COMANDO DA AERONÁUTICA <u>CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE</u> <u>ACIDENTES AERONÁUTICOS</u>



FINAL REPORT A-133/CENIPA/2021

OCCURRENCE: AIRCRAFT: MODEL: DATE: ACCIDENT PR-YRH A320-251N 25NOV2021



NOTICE

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

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

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

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

This Final Report has been made available to the ANAC and the DECEA so that the technical-scientific analyses of this investigation can be used as a source of data and information, aiming at identifying hazards and assessing risks, as set forth in the Brazilian Program for Civil Aviation Operational Safety (PSO-BR).

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

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

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

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

SYNOPSIS

This Final Report pertains to the November 25, 2021 accident involving the model A320-251N aircraft of registration marks PR-YRH. The event was typified as "[SCF-NP] System/Component Failure or Malfunction (Non-Powerplant)" and "[EVAC] Evacuation."

During the takeoff roll, the pilots performed a low-energy rejected takeoff due to lowlevel indication in the yellow hydraulic system.

After the aircraft came to a stop on the runway, a passenger evacuation occurred without being commanded by the flight crew.

The aircraft sustained no damage.

The crewmembers were unharmed.

One of the passengers sustained serious injuries, and fourteen others sustained minor injuries.

Being France the State of design and manufacture of the aircraft, an Accredited Representative from the *Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile* (BEA) was appointed for participation in the investigation of the accident.

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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
APU	Auxiliary Power Unit
BEA	French Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile
CENIPA	Center for the Investigation and Prevention of Aeronautical Accidents
CC	Lead Flight Attendant / Purser
CMA	Aeronautical Medical Certificate
COE	Emergency Operations Center
CRM	Crew Resource Management
CVA	Certificate of Airworthiness
CVR	Cockpit Voice Recorder
DECEA	Brazil's Command of Aeronautics' Department of Airspace Control
ECAM	Electronic Centralized Aircraft Monitor
EGP	Practical General Emergencies
FAA	USA's Federal Aviation Administration
FDAU	Flight Data Acquisition Unit
FDR	Flight Data Recorder
IFR	Instrument Flight Rules
IFRA	Instrument Flight Rating – Airplane
LABDATA	Cenipa's Laboratory for Readout and Analysis of Flight Recorders' Data
LOFT	Line Oriented Flight Training
MCMSV	Flight Attendants' Manual
METAR	Routine Aerodrome Meteorological Report
MGO	General Operating Manual
MLTE	Multi-Engine Landplane Class Rating
NSCA	Brazil's Command of Aeronautics' Norm
NTSB	USA's National Transportation Safety Board
PIC	Pilot in Command
PF	Pilot Flying
PLA	Airline Transport Pilot License - Airplane
PLEM	Emergency Plan
PN	Part Number
PPR	Private Pilot License - Airplane
PSO-BR	Brazil's Civil Aviation Safety Program
QRH	Quick Reference Handbook
RBAC	Brazilian Civil Aviation Regulation

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RTO	Rejected Takeoff		
SAMU	Brazil's public emergency medical service, equivalent to	EMS	
SBCY	ICAO location designator - Marechal Rondon Airport, Ca Mato Grosso	uiabá, S	tate of
SBGR	ICAO location designator - Guarulhos - Governador And Montoro - Airport, State of São Paulo	dré Fran	CO
SIC	Second in Command		
SIPAER	Brazil's Aeronautical Accidents Investigation and Prever	ntion Sys	stem
SN	Serial Number		
TWR-CY	Cuiabá Control Tower		
UTC	Coordinated Universal Time		
VFR	Visual Flight Rules		

1. FACTUAL INFORMATION.

	Model:	A320-251N	Operator:
Aircraft	Registration:	PR-YRH	Azul Linhas Aéreas Brasileiras S.A.
	Manufacturer:	Airbus S.A.S	
Occurrence	Date/time: 25N	OV2021 - 06:04(UTC)	Type(s):
	Location: Mare Airport (SBCY)	chal Rondon International	[SCF-NP] System/component failure or malfunction (non-powerplant)
	Lat. 15°39'00"S	Long. 056°07'03"W	[EVAC] Evacuation
	Municipality – State: Cuiabá – Mato		
	Grosso.		

1.1. History of the flight.

At approximately 0604 UTC, the aircraft was scheduled to take off from SBCY (*Marechal Rondon* International Airport, *Cuiabá*, State of *Mato Grosso*), bound for SBGR (*Guarulhos – Governador André Franco Montoro –* International Airport, State of *São Paulo*), on a regular passenger transport flight, with six crew and 152 passengers on board.

During the takeoff roll on runway 35, the pilots performed a rejected takeoff due to lowlevel indication in the yellow hydraulic system. The rejected takeoff occurred when the aircraft was at a speed of about 90 kt.

After the complete stop on the runway, the evacuation of the aircraft took place without being commanded by the pilots, with the engines still running at reduced power.

The aircraft sustained no damage.



Figure 1 – Image of the aircraft on the runway with the 1L escape slide extended (Door Fwd L).

During the evacuation, fourteen passengers sustained minor injuries and one passenger sustained serious injury.

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Figure 2 – Emergency exit (Emer Exit Aft R) opened by one of the passengers during evacuation from the aircraft.

1.2. Injuries to persons.

Injuries	Crew	Passengers	Others	
Fatal		-	-	
Serious	-	1	-	
Minor	-	14		
None	6	137-	-	

1.3. Damage to the aircraft.

NIL.

1.4. Other damage.

NIL.

1.5. Personnel information.

1.5.1. Crew's flight experience.

Hours Flown				
	PIC	SIC		
Total	5.676:40	2.644:50		
Total in the last 30 days	33:20	53:15		
Total in the last 24 hours	01:40	03:30		
In this type of aircraft	1.398:40	652:50		
In this type in the last 30 days	33:20	53:15		
In this type in the last 24 hours	01:40	03:30		

Note: Data on the pilots' hours of flight provided by the operator of the aircraft.

1.5.2. Personnel training.

The Pilot in Command (PIC) completed his PPR course (Private Pilot – Airplane) in 2005, at the *Aeroclube de Bauru*, State of *São Paulo*.

The Second in Command (SIC) completed his PPR course (Private Pilot – Airplane) in 2010, at the *Aeroclube de São José do Rio Preto*, State of *São Paulo*, in 2010.

1.5.3. Category of licenses and validity of certificates.

Both the PIC and the SIC held a PLA license (Airline Transport Pilot – Airplane) and had valid ratings for the A320 type aircraft (which included the A320-251N model), MLTE (Multi-Engine Land Airplane), and IFRA (Instrument Flight – Airplane).

1.5.4. Qualification and flight experience.

The pilots and flight attendants were qualified and experienced in the type of flight.

1.5.5. Validity of medical certificate.

The pilots and flight attendants held valid CMAs (Aeronautical Medical Certificates).

1.6. Aircraft information.

The serial number 7494aircraft was manufactured by Airbus S.A.S. in 2017, and registered under the Regular Public Air Transport Category (TPR).

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

The technical maintenance records of the aircraft were up to date.

The last inspection of the aircraft, a "Complementary Check" type, was carried out on 24NOV2021 by Manutenção de Linha Azul, in *Campinas*, State of *São Paulo*, with 30 hours and 10 minutes flown since the inspection.

The last more comprehensive inspection of the aircraft, a "Heavy Check C" type, was carried out on 12MAY2021 by *Hangar Azul* VCP, in *Campinas*, State of *São Paulo*, with 279 hours and 50 minutes flown since the inspection.

The Electronic Centralized Aircraft Monitor (ECAM) was a system that monitored and displayed to the pilots information about the engine and aircraft systems. In case of failure, it indicated the system that had presented a malfunction and the corrective actions required.

