules
IFRA	Instrument Flight Rating – Airplane
LABDATA	Cenipa's Laboratory for Flight Recorders Data Readout and Analysis
LDA	Landing Distance Available
METAR	Routine Meteorological Aerodrome-Report
NTSB	USA's National Transportation Safety Board
PF	Pilot Flying
PCH	Commercial Pilot License – Helicopter
PIC	Pilot in Command
PLA	Airline Transport Pilot - Airplane
PM	Pilot Monitoring
PN	Part Number
PPH	Private Pilot License - Helicopter
PPR	Private Pilot License - Airplane
PSO-BR	Brazil's Program for Civil Aviation Operational Safety
QRH	Quick Reference Handbook
RBAC	Brazilian Civil Aviation Regulation
RE	Runway Excursion
SACI	Civil Aviation Integrated Information Center
SBBH	ICAO location designator – *Pampulha - Carlos Drummond de Andrade* - Airport, *Belo Horizonte*, State of *Minas Gerais*
SIC	Second in Command
SIPAER	Aeronautical Accidents Investigation and Prevention System
SN	Serial Number
TODA	Take Off Distance Available
TORA	Take Off Run Available
TWR-BH	*Pampulha* Airport Control Tower
UTC	Coordinated Universal Time
VFR	Visual Flight Rules

1. FACTUAL INFORMATION.

Aircraft	**Model:** 35A **Registration:** PR-MLA **Manufacturer:** *Learjet.*	**Operator:** *Eletric Power Construção Eireli.*
Occurrence	**Date/time**: 20ABR2021 - 16:52 (UTC) **Location:** SBBH(*Pampulha* Airport) **Lat.** 19°51'21"S **Long.** 043°56'15"W **Municipality – State:** *Belo Horizonte – Minas Gerais.*	**Type(s):** [ARC] Abnormal runway contact [RE] Runway excursion

1.1. History of the flight.

At approximately 16:20 UTC, the aircraft departed from SBBH (*Pampulha – Carlos Drummond de Andrade* – Airport, *Belo Horizonte*, MG), on a local touch-and-go training flight, with two pilots and one passenger on board.

After approximately thirty minutes of flight, the aircraft touched down the runway with the landing gear retracted and overran its departure end.

Figure 1 – Photograph of the aircraft after coming to a complete stop.

1.2. Injuries to persons.

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

1.3. Damage to the aircraft.

While descending the slope beyond the opposite runway threshold, the aircraft struck a tree and sustained substantial structural damage.

The cabin area and both wings sustained substantial damage from multiple ground impacts.

Additionally, further damage occurred during the rescue of the victims due to the need to gain access to the cockpit.

The underside of the aircraft sustained minor damage due to contact friction with the runway.

1.4. Other damage.

During the runway excursion, the aircraft collided with the aerodrome's security fence.

Figure 2 – Image of the fence damaged by the aircraft impact.

1.5. Personnel information.

1.5.1. Crew's flight experience.

Flight Experience		
	PIC	Pilot on the right-seat
Total	3,432:40	3,034:20
Total in the last 30 days	27:10	00:00
Total in the last 24 hours	00:00	00:00
In this type of aircraft	41:25	2,211:50
In this type in the last 30 days	27:10	00:00
In this type in the last 24 hours	00:00	00:00

Note: Flight-hour data obtained from the pilots' digital CIV (Pilot Logbook) of the ANAC's Civil Aviation Integrated Information System (SACI).

1.5.2. Personnel training.

The Pilot in Command (PIC) did the PPR course (Private Pilot – Airplane) in 2020, at *Mr. Top Fly Civil Aviation School*, in *Rio de Janeiro*, State of *Rio de Janeiro*. He also did a PPH course (Private Pilot – Helicopter) in 2010, at *Aeroclube de São Paulo*, located in the city of *São Paulo*, State of *São Paulo*.

The Second in Command (SIC) did his PPR course in 2018, at *International Civil Aviation Schoo*l.

The pilot occupying the right seat did his PPR course in 1969. No information was obtained regarding the location where the course was completed.

1.5.3. Category of licenses and validity of certificates.

The PIC held a PPR license and valid ratings for aircraft type LR30 (which includes model 35A) and for IFRA (Instrument Flight – Airplane). He also held a PCH license (Commercial Pilot – Helicopter).

The SIC held a PCM license (Commercial Pilot – Airplane) and valid ratings for aircraft type LR30 and for IFRA.