The data displayed on the Engine/Warning Display (E/WD) and on the System Display (SD) of the ECAM included:

- primary engine indications, fuel quantity, flap and slat positions;
- warning and caution alerts;
- synoptic diagrams of the aircraft systems and status messages; and
- permanent flight data.

The aircraft had three continuously operating hydraulic systems: green, blue, and yellow. Each system had its own hydraulic reservoir. The normal operating pressure was 3,000 psi, and hydraulic fluid could not be transferred from one system to another.



Figure 3 – Hydraulic system page on the ECAM display with data from the green, blue, and yellow hydraulic systems.

The yellow system was powered by Engine 2. An electric pump could also pressurize this system, allowing its use on the ground with the engines shut down. Additionally, the yellow system could also be pressurized by a manual pump for operating the cargo doors on the ground when no electrical power was available.

When the reservoir level of the yellow system was low, the FAULT light illuminated in amber and the message HYDRAULIC Y RSVR LO LVL appeared on the ECAM.

1.7. Meteorological information.

The Meteorological Aerodrome Reports (METAR – aerodrome weather report) for SBCY Aerodrome contained the following information:

METAR SBCY 250400Z 27004KT 9999 FEW020 BKN100 24/23 Q1012

METAR SBCY 250500Z 28008KT 9999 FEW020 BKN100 24/23 Q1011

METAR SBCY 250600Z 28005KT CAVOK 24/23 Q1010

METAR SBCY 250700Z 32003KT CAVOK 24/23 Q1009

It was verified that the weather conditions were above the minimums required for the flight to be conducted.

1.8. Aids to navigation.

NIL.

1.9. Communications.

According to the audio transcripts of the communications between PR-YRH and the control units, it was noted that the flight crew maintained radio contact with the *Cuiabá* Control Tower (TWR-CY) and that there was no technical abnormality in the communication equipment during the aeronautical occurrence.

1.10. Aerodrome information.

The aerodrome was public, managed by INFRAERO, and operated under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR), during both daytime and nighttime periods.

The runway was asphalt, with thresholds 17/35, measuring 2,300 x 45 meters, and an elevation of 617 ft.

1.11. Flight recorders.

The aircraft was equipped with a Cockpit Voice Recorder (CVR), Part Number (PN) 1605-01-00, Serial Number 1465, manufactured by Universal Avionics.

The voice recorder was sent to the Flight Data Recorder Reading and Analysis Laboratory (LABDATA) of the Aeronautical Accidents Investigation and Prevention Center (CENIPA), where the data download was successfully performed.

The equipment functioned normally and contained data related to the occurrence flight.

The transcript of the messages showed the initial interaction between the pilots and the TWR-CY right after the Rejected Takeoff (RTO), as well as the attempts at communication between the pilots and the Cabin Chief (CC) before and during the evacuation of the passengers (Table 1). The aircraft's callsign was Azul 2751.

Time	Source	Transcript (Non-verbatim)
06:04:08	PIC	The PIC announces the "stop" callout.
06:04:16	SIC	The SIC informs TWR-CY that the aircraft is stopping on RWY 35.
06:04:22	TWR	The TWR acknowledges receipt of the message.
06:04:32	PIC	Via PA ¹ , the PIC instructs the flight attendants and passengers to wait for instructions.
06:04:36	TWR	The TWR asks if Azul 2751 needs any support.
06:04:39	SIC	The SIC replies, "negative", and does not complete the sentence about where the aircraft is going to stop.
06:04:50	TWR	The TWR asks whether the aircraft needs to perform any check.
06:05:00	PIC	Via interphone, the PIC asks the flight attendants what happened.
06:05:08	PIC	The PIC repeats the call to the flight attendants via interphone.
06:05:11	SIC	The SIC informs that the passengers are disembarking through the right-had door.
06:05:23	TWR	The TWR calls Azul 2751.
06:05:50	TWR	The TWR again asks if 2751 needs any ground support.
06:05:57	PIC	The PIC repeats the call to the flight attendants via interphone.
06:06:15	SIC	The SIC calls the CC by name via interphone.
06:06:17	SIC	The SIC again calls the CC by name via interphone and asks what happened.
06:06:21	SIC	The SIC again calls the CC by name via interphone and asks what happened.
06:06:26	SIC	The SIC calls the CC by name and asks him to enter the cockpit.
06:06:29	PIC	The PIC calls the CC by name via interphone.
06:06:34	PIC	The PIC calls the TWR.
06:06:40	PIC	The PIC repeats the call to the TWR.

¹ The term Passenger Address (often abbreviated as PA) refers to the onboard communication system used by the crew to make announcements to the passengers. This system enables pilots and flight attendants to communicate with passengers, providing important information such as safety instructions, flight updates, weather conditions, and turbulence warnings. The PA is a crucial part of an aircraft's communication equipment, ensuring that all passengers receive clear and timely messages directly from the crew.

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	06:06:42	TWR	The TWR responds to the call.	
	06:06:44	PIC	The PIC informs the TWR that there was a hydraulic warning, that an evacuation was initiated without his knowledge, that he is unable to establish contact with the passenger cabin, and that he will report back as soon as possible.	
	06:06:55	TWR	The TWR acknowledges and maintains listening watch.	
	06:07:00	6:07:00 PIC The PIC call the CC by name once again via interphone an asks if anyone can hear him.		
	06:07:08	SIC	The SIC calls the CC by name once again via interphone.	
	06:07:28	-	The CC enters the cockpit.	
	06:07:32	PIC	The PIC asks the CC what happened.	
	06:07:34	CC	The CC informs that three chimes, emergency and evacuation, were heard.	
	06:07:36	PIC	The PIC states that there were no three chimes.	

Table 1 – Excerpt of cockpit dialogues recorded by the CVR during the takeoff and evacuation of the aircraft. Source: CVR.

The aircraft was equipped with a digital Flight Data Recorder (FDR), model FA2100 FDR L3, model 2100-2/4043, PN 2100-4043-00, SN 000585479, with a maximum capacity of 256 words per second and ARINC 573/717 communication bus. The Flight Data Acquisition Unit (FDAU) installed on the aircraft had PN ED34A350.

Relevant information obtained from the FDR readout is described in item 1.18. Operational Information.

1.12. Wreckage and impact information.

Not applicable.

1.13. Medical and pathological information.

1.13.1. Medical aspects.

No evidence was found that issues of physiological order or incapacitation might have affected the performance of the crew.

1.13.2. Ergonomic information.

NIL.

1.13.3. Psychological aspects.

The PIC had been with the company for 11 years and was promoted to Captain in 2015. Until May 2021, he operated the ATR 72-600 and, in June of that same year, began operating the Airbus A320.

He was on his second consecutive overnight shift and, according to his account, felt tired on the day of the occurrence. As a result, he agreed with the FO, who reported feeling in better condition, that the FO would act as Pilot Flying (PF) on the second leg of the flight, which would be conducted from SBCY to SBGR.

The PIC considered the flight schedule tight, with many overnight flights. However, he stressed that the company complied with aeronautical regulations.

The FO had been with the company for two years and flew only the Airbus A320. He reported being accustomed to the overnight flight schedule planned by the company.

The Cabin Chief (CC) had been with the company for two and a half years. He had previously worked for another airline for eight years. According to his account, over the

course of his career, he had participated in six RTOs, with the present occurrence being the first that involved an evacuation.

The other flight attendants had also been with the company for more than two years. Three of the four flight attendants on board had previously experienced rejected takeoffs.

According to the flight attendants, the workload was high. However, the company did not exceed the limits established by applicable regulations.

According to the pilots, the flight proceeded normally until the beginning of the takeoff roll, when a hydraulic system failure indication appeared at approximately 90 kt. They reported that the failure was immediately identified and that they performed the "stop" callout and the procedures outlined in the Quick Reference Handbook (QRH).

During the interview with the Investigation Team, the flight attendants stated that, at the time of the occurrence, they believed the aircraft would overrun the runway.