The pilot occupying the right seat held a PLA license (Airline Transport Pilot – Airplane), but his LR30 type rating had expired in January 2017.

1.5.4. Qualification and flight experience.

Most of the PIC's operational background was developed in rotary-wing aviation. In 2020, the opportunity arose to begin flying fixed-wing aircraft, when he was hired to fly the airplane involved in this accident.

In that context, the PIC completed his basic PPR training at a Civil Aviation Training Center (CIAC) in Brazil and subsequently completed the Learjet 35A course at *FlightSafety International Learning Center*, in Tucson, Arizona, USA.

After the course at FlightSafety, he obtained the LR30 type rating and began flying the aircraft in March 2021. During that period, the PIC performed 3 local flights and 8 cross-country flights, aimed at acquiring more experience with the Learjet 35A.

The pilot occupying the right seat began his flying career in 1969. He operated several aircraft models, including the Learjet 35A.

On the date of the occurrence, his LR30 type rating was no longer valid, which disqualified him from providing instruction or serving as SIC, pursuant to Section 91.531 of the Brazilian Civil Aviation Regulation (RBAC) nº 91, Amendment nº 03, which addresses General Operating and Flight Rules for Civil Aircraft.

Although the SACI system did not record a significant number of flight hours for the pilot in the right seat, the Investigation Committee received several accounts indicating that he had substantial experience.

According to information gathered, he was regarded as one of the most experienced pilots in this aircraft model in Brazil – possibly with the highest number of flight hours. However, this claim could not be confirmed due to a lack of official records.

The latest flight of the pilot occupying the right seat recorded in SACI dated from January 2019, on a Cessna Citation C650 aircraft.

Prior to the implementation of SACI in 2014, flight hours were recorded manually in logbooks or stored in other types of physical records, which, for various reasons, often resulted in data loss.

The SIC had experience and qualifications similar to those of the PIC.

In this context, one concluded that the PIC was qualified and had approximately 41 hours of experience in the aircraft model. On the other hand, the pilot in the right seat was not qualified to provide instruction or to serve as crew member on the flight in which this accident occurred.

1.5.5. Validity of medical certificate.

Both the PIC and SIC held valid Aeronautical Medical Certificates (CMA).

The CMA of the pilot occupying the right seat had expired on September 2, 2019.

1.6. Aircraft information.

The aircraft, serial number 072, was manufactured by Learjet in 1976 and registered under the Private Air Services (TPP) Registration Category.

The CVA (Certificate of Airworthiness) of the aircraft was valid.

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

The most recent inspection of the aircraft, a “600-hour” type, was performed on March 30, 2021, by the maintenance organization *Líder Aviação*, in *Belo Horizonte*, State of *Minas Gerais.* The aircraft flew 22 hours and 30 minutes after the said inspection.

The latest comprehensive inspection of the aircraft, “1,200-hour” type, was carried out on March 17, 2021, also by *Líder Aviação*, in *Belo Horizonte*, MG. the aircraft flew 22 hours and 30 minutes after the aforementioned inspection.

- *Landing Gear Warning System*

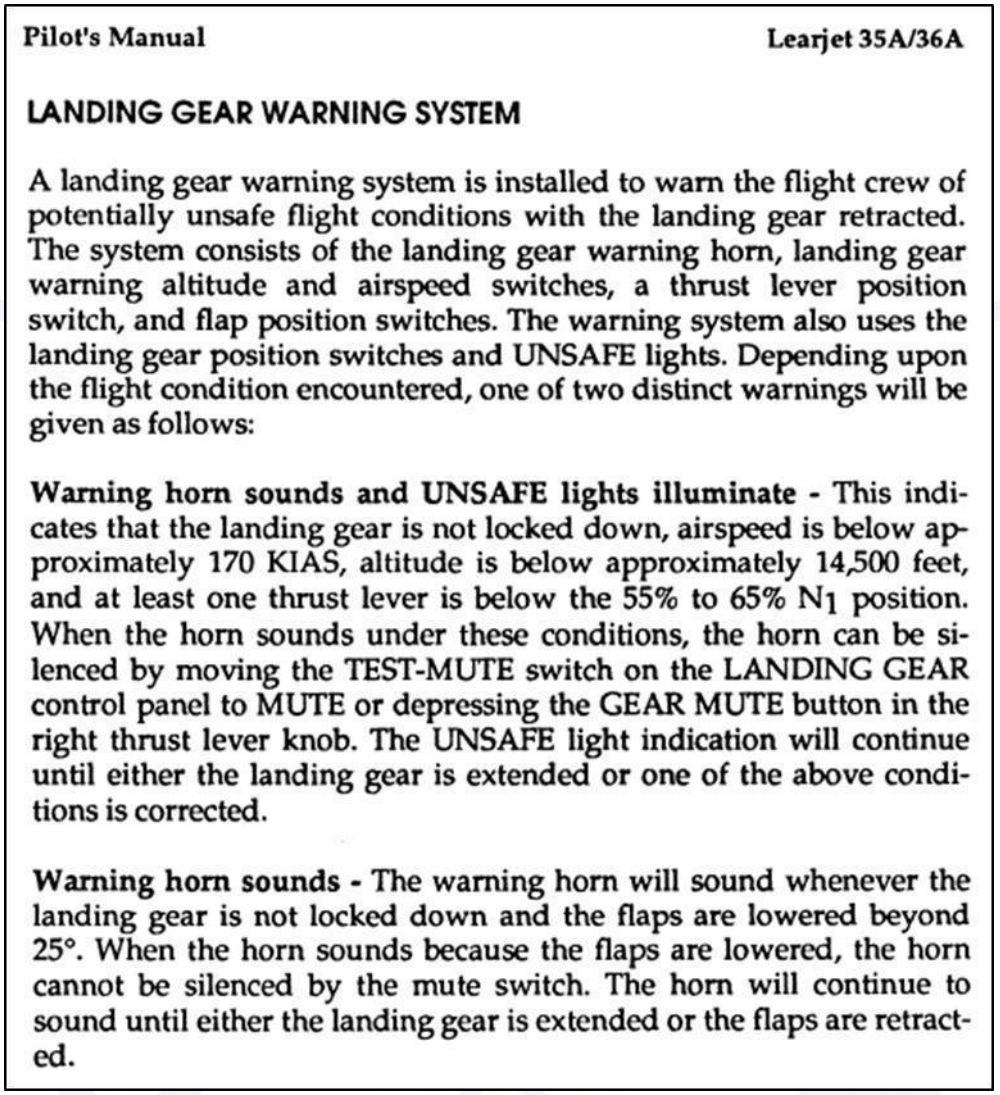
According to the Pilot’s Manual 102, dated February 1992, Section III, page 3-8, the aircraft was equipped with a landing gear warning system.

The purpose of this system was to alert pilots when the landing gear was retracted under specific parameters established by the manufacturer. An aural warning and the UNSAFE light would be automatically activated when the landing gear was not extended and:

- airspeed was below 170 kt;
- altitude was below 14,500 ft; and
- at least one throttle lever was set below 55% to 65% N1.

The aural warning could be silenced by setting the landing gear control panel switch to the MUTE position or by pressing the GEAR MUTE button located to the right of the throttle quadrant. However, the UNSAFE warning light would remain illuminated until the gear was extended or the triggering conditions were no longer present.

The aural warning could not be silenced if the flaps were extended beyond 25°.



Pilot's Manual Learjet 35A/36A

LANDING GEAR WARNING SYSTEM

A landing gear warning system is installed to warn the flight crew of potentially unsafe flight conditions with the landing gear retracted. The system consists of the landing gear warning horn, landing gear warning altitude and airspeed switches, a thrust lever position switch, and flap position switches. The warning system also uses the landing gear position switches and UNSAFE lights. Depending upon the flight condition encountered, one of two distinct warnings will be given as follows:

Warning horn sounds and UNSAFE lights illuminate - This indicates that the landing gear is not locked down, airspeed is below approximately 170 KIAS, altitude is below approximately 14,500 feet, and at least one thrust lever is below the 55% to 65% N_1 position. When the horn sounds under these conditions, the horn can be silenced by moving the TEST-MUTE switch on the LANDING GEAR control panel to MUTE or depressing the GEAR MUTE button in the right thrust lever knob. The UNSAFE light indication will continue until either the landing gear is extended or one of the above conditions is corrected.

Warning horn sounds - The warning horn will sound whenever the landing gear is not locked down and the flaps are lowered beyond 25°. When the horn sounds because the flaps are lowered, the horn cannot be silenced by the mute switch. The horn will continue to sound until either the landing gear is extended or the flaps are retracted.

Figure 3 – Learjet 35A Landing Gear Warning System.
Source: Pilot's Aircraft Manual.