The CC stated that he noticed the emergency visual and aural alarms and checked for signs of fire or smoke outside the aircraft but saw nothing. Nevertheless, he was expecting the situation to worsen due to the emergency alert.

The PIC reported that he communicated with the flight attendants and passengers via the PA system five seconds after the aircraft came to a complete stop, intending to instruct them to await further instructions.

According to the interviews conducted, the flight attendants did not understand that message. At that moment, some passengers began to panic, believing there was a fire outside the aircraft.

Approximately fifteen seconds after the PA announcement, upon hearing screams from the passenger cabin, the PIC made a call via interphone in "emergency call" mode to contact the flight attendants, but was unsuccessful.

The PIC further reported that he had previously undergone rejected takeoff procedures five times while operating the ATR 72-600. In his view, emergency procedures were similar regardless of the aircraft type. He noted that, in the case of the ATR 72-600, there was no emergency call button as there was on the Airbus.

To the pilots, using the emergency call in a situation like this was a discretionary action, i.e., not mandatory. When questioned by the Investigation Team, they stated that they believed there was no written guidance on this procedure.

For the flight attendants, the emergency call was not an expected procedure in that situation. According to the company's training, in such cases, a call over the PA system should come first. From their perspective, when triggered directly by the emergency alert, it was interpreted as "the worst-case scenario."

According to the flight attendants, the standardized phraseology for emergency procedures was neither intuitive nor helpful, such as the term "Echo Victor, Echo Victor," which was the command given by the PIC to proceed with the evacuation.

The PIC recalled that, when he made the emergency call via interphone, the CC responded with "hello, hello." Subsequently, communication was lost, and the CC did not return the call.

The PIC reported to the Investigation Team that he remained on the line, heard screams in the passenger cabin, and asked for calm, but there was no reply.

As determined, only one of the flight attendants, who was at the rear of the aircraft, reported hearing the PIC's voice seconds before placing the handset back in its cradle. Another flight attendant reported attempting to reset the interphone to call the cockpit again

but gave up when he heard the emergency exit door being opened, initiating the evacuation through the door under his responsibility.

Approximately forty seconds after the aircraft came to a stop, the FO saw some passengers walking on the runway, next to the aircraft. Shortly after, evacuation commands were heard. Despite this, neither he nor the PIC remembered that the engines were still running. The engines were shut down about four minutes after the evacuation began.

The CC reported that, shortly after the RTO, passengers began panicking when the flight attendant next to him "froze," repeatedly asking whether to open the emergency exit or not. The CC then decided to open the door and advised the passengers to calmly leave the cabin. However, they began pushing to get out of the aircraft.

Also according to the CC, in addition to the turmoil caused by passengers who believed the aircraft was on fire, another factor contributing to his decision to begin the evacuation through door 1L was the perception that one of the passengers had already opened the emergency window, which made the situation harder to control.

The flight attendants at the rear of the aircraft, at doors 4L and 4R, reported acting after the evacuation actions initiated by the CC and the other flight attendant positioned at the front (door 1R). Due to the confusion in the passenger cabin, they were unable to hear the engine noise. However, they observed the slides swinging.

The pilots reported that they did not understand what was happening in the passenger cabin or what had triggered the aircraft evacuation until the CC arrived in the cockpit. About three minutes after the start of the evacuation, the CC unlocked the cockpit door, according to the PIC, appeared very nervous, and could not explain at that moment what had led him to initiate the passenger evacuation.

The PIC added that he believed the flight attendants might have suspected a fire due to the smoke resulting from the tires' friction with the asphalt and a possible burning smell in the passenger cabin due to heavy braking during the RTO.

He reported that he had not flown with that crew before that flight, except for the CC, but that, up to the time of the occurrence, the crew environment was good, with proper task management.

The CC was flying with that group of flight attendants for the first time. In his view, Crew Resource Management (CRM) concepts were not well applied during the emergency.

He also considered that there had been no training failure regarding emergency procedures, since he reviewed them the following day during a meeting with the company's safety team. In his opinion, the main problem was crew communication.

According to the collected reports, some passengers panicked immediately after the RTO, shouting "it's on fire!" and "it's going to explode!", which prevented the flight attendants from understanding the PIC's PA message instructing them to wait and led them to initiate the emergency evacuation without command from the pilots.

According to the flight attendants, the RTO occurred at night, so the external lights especially the anti-collision lights (red and strobe)—along with smoke from the intense braking, may have given the impression that there was fire outside the aircraft.

The passenger seated near the emergency exit on the left wing stated that, after the aircraft came to a stop, he heard a sound resembling depressurization and noticed some smoke outside the cabin. However, he reported not smelling any smoke inside the aircraft.

He also stated that he did not recall hearing any announcements or communications from the pilots to the passengers due to the turmoil and widespread shouting that took over the cabin.

Finally, this passenger added that the evacuation movement apparently began in the front section of the aircraft and that, during the rejected takeoff, even before the aircraft came to a complete stop, some passengers began shouting "it's going to explode!" and "it's going to catch fire!", which may have triggered panic in the cabin.

1.14. Fire.

There was no fire.

1.15. Survival aspects.

The Emergency Plan (PLEM) of SBCY was activated shortly after the Aerodrome Operator was informed by the TWR-CY of the evacuation of PR-YRH.

The actions were coordinated by the Emergency Operations Center (COE), and the airport's medical response resources, along with two ambulances from the Mobile Emergency Care Service (SAMU)—which were part of the support resources established by the PLEM—carried out the initial assistance to the passengers.

The airline also mobilized employees who were off duty at the time of the occurrence to support the passengers, by accompanying medical care, providing transportation for those residing in Cuiabá, and arranging accommodation for the other passengers in hotels and on flights departing from SBCY throughout the day.

Out of a total of 152 evacuated passengers, 14 sustained injuries that were initially reported as minor.

One passenger suffered a dislocation of the right ankle and was taken to Santa Rita Hospital. A pregnant passenger, 30 weeks along, was sent to São Lucas Hospital for observation. Both hospitals were less than 2.5 km from SBCY and were also part of the emergency care units designated as support resources under the PLEM.

Several days after the occurrence, the Investigation Team received information that a child who had been on board the aircraft had suffered a fractured tibia. The medical certificate submitted to the Investigation Team, issued by the Orthopedic Hospital – Orthopedics and Traumatology of Cuiabá, MT, and dated 25NOV2021, stated that the child, who complained of pain following the aircraft evacuation, underwent imaging and was diagnosed with a fracture of the left tibia, requiring immobilization and orthopedic treatment.

Based on the information gathered by the Investigation Team, all procedures provided for in the Emergency Plan were executed as planned, including the establishment of passenger triage and stabilization areas, the evacuation of the most seriously injured victims to nearby health facilities, and the actions to reopen the runway following the occurrence.

1.16. Tests and research.

During the takeoff roll, the alarm panel displayed the warning HYDRAULIC Y RSVR LO LVL.

The flight crew chose to reject the takeoff at approximately 90 kt, still within the lowenergy phase (below 100 kt for the A320 fleet).

Subsequent examinations following the accident revealed that a small component of one of the hydraulic system sensors had detached from the assembly and fallen into the oil reservoir, triggering the HYDRAULIC Y RSVR LO LVL warning light. Therefore, it was a case of an indication problem, with no actual fluid leakage.

The faulty sensor was original to the aircraft.

No other issues were identified in the aircraft's yellow hydraulic system.

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Eaton Aerospace Group, the sensor manufacturer, was unable to determine the cause of the component's detachment but reported having no previous records of similar occurrences.

Airbus S.A.S. also informed the Investigation Team that there were no reports of service difficulties related to malfunctions of the sensors comprising the A320's hydraulic system.



Figure 4 – On the right, the component of the hydraulic system sensor that detached and fell into the oil reservoir, causing the low-level warning light of the yellow hydraulic system to illuminate.

The pieces of the aircraft's internal communication equipment, PA and interphones, were tested after the occurrence by the airline's maintenance team and functioned normally.