1.7. Meteorological information.

The routine Meteorological Aerodrome Reports (METAR) for SBBH contained the following data:

METAR SBBH 201600Z 27004KT 9999 SCT030 27/10 Q1015=

METAR SBBH 201700Z 23004KT 9999 SCT040 27/10 Q1014=

The conditions were above the minimums required for the flight, with visibility exceeding 10 km and scattered clouds at 4,000 ft. Wind was reported at 4 kt.

1.8. Aids to navigation.

NIL.

1.9. Communications.

The crew maintained contact with SBBH Control Tower (TWR-BH) throughout the entire flight.

Audio analysis confirmed that the aircraft remained in the traffic pattern, performing touch-and-go procedures. Additionally, no emergency or mechanical abnormality was reported by the pilots.

1.10. Aerodrome information.

The aerodrome was public, managed by *Infraero*, and operated under both Visual Flight Rules (VFR) and Instrument Flight Rules (IFR), during day- and night-time periods.

The runway was asphalt-sealed, with thresholds 13/31, measuring 2,364 m x 45 m, and situated at an elevation of 2,589 ft.

The declared distances for TakeOff Run Available (TORA), TakeOff Distance Available (TODA), Accelerate-Stop Distance Available (ASDA), and Landing Distance Available (LDA) corresponded to those specified on the Aerodrome Chart (ADC), as shown in Figure 4.

RWY	TORA(m)	TODA(m)	ASDA(m)	LDA(m)
13	2364	2364	2364	2364
31	2364	2364	2364	2364

Figure 4 – Declared runway distances at SBBH, as per AIRAC AMDT 24/18, January 3, 2019.

1.11. Flight recorders.

The aircraft was equipped with a Cockpit Voice Recorder (CVR), Part Number (PN) 1601-02-3, and Serial Number (SN) 6305.

The voice recorder was sent to the CENIPA's LABDATA (Flight Data Recorders Readout and Analysis Laboratory), where download of the data was successfully completed.

1.12. Wreckage and impact information.

After touching down with the landing gear retracted, the aircraft overran the departure end of runway 13, and traveled 270 meters before striking a tree (Figure 5).

Figure 5 – Sketch of the occurrence.
Source: adapted from Google Earth.

The aircraft's landing gear was in full retracted position, and the landing gear control lever was found in the UP position (Figure 6).

Scraping was observed on the underside of the fuselage, and fuselage fragments were recovered from the runway.

Figure 6 – Landing gear lever in the UP position (top).

On the throttle pedestal, the left engine lever was near the idle position, and the right engine lever was near maximum power.

Figure 7 – Throttle pedestal.

The fuel tanks were damaged and ruptured, resulting in significant fuel spillage around the wreckage.

It was not possible to determine the flap position due to damage caused by surface friction and impacts during the runway excursion.

1.13. Medical and pathological information.

1.13.1. Medical aspects.

The forensic examination concluded that the cause of death of the pilot occupying the right seat was multiple trauma.

1.13.2. Ergonomic information.

NIL.

1.13.3. Psychological aspects.

According to reports, the pilot occupying the right seat was retired and widely recognized in the aeronautical community for his extensive experience with this aircraft model.

He had been hired to conduct training flights with the PIC and the SIC. The purpose of the flight was to allow the PIC to perform different traffic patterns, including engine failure simulations. The accident under investigation occurred during the first of these planned training flights.

The obtained information indicated that no proper briefing was conducted between the PIC and the pilot in the right seat prior to the flight. No records or detailed accounts were found regarding any previous coordination related to the specific procedures to be followed during the flight, the planned maneuvers, or each crewmember's responsibilities.

Besides, there was no exchange of information regarding safety parameters or possible contingency actions in the event of an emergency.

Some investigative elements related to psychological aspects are consolidated within the factual data presented in item 1.18 (Operational Information), as well as in other sections of this report. This approach was adopted because, in this occurrence, human and operational factors were intrinsically linked, and the psychological evidence emerged organically from the documented operational context. Thus, maintaining this information connected to the remaining facts contributes to a comprehensive understanding of the accident.

1.14. Fire.

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

1.15. Survival aspects.

Following the accident, part of the fuselage in the cockpit area had to be cut open in order to rescue the pilots. The throttle pedestal also had to be removed.

The SIC, who was on board as a passenger at the time of the occurrence, successfully evacuated the aircraft on his own through an emergency exit.

The right-seat pilot was extricated by emergency responders but succumbed to injuries at the scene.

1.16. Tests and research.

NIL.

1.17. Organizational and management information.

The aircraft had been acquired by a company for the purpose of conducting private flights in the interest of management, which led to the need to hire two pilots to compose the crew.

Due to the PIC's close relationship with one of the company's owners, he was the first to be invited to join the team. Later, the PIC recommended the SIC – whom he had previously worked with – to serve as part of the crew. The SIC was on board as a passenger at the time of the accident.

Although both the PIC and the SIC were duly qualified to operate the aircraft, they sought out a more experienced professional in the aircraft type so that they could perform training flights under his supervision. That professional was the pilot occupying the right seat.

1.18. Operational information.

It was a private flight conducted under the requirements established by RBAC 91, Amendment nº 03, with two pilots and one passenger on board.

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

The pilots had been conducting training flights on the aircraft from March 27, 2021, until the date of the accident. During that period, three local flights and eight cross-country flights were completed. The next training session was to be a touch-and-go flight at SBBH, which culminated in the accident. For this flight, the pilots decided to hire the pilot occupying the right seat to provide them with instruction, starting with the PIC, with the intention of subsequently conducting the SIC's training.

During the flight, the PIC occupied the left seat and remained at the controls as the Pilot Flying (PF), the pilot in the right seat acted as the Pilot Monitoring (PM), and the SIC occupied a passenger seat.

The touch-and-go training consisted of landing on the runway and then accelerating again to take off from that point, entering a new traffic pattern. This maneuver is commonly used to allow for a greater number of takeoffs and landings within a shorter flight time.

The Aircraft Flight Manual (AFM), as well as the Quick Reference Handbook (QRH), did not contain specific procedures for this type of operation, particularly regarding the configuration changes required for the second takeoff, which involves repositioning of both the flaps and the trim. These adjustments require more dynamic cockpit coordination.

To support the analysis of the sequence of events that led to the gear-up landing, the Investigation Committee highlighted three excerpts from the cockpit conversations recorded by the CVR that may help in understanding the dynamics of the accident. All times referenced in this section are based on Coordinated Universal Time (UTC).

First Excerpt:

16:45:39 – The pilot in the right seat states that the landing will be single-engine.

16:45:41 – The PIC responds with an expression of agreement.

16:45:44 – The pilot in the right seat states "maximum speed 140."

16:45:49 – The pilot in the right seat instructs the PIC to proceed as if on a twin-engine approach.

Second Excerpt:

16:47:09 – The pilot in the right seat advises that if too much trim is used on approach, the aircraft will become highly uncoordinated during landing.

16:47:16 – The PIC asks if he should reduce speed to compensate and reduce yaw.

16:47:18 – The pilot in the right seat agrees.

Third Excerpt:

16:48:39 – The pilot in the right seat announces "full flap" (an aural warning is triggered).

16:48:40 – The PIC confirms "full flap."

16:48:41 – The pilot in the right seat utters an unintelligible expression.

16:48:44 – The PIC asks whether to maintain pitch.

16:48:45 – The pilot in the right seat replies "no."

16:48:46 – The pilot in the right seat says "138" (possibly referring to airspeed) and "gear up."

16:48:55 – The pilot in the right seat asks if the PIC is comfortable.

16:48:56 – The PIC replies affirmatively and says the aircraft passed near a kite.

16:48:59 – The pilot in the right seat asks if it was near the museum's edge.

16:49:00 – The PIC responds with an expression indicating he did not understand.

16:49:06 – The pilot in the right seat repeats the question about the museum's edge.

16:49:10 – The PIC replies that it was to the right.