1.17. Organizational and management information.

The aircraft was operated by *Azul Linhas Aéreas Brasileiras* and was being employed for a scheduled company flight.

The crew assigned to that flight consisted of two pilots and four flight attendants. This composition complied with the procedures prescribed by current legislation and company policy.

The roster for the assigned crew scheduled a total of eight flight legs over three days. The two flights conducted the previous day were the first occasions in which this crew had worked together.

According to interviews conducted by the Investigation Team, the organizational climate within the company was reported by the pilots as good.

The flight attendants noted that the work environment was somewhat stressful due to the COVID-19 pandemic and its resulting implications for the aviation sector.

Training for both pilots and flight attendants was assessed as very good by the interviewees.

According to reports made to the Investigation Team, during both initial and recurrent training provided by the company, regardless of aircraft type, the first procedure to be followed by flight attendants in the face of any abnormal situation was always the same: await instructions from the pilots.

According to the flight attendants, based on the Flight Attendants' Manual (MCMSV) and the training received, evacuation procedures were considered an extreme measure to preserve the lives of the aircraft's occupants.

With regard to procedures related to cabin coordination with the pilots in the event of an RTO and emergency evacuation, the flight attendants reported that they believed they had received adequate training to deal with such an emergency situation.

Based on information gathered by the Investigation Team, the training provided by the company included topics related to RTO and aircraft evacuation, for both pilots and flight attendants.

The training given to flight attendants covered initial actions to be taken in the event of an RTO, the importance of maintaining a high level of situational awareness, and the hierarchy and evidence-based criteria to be considered when making a decision about an emergency evacuation, if required.

During the interviews, the flight attendants confirmed that, according to the training received, when the aircraft was stationary on the ground, they should await instructions from the PIC. If evacuation was required, the PIC would use the voice command "Echo Victor, Echo Victor" via PA, and only after this command should they proceed with evacuation.

Furthermore, evacuation could only be initiated by the flight attendants without the PIC's authorization if the pilots were found to be unconscious—confirmed after opening the cockpit door—or if there were uncontrollable signs of fire or smoke inside or outside the aircraft, structural breakage of the fuselage, or a water landing.

The flight attendants also confirmed that, according to the procedures set out in the manual, the first criterion for evacuation on land was that the aircraft had to be completely stopped with both engines shut down. In other words, they should only begin evacuation after verifying that the engines were no longer running and that the aircraft was fully stopped on the runway.

Although aware of the above criteria, the flight attendants reported that some difficulties arose due to the reaction of certain passengers who panicked immediately following the RTO. In the crew's perception, this behavior may have led the CC to initiate the evacuation, even without the prescribed parameters.

Nevertheless, despite the passengers' behavior, the flight attendants acknowledged that the correct procedure in the event of panic and commotion was to try to control the situation and instruct the passengers to remain seated, awaiting further instructions.

With regard to cabin coordination procedures during an RTO and communication with the flight attendants, the pilots reported that they had received adequate training to manage the emergency.

According to the research conducted, the training provided to pilots addressed, among other aspects, the importance of communication and coordination between the flight crew, flight attendants, and passengers during an RTO, with the objective of maintaining control of the situation and raising situational awareness for a possible evacuation.

The analysis of the theoretical and practical evaluation history of the pilots and flight attendants, carried out by the Investigation Team, did not reveal any deficiencies in the execution of emergency procedures related to RTO and aircraft evacuation.

With regard to the emergency interphone call from the cockpit during an RTO, it was found, based on information from the company's Safety and Training departments, to be a discretionary procedure on the part of the PIC, depending on the urgency of the communication and the coordination required with the flight attendants.

For example, in an RTO prompted by an indication of smoke or fire in the lavatory, the PIC should reject the takeoff, issue the "await instructions" message, and make an emergency interphone call to confirm with the flight attendants whether the indication was real or spurious. That is, the emergency call would be necessary to obtain quick feedback from the cabin crew regarding the lavatory conditions and, subsequently, take appropriate action.

In contrast, in an RTO prompted by a Bleed Overheat indication, the pilot should only abort the takeoff and issue the "await instructions" message, without making an emergency interphone call, as there would be no need to obtain additional information from the flight attendants regarding the event.

1.18. Operational information.

It was a passenger transport flight under the requirements of the Brazilian Civil Aviation Regulation n^o 121, Amendment 14, which governs public air transport operations with airplanes having a maximum certified seating configuration of more than 19 passenger seats or a maximum payload capacity exceeding 3,400 kg, on the SBCY – SBGR segment.

The intended route, according to the IFR flight plan, called for departure from SBCY at 06:00 UTC, bound for SBGR.

The phases prior to the takeoff roll proceeded normally.

During the takeoff roll on Runway 35 at SBCY, the pilots received a low-level warning for the yellow hydraulic system (HYDRAULIC Y RSVR LO LVL) and rejected the takeoff.

According to the FDR, the rejected takeoff occurred during the low-energy phase, at a speed of approximately 90 kt (Figure 5).



After the aircraft came to a complete stop on the runway, an evacuation occurred without command from the pilots, while the engines were still running at idle power.

CVR data indicated that at 06:04:32 (UTC), immediately after the rejected takeoff, the PIC communicated with the flight attendants and passengers via PA, instructing them to wait for further instructions.

Subsequently, while performing cockpit procedures and coordinating with TWR-CY, the pilots were surprised by the passengers disembarking, initially through the front left door, with the engines still running and without the command "Echo Victor, Echo Victor" having been given, as specified in the company's manuals for commanded evacuation situations.

Analysis of the FDR and CVR showed the following sequence of events during the RTO:

At 06:04:08 UTC, the ECAM issued the HYD Y RSVR LO LVL warning and the PIC commanded the RTO;

At 06:04:21 UTC, the aircraft came to a stop on the runway following the rejected takeoff;

At 06:04:32 UTC, the PIC instructed the flight attendants via PA to await instructions;

At 06:04:58 UTC, the 1L door and slide (DOOR FWD L) were opened;

At 06:05:00 UTC, the PIC attempted to contact the Cabin Chief via interphone, unsuccessfully;

At 06:05:09 UTC, the 1R door and slide (DOOR FWD R) were opened;

At 06:05:16 UTC, the 4L door and slide (DOOR AFT L) were opened;

At 06:05:17 UTC, the 4R door and slide (DOOR AFT R) were opened;

At 06:05:21 UTC, the rear right emergency exit (Emer Exit AFT R) was opened;

At 06:05:25 UTC, the front left emergency exit (Emer Exit FWD L) was opened;

At 06:05:28 UTC, the rear left emergency exit (Emer Exit AFT L) was opened;

At 06:05:32 UTC, the front right emergency exit (Emer Exit FWD R) was opened;

At 06:07:28 UTC, the cockpit door was opened;

At 06:09:39 UTC, the pilots realized that the engines were still running and proceeded to shut them down.

The 1L, 1R, 4L, and 4R doors were opened by the flight attendants.

The emergency exits AFT R, FWD L, AFT L, and FWD R were opened by passengers seated in rows 10 and 11, five seconds after the flight attendants had opened doors 1L, 1R, 4L, and 4R (Figure 6).

	Sequência de abertura das portas e saídas de emergência		
	1	1L (DOOR FWD L)	06h04min58seg
6 8	2	1R (DOOR FWD R)	06h05min09seg
7 5	3	4L (DOOR AFT L)	06h05min16seg
	4	4R (DOOR AFT R)	06h05min17seg
	5	Emerg Exit AFT R	06h05min21seg
	6	Emerg Exit FWD L	06h05min25seg
	7	Emerg Exit AFT L	06h05min28seg
	8	Emerg Exit FWD R	06h05min32seg

Figure 6 – Sequence of door and emergency exit openings.

After shutting down the engines, the pilots requested support from TWR-CY for initial assistance and transport of the passengers to the airport terminal.

1.19. Additional information.

Chapter 3 – Emergency Procedures, Evacuation section, of the MCMSV provided the following information:

The decision to evacuate all occupants from an aircraft in under 90 seconds is extremely difficult. Even during manufacturer training or certification sessions, conducted in controlled environments, participants may sustain injuries. Nonetheless, critical situations may compel the crew to initiate an evacuation as an extreme measure to preserve the lives of the aircraft's occupants.

3.13.1. Hierarchy

The *technical crew*² relies on all available training, experience, and indicators to ensure the safety of the aircraft and its occupants. Once the aircraft is stationary on the ground, the captain may decide to initiate an evacuation. While awaiting the captain's decision, all flight attendants must maintain situational awareness and assess the conditions in their respective areas. If there is no indication of an evacuation (see next item) and signs of unrest among passengers arise, issue the command: "*Permaneçam sentados* / Remain seated."

Upon determining that evacuation is necessary, the captain shall use the command voice:

"ECHO VICTOR, ECHO VICTOR"

Upon hearing this command from the flight deck, proceed with the evacuation.

3.13.2. Evidence

Undeniable signs of an evacuation are referred to as evidence. Once an aircraft has come to a complete stop on the ground with the engines shut down, proceed with an evacuation if one or more of the following three signs is present:

- Uncontrollable fire and/or smoke inside or outside the aircraft;
- Fuselage rupture; and
- Final landing in water.

² The Airline company's manual utilized the term "technical crew" when referring to "flight crew".

3.13.3. Ground Evacuation Technique

Techniques in Action

1. Aircraft completely stopped with engines shut down;

2. If there is evidence or a command hierarchy indicated by ECHO VICTOR, ECHO VICTOR, leave your seat while giving the command: "Soltem os cintos e saiam / Release your seat belts and get out";

3. Assess the external area: check for fire, spilled fuel, and debris;

4. Grasp the evacuation station handle (on the ATR, hold onto the handhold), open the emergency exit, and verify the inflation of the slide (on the ATR, check the condition of the exit). Only if the slide does not inflate automatically, pull the manual inflation handle;

5. As soon as it is confirmed that the slide is inflated (through the cessation of Venturi noise and visual confirmation), or at exits without slides (once the exit is ready for use), give the command: "*Por aqui, por aqui /* This way, this way";

6. Instruct the occupants near the exit: "*Pulem*, *pulem* / Jump, jump." Continuously reassess the integrity of the slide and the safety of the evacuation route;

7. On aircraft equipped with overwing exits, give the command: "Abram as janelas sobre as asas / Open the overwing exits";

8. Conduct the abandonment check;

9. If the evacuation is performed outside airport infrastructure, take along the designated emergency equipment.

[...]

NOTE

The voice command to open the emergency exits over the wings may be issued at the point indicated above or at the most appropriate moment during the evacuation. What matters is that the emergency exits over the wings are opened as quickly as possible if evacuation is required.

[...]

3.13.5. Abnormal Ground Event

When faced with an aircraft on the ground due to abnormal events such as those described above, the flight attendant shall wait for the aircraft to come to a complete stop. After assessing for approximately 5 seconds whether there is no evidence of evacuation and no communication from the flight crew such as "*Atenção*, *Aguardem Instruções /* Attention, Standby for Instructions" or any other message from the flight deck, the flight attendants shall attempt to contact the pilots via the interphone system. If unsuccessful, the flight attendant closest to the cockpit door, and in condition to do so, will begin the external opening of that door. Depending on the door model used in the fleet, around 30 seconds after the external panel request is made — and if not inhibited internally — the door will open. If the flight attendant. The attendant will follow the procedure applicable to the aircraft model to operate the fire handles and, if present, activate the Evac command on aircraft equipped with this feature.

In the event of an emergency landing outside of airport infrastructure and with the flight crew unconscious, the flight attendant shall follow the procedure for the aircraft model to operate the fire handles, activate the fixed ELT (if the pilots did not activate it during the emergency landing procedure), and, if available, activate the Evac command on aircraft equipped with this resource.

NOTE

The procedure described above shall only be carried out if the flight crew members are unconscious.

Subsequently, evacuation shall be commanded using the verbal instruction "Release your seat belts and get out", followed by the evacuation techniques.

ATTENTION

It is essential to clearly identify that the aircraft has come to a complete stop. It is very common for an initial impact to be followed by additional impacts. Make sure the aircraft is completely stopped and the engines are shut down.

Upon arriving at the flight deck, if the flight crew is conscious, they will be experiencing a high workload. Flight attendants must be present but should not interrupt the pilots' procedures.

If signs of unrest among passengers appear, remember to use the command voice: "PERMANEÇAM SENTADOS / REMAIN SEATED".

[...]

3.13.6. Engine Shutdown

If an evacuation is initiated due to evidence, and you notice that the engines are still running, establish communication with the flight deck. If the technical crew is found to be unconscious, proceed as follows:

If the emergency landing occurred at an airport: operate the fire handles and, if available, activate the Evac command on aircraft equipped with this feature; and

If the emergency landing occurred outside of airport infrastructure: operate the fire handles, activate the fixed ELT (if the pilots did not activate it during the emergency landing procedure), and, if available, activate the Evac command on aircraft equipped with this feature.

After that, the crew member shall command the evacuation using the voice command: "*Soltem os cintos e saiam* / Release your seat belts and get out," followed by standard evacuation techniques.

3.13.7. Landing in an Abnormal Attitude

If the aircraft lands in an abnormal attitude and there is no evidence or command to evacuate based on hierarchy, the voice command: ""*Atenção, aguardem instruções* / Attention, Standby for Instructions" may be issued from the flight deck. Remain alert and maintain a high level of situational awareness.

The flight crew's workload is extremely high at this moment. For various reasons, it is possible that we may not receive the instruction "*Atenção, aguardem instruções*" / "Attention, Standby for Instructions." In that case, establish communication with the flight deck using all available means: interphone and cockpit door opening.

Remember: if necessary, use the command "*Permaneçam sentados /* Remain seated" to help contain possible unrest among the passengers.

[...]

3.13.8.5. Command Voices

Command voices are always affirmative, clear, spoken in a loud tone, and announced in both Portuguese and English. In addition to these two languages, the command voices are accompanied by hand gestures to ensure that all individuals can understand the message.

Foreign passengers need information during critical moments such as cabin preparation or an emergency evacuation. Even without fluency in English, all flight attendants must master and use the command voices in both Portuguese and English.

ATENÇÃO / ATTENTION

A VIDA DOS OCUPANTES DA AERONAVE - INCLUINDO A SUA - DEPENDE DE VOZES DE COMANDO. / THE LIVES OF THE AIRCRAFT OCCUPANTS — INCLUDING YOUR OWN — DEPEND ON COMMAND VOICES.

"SOLTEM OS CINTOS E SAIAM" / "RELEASE YOUR SEAT BELTS AND GET OUT" "POR AQUI, POR AQUI" / "THIS WAY, THIS WAY"

"PULEM, PULEM" / "JUMP, JUMP"

"USEM AQUELA SAÍDA" / "USE THAT WAY"

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"SOLTEM OS CINTOS, VISTAM OS COLETES E SAIAM" / "RELEASE YOUR SEAT BELTS, DON YOUR LIFE VESTS AND GET OUT"

"PARE, PARE" / "STOP, STOP"

"PERMANEÇAM SENTADOS" / "REMAIN SEATED"

"ABRAM AS JANELAS SOBRE AS ASAS" / "OPEN THE OVERWING EXITS"

[...]

ATENÇÃO

The command "PERMANEÇAM SENTADOS / REMAIN SEATED" shall be used if you perceive the need due to the onset of unrest among passengers.

In aircraft equipped with emergency exits over or under the wing, use the specific command at the most appropriate moment of the evacuation.

[...]