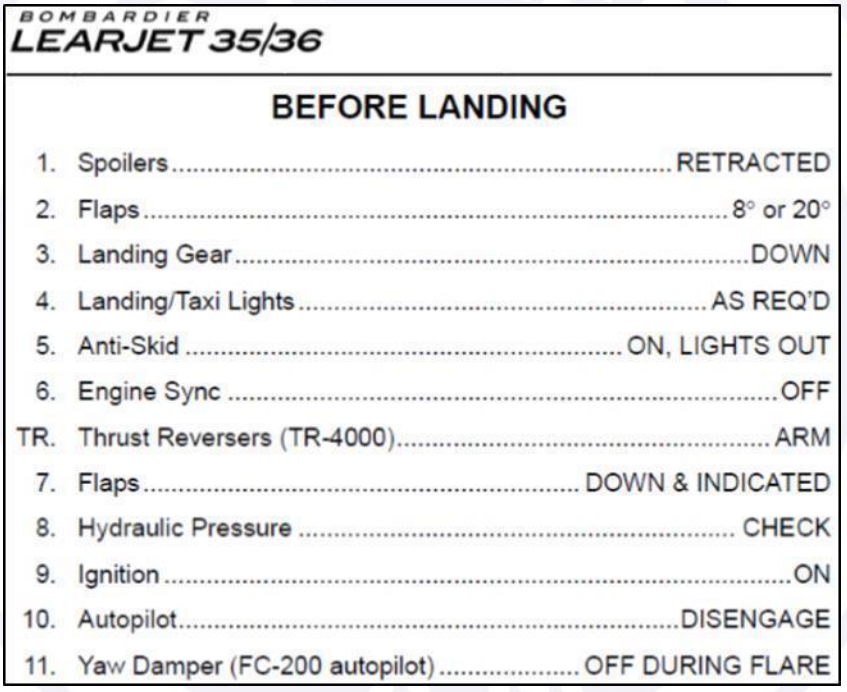
The audio data from the first and second excerpts indicated that the pilots were conducting simulated single-engine landing training at the time of the accident.

The third excerpt was recorded during final approach and indicated that the pilot in the right seat was reading checklist items and stating that the landing gear was still retracted. It was also observed that the aircraft passed near a kite.

After the pilot in the right seat announced "full flap", an aural warning was triggered and remained audible until the moment of touchdown.

The CVR did not record any further comment or action by the PIC after hearing the pilot in the right seat report that the landing gear was up ("gear up") moments before landing.

The Before Landing checklist prescribed the procedures shown in Figure 8.



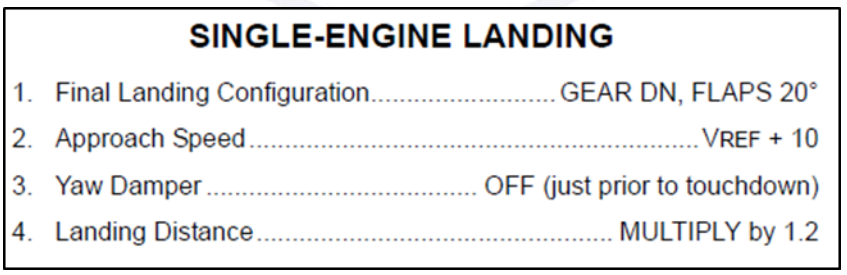
BOMBARDIER
LEARJET 35/36

BEFORE LANDING

1.	Spoilers	RETRACTED
2.	Flaps	8° or 20°
3.	Landing Gear	DOWN
4.	Landing/Taxi Lights	AS REQ'D
5.	Anti-Skid	ON, LIGHTS OUT
6.	Engine Sync	OFF
TR.	Thrust Reversers (TR-4000)	ARM
7.	Flaps	DOWN & INDICATED
8.	Hydraulic Pressure	CHECK
9.	Ignition	ON
10.	Autopilot	DISENGAGE
11.	Yaw Damper (FC-200 autopilot)	OFF DURING FLARE

Figure 8 – Before Landing Procedure
Source: QRH.

For single-engine landing conditions, the QRH specified the configuration and parameters shown in Figure 9 below.



SINGLE-ENGINE LANDING

1.	Final Landing Configuration	GEAR DN, FLAPS 20°
2.	Approach Speed	VREF + 10
3.	Yaw Damper	OFF (just prior to touchdown)
4.	Landing Distance	MULTIPLY by 1.2

Figure 9 – Single-Engine Landing
Source: QRH.

The aircraft was captured by airport security cameras flying over the runway at a height above the usual for landing and with the landing gear retracted.

Figure 10 – Aircraft captured by security camera
Source: Aerodrome Administration.

At about that time, the CVR recorded the following exchange between the pilots:

16:49:30 – The pilot in the right seat states that something is "good."

16:49:46 – The pilot in the right seat instructs the PIC to adjust the power.

16:49:49 – The pilot in the right seat states that the aircraft is too fast.

16:49:51 – The pilot in the right seat instructs the PIC to “hold” (possibly meaning to maintain altitude until touchdown).

16:49:52 – The pilot in the right seat repeats the instruction to “hold” (possibly meaning to maintain altitude until touchdown).