3.13.10. Improper Evacuation

Studies conducted by the NTSB (National Transportation Safety Board) and the FAA (Federal Aviation Administration) indicate that an evacuation may result in serious injuries to aircraft occupants. For this reason, the crew must make sound decisions and, based on scenario assessment, verify the presence of evacuation evidence and evacuation commands issued by the flight crew, thus characterizing an imminent evacuation.

To prevent the improper initiation of an emergency evacuation, situational awareness must be present, and awareness of the surroundings is of utmost importance.

The command to evacuate based on hierarchy must come from the technical crew. However, if the aircraft is in an abnormal and/or emergency situation, prepared or not, and it becomes obvious — through clear evidence — that an emergency evacuation is necessary, the flight attendant shall initiate the evacuation after ensuring that the engines are shut down and the aircraft is completely stopped.

Except under the conditions described above, if an improper evacuation is initiated by another flight attendant or even a passenger, immediately interrupt the improper evacuation using the command voice: "*PARE*, *PARE* / STOP, STOP." If possible, and if a flight attendant without an assigned exit is available, this attendant shall assess the situation and, if feasible, position themselves at the improperly opened exit with the intent to stop the evacuation using physical presence and the command voice, while remaining alert in case the evacuation needs to be restarted or recommanded. Flight attendants with assigned exits must remain near their respective stations and command the interruption of the evacuation using the respective command voice.

The captain must be immediately informed of the occurrence via emergency call.

THEREFORE:

If improper evacuation is identified – interrupt it using the command voice "*PARE*, *PARE* / STOP, STOP" and, if possible, block the exit.

Flight attendant without assigned exit – proceed to the opened exit, provided there is no attendant already assigned to that door or window, and block the exit safely. If a flight attendant is already at the improperly opened door/window, the unassigned attendant assists in interrupting the evacuation using the command voice and assesses the need to move to the exit to assist the colleague in blocking the door/window.

Flight attendant with assigned exit – remain at their station, block the exit, and command the interruption of the evacuation using the command voice "PARE, PARE / STOP, STOP." One of the attendants, preferably the Lead, shall command the interruption of the improper evacuation via PA or megaphone, in case the aircraft has no electrical power. Other attendants must use the command voice in a clear and loud tone.

Remember: You should only interrupt an evacuation initiated by another flight attendant if the interruption is clearly warranted. Use communication tools (interphone) to ensure there is no indication of a need for evacuation (hierarchy and/or evidence).

An improper evacuation initiated by passengers without a command from the crew must be stopped immediately.

[...]

The General Operations Manual (MGO), Volume 1, in its Chapter 9 – Emergency Operations, Emergency Evacuation section, contained the following:

The decision to evacuate an aircraft must be made calmly and rationally. An evacuation places aircraft occupants in a panic situation, which may result in serious issues if unrest ensues, such as injuries.

An evacuation must always be initiated when there is evidence or risk of fire on the aircraft, fuselage rupture, or whenever the captain deems it necessary.

9.12.1. Unjustified Evacuation

A failure to provide information to flight attendants and passengers during an emergency situation may lead to an unjustified evacuation. Flight attendants or passengers may initiate an evacuation if proper communication is not provided through the PA system from the flight deck. To prevent this, the captain must issue all required announcements via the PA.

9.12.2. Evacuation Based on Evidence

An evacuation is considered evident when:

- There is uncontrollable fire and/or smoke (inside or outside the aircraft);
- There is a fuselage rupture; and
- The operation ends in a water landing.

In such cases, an evacuation shall begin after the aircraft comes to a complete stop, without the need for an explicit command.

9.12.3. Commanded Evacuation

If, after the aircraft comes to a stop, whether in a prepared or unprepared emergency, the fuselage remains intact (i.e., no rupture), even in the case of an abnormal attitude (e.g., landing gear collapse), or fire in the engine or APU, an evacuation shall only be initiated by command. This command shall be given by the on-board chain of command.

In an abnormal situation, after the aircraft has come to a stop, and as soon as feasible, the captain shall announce over the PA system:

"ATENÇÃO, AGUARDEM INSTRUÇÕES / ATTENTION, STANDBY FOR INSTRUCTIONS"

This communication indicates that the pilots are interacting and attempting to resolve the situation. Flight attendants shall remain at their stations conducting a mental review of the procedures expected in such situations. Two outcomes are possible:

a. The situation is brought under control;

b. The situation remains uncontrolled and, consequently, an evacuation becomes necessary.

When faced with an aircraft on the ground due to abnormal events such as those described above, the flight attendant shall wait for the aircraft to come to a complete stop. After evaluating for approximately 5 seconds whether there is no evidence of evacuation and no communication from the flight crew — such as "*Atenção*, *Aguardem Instruções*" "Attention, Standby for Instructions" — or any other message from the flight deck, flight attendants shall attempt to contact the pilots via the interphone system. If unsuccessful, the flight attendant closest to the cockpit door and in adequate condition shall initiate external opening of that door. Depending on the door model in the fleet, approximately 30 seconds after the external panel request — if not internally inhibited — the door will open. Upon identifying that the

flight crew is unconscious, the authority to initiate the evacuation shall rest with the flight attendant. The attendant shall follow the procedures corresponding to the aircraft model, operating the fire handles and commanding the evacuation using the voice command "*Soltem os cintos e saiam* / Release your seat belts and get out" followed by standard evacuation techniques.

NOTE

It is essential to clearly identify that the aircraft has come to a complete stop. It is very common for an initial impact to be followed by additional impacts. Make sure the aircraft is completely stopped.

Upon arriving at the flight deck, if the technical crew is conscious, they will be experiencing a high workload. Flight attendants must be present and must not interrupt the pilots' procedures.

9.12.3.1. Controlled Situation

After the instruction to await further instructions, the pilots will begin the procedures intended to resolve the problem, which may take several minutes.

When the situation is under control and no further risks are present, the captain shall announce via PA:

"Tripulação, SITUAÇÃO CONTROLADA / Crew, SITUATION UNDER CONTROL."

At that point, the pilots will begin managing the next steps, such as determining whether the aircraft is able to taxi under its own power.

At the first opportunity, the captain will contact the flight attendants to assess the condition of the passenger cabin and to inform passengers about the situation.

9.12.3.2. Necessary Evacuation

The order to initiate an emergency evacuation shall be given by the captain via the PA system. In the event the captain is incapacitated, this order shall be given according to the chain of command among qualified crew members.

The timing for initiating an evacuation shall follow the checklist specifications to ensure that all necessary items are completed and the aircraft is prepared for evacuation.

The verbal command to initiate evacuation shall be delivered via the PA system using the following phraseology:

"ECHO VICTOR, ECHO VICTOR"

Upon receiving the evacuation order, flight attendants shall assess internal and external conditions at their stations to determine the operational viability of an emergency evacuation, including evaluation of exits below the waterline, fire, spilled fuel in the surrounding area, or debris obstructing the flow of people or slide deployment.

Regarding Rejected Takeoff (RTO) Procedures, the MCMSV established the following in Chapter 3 – Emergency Procedures:

Section 3.3. REJECTED TAKE OFF (RTO)

Indicators in the flight deck or the identification of imminent risks to aircraft operation during the takeoff roll may lead the flight crew to abort the takeoff. A rejected takeoff, or RTO (Rejected Takeoff), is a procedure that requires heightened awareness and communication between flight attendants and pilots.

Maintain a high level of situational awareness and continuously assess for any signs of evidence or a command to evacuate from the flight deck. Always attempt to establish communication to confirm command hierarchy in this situation. Remember that the flight crew's workload is very high at this time.

1.20. Useful or effective investigation techniques.

NIL.

2. ANALYSIS.

This was a scheduled passenger transport flight between SBCY and SBGR, with six crew members and 152 passengers on board, departing at night.

The Investigation Committee initially verified that all operational requirements related to the crew and the aircraft were in accordance with the regulations issued by the Brazilian Civil Aviation Authority.