16:49:58 – The pilot in the right seat again instructs the PIC to “hold” (possibly meaning to maintain altitude until touchdown).

Immediately afterward, the sound of the aircraft’s fuselage scraping against the runway was heard.

The PIC informed the Investigation Committee that he could not recall the exact details of the final moments of the landing.

1.19. Additional information.

RBAC 91, in Section 91.5 – Crew Requirements, letter (a), item (3), established the following requirement:

> 91.5 Crew Requirements
>
> (a) The operation of a civil aircraft registered in Brazil is permitted only if:
>
> […]
>
> (3) the operation is conducted by crewmembers who are properly licensed/certified and rated for the aircraft in accordance with RBAC nº 61 or RBHA 63, or any RBAC that may replace it, for the function they perform on board, with recent experience, and holders of valid Aeronautical Medical Certificates (CMA) issued in accordance with RBAC nº 67.

Regarding type rating renewal, RBAC nº 61, Amendment nº 13, which addresses Licenses, Ratings, and Certificates for Pilots, stipulated in Section 61.215 – Type Rating Renewal, letter (a), the following requirements:

61.215 Type Rating Renewal

(a) To renew a type rating, the applicant must:

(1) have successfully completed, within the six (6) months prior to the proficiency check, ground and flight training for the renewal of the rating corresponding to the aircraft type requested; and

(2) pass a proficiency check conducted in accordance with paragraph 61.213(a) (4) of this Regulation.

1.20. Useful or effective investigation techniques.

NIL.

2. ANALYSIS.

This was a private flight conducted under the requirements established by RBAC 91, with two pilots and one passenger on board.

Given that weather conditions were above the minimums required for the flight, it was concluded that no meteorological factor contributed to the accident under investigation.

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

Throughout the investigation process, no evidence was found to suggest that mechanical failures contributed to the chain of events leading to this accident.

According to information gathered by the Investigation Committee, there was no briefing or prior coordination before the flight regarding the specific procedures to be followed, the planned maneuvers, or the responsibilities of each crewmember. There was also no exchange of information concerning safety parameters or potential contingency actions in case of an emergency.

The PIC was qualified; however, despite having extensive experience in rotary-wing aviation, he had only recently begun operating fixed-wing aircraft and had completed the PPR course just a few months prior to the accident. After completing basic training at a CIAC in Brazil, he underwent aircraft-specific training at FlightSafety, in the United States.

Although both the PIC and the SIC were properly rated, they chose to conduct a series of flights to increase their familiarity with the aircraft.

The training flight that resulted in this accident was a touch-and-go session at SBBH. For this flight, the pilots decided to hire the pilot occupying the right seat to provide instruction, starting with the PIC and, later, with the SIC.

However, the pilot occupying the right seat was not qualified to conduct the flight in question, as his Aeronautical Medical Certificate (CMA) had expired on September 2, 2019, and his LR30 type rating had lapsed in January 2017. His latest flight recorded in the SACI system was dated January 2019, in a Cessna Citation C650.

One therefore concluded that there was a failure to comply with the requirements set forth in Section 61.215 of RBAC 61 (ground and flight training and proficiency check), with regard to the pilot occupying the right seat.

Thus, conducting the flight with an unqualified pilot reflects the adoption of inappropriate attitudes, such as complacency, overconfidence, and disregard for the requirements established in RBACs 91 and 61, all of which may have contributed to this accident.

Additionally, the fact that the pilot in the right seat had not held a valid CMA for approximately two years raised concerns about his physical fitness to meet the demands of the flight – especially during high workload phases, such as repeated landings and takeoffs.

At the time of the accident, the crew was conducting a simulated engine-out landing. However, it was verified that neither the Aircraft Flight Manual (AFM) nor the Quick Reference Handbook (QRH) for the model 35A included procedures for touch-and-go operations.

Therefore, it is possible that the aircraft's checklist was either adapted for the intended flight profile or simply not used. CVR recordings revealed that, during the final approach of the accident flight, the aircraft was configured with 40° flaps (full) and the landing gear retracted – whereas the recommended configuration for single-engine landings was 20° flaps and gear down.

During the approach, after the pilot in the right seat commanded full flap extension, the aural warning indicating that the landing gear was still retracted was activated and can be heard on the CVR recording.

However, no corrective actions were taken by the crew, revealing an impairment in their ability to recognize and interpret cues from the operational environment – resulting in reduced situational awareness and ultimately leading to a gear-up landing.

A few seconds after flap extension, the PIC reported to the pilot in the right seat that the aircraft had crossed paths with a kite, which momentarily drew their attention and may have compromised their ability to respond appropriately to operational cues leading to a breakdown in the alert system and contributing to distraction, specifically regarding gear extension.

It is possible that the accelerated pace of the touch-and-go training flight, when compared to standard procedures, combined with the other factors identified, contributed to the omission of the landing gear extension.

During landing, the aircraft was recorded by surveillance cameras while flying over the runway with the landing gear retracted. At that time, the pilot in the right seat was alerting the PIC that the aircraft was too fast – a condition consistent with the landing gear being retracted, since drag would have been lower than expected.

In this context, the ineffective use of available human resources for the operation resulted in poor task management among the crew. The PIC never questioned the aircraft's condition to proceed with the landing, and the pilot in the right seat failed to monitor the aircraft's configuration or provide assertive guidance regarding the landing gear status circumstances that contributed to this accident.

Finally, the investigation revealed that the PIC had approximately 41 hours of experience on the LR35 aircraft. Given his operational background – almost entirely developed in rotary-wing aviation – it is possible that his limited experience with fixed-wing aircraft had not yet enabled him to acquire the full set of skills and knowledge necessary to conduct safe operations in the Learjet 35.

3. CONCLUSIONS.

3.1. Findings.

a) the PIC and SIC held valid CMAs (Aeronautical Medical Certificates);

b) the pilot occupying the right seat held a CMA that expired in 2019;

c) the PIC and SIC held valid type ratings for the LR30 aircraft;

d) the pilot occupying the right seat held an expired LR30 type rating;

e) the PIC was qualified and had 41 hours and 25 minutes of flight time on the aircraft model;

f) the pilot in the right seat was not qualified to conduct the flight;

g) the aircraft had a valid CVA (Certificate of Airworthiness);

h) the aircraft was within the weight and balance limits;

i) the records of the airframe and engine logbooks were up to date;

j) the weather conditions were above the minimums required for the flight;

k) during a local touch-and-go flight, the aircraft contacted the runway with the landing gear retracted;

l) the aircraft overran the departure end of the runway and traveled 270 meters before striking a tree trunk;

m) the aircraft sustained substantial damage;

n) the SIC, who was on board as a passenger, was not injured;

o) the PIC sustained serious injuries; and

p) the pilot occupying the right seat sustained fatal injuries.

3.2. Contributing factors.

- **Attention – undetermined.**

It is possible that the aircraft's encounter with a kite led to a delayed and imprecise response to operational cues, which may have resulted in a breakdown in the alert and distraction management system, specifically regarding landing gear extension.

- **Attitude – undetermined.**

Conducting the flight with an unqualified pilot reflected the adoption of inappropriate attitudes such as complacency, overconfidence, and disregard for the requirements established in RBACs 91 and 61, which may have contributed to this accident.

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

Inefficient use of the human resources available for the aircraft operation led to inadequate task management among the crew. The PIC never questioned the aircraft's readiness for landing, and the pilot occupying the right seat failed to monitor the aircraft configuration or assertively advise on the landing gear position for touchdown.

- **Perception – a contributor.**

During the approach, the aural warning indicating that the landing gear was still retracted was activated and could be heard on the CVR audio. However, the pilots took no corrective action, evidencing impaired ability to recognize and interpret internal environmental cues, which led to reduced situational awareness and culminated in a gear-up landing.

- **Limited pilot's experience – undetermined.**

Considering the PIC's operational background, developed almost entirely in rotary-wing aviation, it is possible that his limited experience with fixed-wing aircraft had not yet enabled him to acquire the full range of skills and knowledge necessary for the safe operation of Learjet 35 flights.

4. SAFETY RECOMMENDATIONS

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 consonance with the Law n°7565/1986, recommendations are made solely for the benefit of 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 ANAC (Brazil's National Civil Aviation Agency), it is recommended:

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Disseminate the lessons learned from this investigation to the company *Eletric Power Construção Eireli*, operator of the aircraft, in order to promote Safety Culture enhancement, focusing on the risks arising from the execution of operational procedures without ensuring that the pilots occupying the command seats are duly qualified.

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Disseminate the lessons learned from this investigation during Operational Safety Promotion events, with the aim of reinforcing the importance of Crew Resource Management (CRM) training in civil aviation operations, as well as the compliance with applicable regulatory requirements.

4. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On August 5th, 2025.