The meteorological conditions were above the minimums required for the flight.

The navigation aids showed no technical anomalies, and communications between the aircraft and air traffic control units occurred without incident.

The aircraft was within the weight and balance limits specified by the manufacturer, and there were no pre-existing technical conditions that could have contributed to the occurrence.

The phases preceding the takeoff unfolded normally.

During the takeoff roll from runway 35 at SBCY, the pilots received a low oil level warning for the yellow hydraulic system and aborted the takeoff.

After the aircraft came to a complete stop on the runway, the passengers initiated an evacuation without orders from the pilots and while the engines were still running at idle.

During the evacuation, 14 passengers sustained minor injuries and one passenger sustained serious injuries.

Post-accident examinations showed that a small component of one of the hydraulic system sensors had detached from the main part and fallen into the oil reservoir, triggering the HYDRAULIC Y RSVR LO LVL warning light. It was, therefore, an indication issue, with no actual leakage.

When consulted about this failure, the sensor manufacturer reported being unable to identify the cause of the component detachment and added that there had been no previous reports of similar occurrences.

Likewise, Airbus S.A.S. stated that there were no service reports of malfunctions involving the hydraulic system sensors in the A320 fleet.

Thus, this failure was not characterized as a latent unsafe condition requiring corrective action.

The medical facilities used to treat the passengers were located in *Várzea Grande*, State of *Mato Grosso*, less than 2.5 km from the airport, and were part of the support resources provided for in the aerodrome's Emergency Response Plan (PLEM).

Based on the data collected by the Investigation Committee, all procedures outlined in the aerodrome's PLEM were executed as planned.

Data retrieved from the CVR and FDR indicated that the pilots correctly executed the rejected takeoff (RTO) procedures outlined in the Airbus A320 QRH when the hydraulic yellow low level indication was observed.

Eight seconds after initiating the rejected takeoff, with the aircraft under control, the First Officer reported to TWR-CY that the aircraft was stopping on runway 35.

At 06:04:32 UTC, the Captain instructed passengers and flight attendants via the PA to await further instructions. According to statements collected, this message was not understood by the flight attendants, possibly due to initial unrest among some passengers who believed there was fire outside the aircraft.

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At 06:04:58 UTC, door 1L was opened by the Lead Flight Attendant (CC). Subsequently, the other flight attendants followed the CC's action and opened their respective doors while the engines were still running, without any command from the flight crew and without verifying the conditions that would warrant an evacuation without command (i.e., evacuation based on evidence).

Figure 7 summarizes the sequence of actions taken by pilots and flight attendants during the RTO followed by the evacuation:



Figure 7 – Timeline and sequence of the RTO followed by evacuation of PR-YRH on runway 35 at SBCY.

In general, as described in item 1.19 – Additional Information, both the General Operations Manual (MGO) and the MCMSV provided the necessary guidance on procedures to be followed by crew members in the event of an RTO and aircraft evacuation.

The MCMSV, Evacuation section, Chapter 3 – Emergency Procedures, presented the two criteria for making the decision to evacuate the aircraft following an abnormal event: hierarchy and evidence.

Regarding the hierarchy criterion, the MCMSV stated that, following an abnormal event such as a rejected takeoff, flight attendants should maintain heightened situational awareness, assess the situation in their area, and await instructions from the pilots.

If evacuation was necessary by the Captain's decision (evacuation by hierarchy), he should announce the command "Echo Victor, Echo Victor" via the PA. Upon hearing this command, flight attendants were to immediately begin the evacuation procedures.

The manual also advised that, if there were no signs of evacuation or command from the Captain and unrest began among the passengers, the flight attendants should control the situation and loudly command: "*PERMANEÇAM SENTADOS* / REMAIN SEATED."

Regarding the evidence criterion, the MCMSV established that, once the aircraft had come to a complete stop on the ground and the engines were shut down, the flight attendants should proceed with evacuation — without a command from the pilots — if one or more of the following three signs were present:

- Uncontrollable fire and/or smoke inside or outside the aircraft;

- Fuselage rupture; and
- Final landing in water.

Item 3.13.5 – Abnormal Ground Event of the MCMSV also instructed that, when faced with an aircraft on the ground due to an abnormal event, such as an RTO, flight attendants should wait for the aircraft to come to a complete stop, assess for five seconds the absence of any evidence of evacuation, and, in the absence of communication from the flight deck, attempt to contact the pilots via the interphone system. If this attempt failed, the flight attendant closest to the cockpit door should begin opening it from the outside. Finally, if the pilots were unconscious, the authority to initiate the evacuation would fall to the Lead Flight Attendant (CC).

It is also important to highlight that item 3.13.10 – Improper Evacuation of the MCMSV emphasized the importance of situational awareness among flight attendants in order to prevent an emergency evacuation from being initiated unnecessarily.

According to the manual, an evacuation could result in serious injuries to the aircraft occupants. For that reason, the crew should make sound decisions and, based on scenario assessment, determine whether there was evidence of evacuation or communication from the pilots indicating an imminent evacuation. The command to evacuate based on hierarchy should always originate from the PIC.

If the aircraft were in an abnormal or emergency condition and it became obvious — through clear evidence — that an emergency evacuation was necessary, the CC should initiate the evacuation only after confirming that the aircraft had come to a complete stop and that the engines had been shut down.

The MCMSV further instructed that, except under the conditions described above, when an improper evacuation was initiated by another flight attendant or even by passengers, flight attendants should immediately interrupt the procedure using the voice command: "*PARE*, *PARE* / STOP, STOP."

For better understanding, Figure 8 presents a flowchart that summarizes the procedures outlined in the MCMSV for crew decision-making regarding emergency evacuation.



Figure 8 – Procedures outlined in the MCMSV for crew decision-making during emergency evacuation.

The General Operations Manual (MGO), Chapter 9 – Emergency Operations, Emergency Evacuation Section, emphasized that failures in providing information to flight attendants and passengers during an emergency situation could lead to an unjustified evacuation.

This publication stressed that, in the absence of proper communication from the flight deck via the PA system, flight attendants or passengers could initiate an unjustified evacuation. To prevent this from happening, the PIC was expected to make all required announcements via the PA.

Item 9.12.3 – Commanded Evacuation stated that, after the aircraft had come to a complete stop, whether in a prepared or unprepared emergency, if the fuselage was intact (i.e., without ruptures), even if the aircraft was in an abnormal attitude (such as landing gear collapse), or even with fire in the engine or the Auxiliary Power Unit (APU), an evacuation should only be initiated by command through the onboard chain of command.

The MGO also emphasized that, in an abnormal situation, after the aircraft had come to a stop, the PIC should inform the flight attendants and passengers as soon as possible, via the PA, that they should wait for instructions, using the expression: "*ATENÇÃO, AGUARDEM INSTRUÇÕES / ATTENTION, STANDBY FOR INSTRUCTIONS.*"

This communication would indicate that the pilots were conscious and adequately managing the situation.

Flight attendants should remain at their stations, conducting a mental review of the procedures expected in such a scenario, which could unfold in one of two ways:

- the situation is brought under control, with no need for evacuation; or

- the situation remains uncontrolled, and, consequently, an evacuation becomes necessary.

MGO's Item 9.12.3.2 – Necessary Evacuation, similarly to the MCMSV, stated that the order to initiate an emergency evacuation should be given by the PIC via the PA system. In the event the PIC became incapacitated, the order should be given according to the chain of command among qualified crew members, namely: First Officer (SIC), Lead Flight Attendant (CC), and the remaining flight attendants.

The verbal command to initiate evacuation should be issued via the PA system using the following phraseology: "*Echo Victor*, *Echo Victor*." Upon receiving the evacuation order, flight attendants should assess the internal and external conditions at their stations regarding their operability for an emergency evacuation, including: exits below the waterline, presence of fire, fuel spillage in the external area, or debris obstructing the flow of people or the deployment of the slide.

For better understanding, Figure 9 presents a flowchart that summarizes the procedures outlined in the MGO for an RTO with the aircraft controlled on the runway and with no criteria for evacuation based on evidence.



Figure 9 – Procedures outlined in the MGO for an RTO with the aircraft controlled on the runway and with no criteria for evacuation based on evidence.

Based on the data gathered by the Investigation Committee, and analyzing the actions of the flight attendants in light of the guidance contained in the MCMSV (summarized in

Figure 8), it was found that, following the RTO, the cabin crew failed to observe two requirements which, had they been fulfilled, might have prevented the improper evacuation:

- the conditions that would characterize an evacuation based on evidence were not confirmed; and
- in the absence of communication from the flight deck, all means to establish contact with the pilots were not exhausted.

With regard to the pilots' actions, based on an analysis of the procedures adopted in light of the provisions in the MGO (summarized in Figure 9), it was concluded that the instruction issued by the PIC via the PA system for flight attendants and passengers to await further instructions after the RTO was not understood.

Had this communication from the pilot reached its intended recipients, it would have indicated that the situation was under control, thus avoiding panic among passengers and enabling flight attendants to contain the initial unrest that followed the rejected takeoff.

Considering the circumstances of the occurrence, it was inferred that the failure of the flight attendants to receive the PIC's message via PA immediately after the RTO, combined with the unrest initiated by some passengers who believed there was fire outside the aircraft, led the Lead Flight Attendant (CC) to believe that the best decision at that moment was to initiate an evacuation based on evidence, without a command from the PIC.

Thus, the events following the RTO created a crisis scenario that was exacerbated by a breakdown in communication between the flight deck crew and the cabin crew, due to limitations in the ability of the recipients (flight attendants and passengers) to comprehend the information. This, in turn, contributed to inefficient task management and the initiation of an improper evacuation.

As such, failures and/or misunderstandings in communication and interaction among crewmembers, associated with noncompliance with the operational procedures established in the company's manuals, resulted in inefficient use of the available human resources to manage a situation encountered by a qualified and adequately trained crew — which contributed to this accident.

In this context, there was a degradation in the quality of the decision-making process, influenced by a misjudgment regarding the actual condition of the aircraft and the pilots in the flight deck, as well as by the bias caused by the uncontrolled unrest in the passenger cabin, which contributed to this accident.

Therefore, throughout the course of this investigation, it was determined that the company's manuals and the training provided to pilots and flight attendants included all the necessary information and procedures to deal with an RTO and to prevent an undesired evacuation. Nonetheless, isolated failures in the areas of communication, decision-making, cabin coordination, and a low level of situational awareness contributed to the outcome of this aeronautical occurrence.

Finally, the crew may have experienced a state of low situational awareness, as they failed to properly perceive the possible developments of the situation they were facing. This condition was possibly a result of the crew's daily routine operating regular airline flights under a highly automated environment.

3. CONCLUSIONS.

3.1. Findings.

- a) the pilots and flight attendants held valid CMAs (Aeronautical Medical Certificates;
- b) the pilots held valid type ratings for the A320 aircraft (which included the A320-251N model), as well as MLTE and IFR ratings;

- c) the pilots and flight attendants were qualified and experienced in the type of flight;
- d) the aircraft had a valid CVA (Certificate of Airworthiness);
- e) the aircraft was within weight and balance limits;
- f) the records of the technical maintenance logbooks were up to date;
- g) the weather conditions were above the minimums required for flight;
- h) during the takeoff from Runway 35 at SBCY, the pilots rejected the takeoff due to a hydraulic yellow low level warning;
- i) it was determined that a small component of one of the yellow hydraulic system sensors detached and fell into the aircraft's oil reservoir, triggering the warning light;
- j) the rejected takeoff occurred at a speed of approximately 90 kt. during the low-energy phase;
- k) shortly after the rejected takeoff, a disturbance began on board, initiated by some passengers who believed there was fire outside the aircraft;
- I) the flight attendants reported that the pilots' communication via PA instructing to "await instructions" was not understood;
- m) after the complete stop on the runway, the aircraft was evacuated without command from the pilots, and with the engines still running at idle;
- n) the PIC was unable to contact the flight attendants via interphone due to the disturbance in the passenger cabin;
- according to the FDR, the first door opened was 1L (DOOR FWD L), which was under the responsibility of the CC. Subsequently, the other flight attendants followed the procedure initiated by him, opening doors 1R (DOOR FWD R), 4L (DOOR AFT L), and 4R (DOOR AFT R);
- p) approximately five seconds after the last door was opened, the passengers seated near the emergency exits opened Emer Exit AFT R and Emer Exit FWD L;
- q) the aircraft sustained no damage;
- r) during the evacuation, fourteen passengers sustained minor injuries and one passenger sustained a serious injury; and
- s) the crew and the remaining passengers were unharmed.

3.2. Contributing factors.

- Communication – a contributor.

The events that followed the RTO created a crisis scenario that was aggravated by difficulties in communication between the cockpit and the flight attendants, given the limitations in the ability of the receivers (flight attendants and passengers) to understand the information, contributing to the initiation of an unwarranted evacuation.

In the context of the situation experienced, a correct understanding of the scenario after the RTO would not have left the flight attendants uncertain about the appropriate procedure to be carried out at that time—namely, to contain the passengers' panic and keep them seated, awaiting instructions.

- Crew Resource Management – a contributor.

Failures and/or confusion in communication, combined with the failure to observe operational procedures established in the company manuals, led to inefficient use of available human resources to manage the situation experienced by a qualified and properly trained crew, which contributed to the accident in question.

- Team dynamics – a contributor.

The difficulty in interaction among team members (pilots and flight attendants) led to inefficient task management and a failure in team integration, including among the flight attendants themselves, which contributed to the occurrence of an unwarranted evacuation.

- Perception – undetermined.

It is possible that the routine nature of regular airline operations may have resulted in a reduced level of situational awareness among the crew and limited their ability to recognize, understand, and project the possible developments of the situation experienced during this occurrence, resulting in an unwarranted evacuation.

- Decision-making process – a contributor.

In the context of the events that occurred after the RTO, it was found that the quality of the decision-making process was compromised due to inadequate judgment of the aircraft's actual condition and the uncontrolled onset of panic in the passenger cabin, which contributed to this accident.

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".

To Brazil's National Civil Aviation Agency (ANAC), it is recommended:

A-133/CENIPA/2021 - 01

Issued on 06/23/2025

Disseminate the lessons learned from this investigation to air transport companies operating under the requirements of the RBAC 121, emphasizing the importance of cabin coordination and efficient, standardized communication between pilots and flight attendants, in order to avoid undesired evacuations and increase the level of situational awareness among crews.

A-133/CENIPA/2021 - 02

Issued on 06/23/2025

Disseminate the lessons learned from this investigation to the Brazilian Commercial Aviation Safety Team (BCAST), highlighting the importance of cabin coordination and efficient, standardized communication between pilots and flight attendants, in order to avoid undesired evacuations and increase the level of situational awareness among crews of airlines governed by the RBAC 121.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

Shortly after this aviation occurrence, the airline updated the Practical General Emergency (EGP) program to include the scenario of an unwarranted evacuation, with emphasis on the following aspects:

- evacuation based on evidence;
- situational awareness;
- the importance of communication between the pilot and passenger cabins; and

- the application of command voices.

Since the second half of 2022, pilots operating the company's Airbus A320 aircraft have been receiving guidance on proper communication and cabin coordination with flight attendants in RTO events.

The airline's Training Department created a Line Oriented Flight Training (LOFT) scenario involving an event similar to the one that occurred with PR-YRH at SBCY. The scenario consists of an RTO followed by an uncommanded evacuation.

The objective of the scenario is to enable pilots to practice, in the simulator, certain non-technical skills required to manage such a situation.

On June 23th, 2025.