COMANDO DA AERONÁUTICA

CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE ACIDENTES AERONÁUTICOS

FINAL REPORT
IG-127/CENIPA/2020

OCCURRENCE:	**SERIOUS INCIDENT**
AIRCRAFT:	**PR-MYW/PT-OLF**
MODEL:	**A320-214/PA-31T1**
DATE:	**13OUT2020**

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 October 13, 2020, serious incident involving the model A320-214 aircraft of registration marks PR-MYW, and the model PA-31T1 aircraft of registration marks PT-OLF. The occurrence was typified as "[MAC] Loss of Separation/Midair Collision."

The A320 aircraft (PR-MYW) was descending toward SBCY (*Marechal Rondon* Aerodrome, *Cuiabá*, State of *Mato Grosso*).

The PA-31T1 aircraft (PT-OLF) had departed from SBCY and was cruising on a heading opposite to that of the PR-MYW.

Near the boundary between the airspace under the jurisdiction of APP-CY (*Cuiabá* Approach Control) and the airspace controlled by ACC-AZ (*Amazonic* Area Control Center), the separation between the two aircraft dropped below the minimums established in regulations.

There was no damage to the airplanes involved.

The crews and passengers of both aircraft sustained no injuries.

Being the United States of America the State of design and manufacture of the PT-OLF aircraft, the USA's NTSB (National Transportation Safety Board) designated an accredited representative for participation in the investigation of the occurrence.

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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
ACC-AZ	Amazonic Area-Control Center
ACC-AZ R-PH	ACC-AZ's *Porto Velho* Control Region
APP-CY	*Cuiabá* Approach Control
ASST ACC-AZ	ACC-AZ's Assistant ATCO
ASST APP-CY	APP-CY's Assistant ATCO
ATC	Air Traffic Control
ATCO APP-CY	APP-CY's ATCO
ATCO ACC-AZ	ACC-AZ's ATCO
ATS	Air Traffic Service
CAOp	Letter of Operational Agreement
CENIPA	Center for the Investigation and Prevention of Aeronautical Accidents
CGNA	Air Navigation Management Center
CIV	Digital Pilot-Logbook
CMA	Aeronautical Medical Certificate
CVA	Certificate of Airworthiness
DECEA	Department of Airspace Control
FIR	Flight Information Region
GPS	Global Positioning System
ICA	Command of Aeronautics' Instruction
IFR	Instrument Flight Rules
IFRA	Instrument Flight Rating - Airplane
MEDEVAC	Aeromedical evacuation
METAR	Routine Meteorological Aerodrome Report
MLTE	Multi-Engine Landplane Class Rating
MNTE	Single-Engine Landplane Class Rating
NRef	Reference number
NTSB	USA's National Transportation Safety Board
PIC	Pilot in Command
PIMO	Program for Training and Maintenance of Operational Proficiency
PLA	Airline Transport Pilot License - Airplane
PPR	Private Pilot License - Airplane
PSNA	Air Navigation Service Provider
PSO-BR	Brazilian Civil Aviation Safety Program
RA	Resolution Advisory

REDEMET	Command of Aeronautics' Meteorology Network
RVSM	Reduced Vertical Separation Minima
SAGITÁRIO	Advanced System for Air Traffic Information Management and Operational Interest Reporting *(N.T: each letter of the acronym stands for a word of the definition in Portuguese)*
SBCY	ICAO location designator – *Marechal Rondon* Aerodrome, *Cuiabá*, MT
SBGR	ICAO location designator – *Guarulhos* (*Governador André Franco Montoro*) Aerodrome, *São Paulo*, SP
SBRD	ICAO location designator – *Maestro Marinho Franco* Aerodrome, *Rondonópolis*, MT
SBSR	ICAO location designator – Aerodrome of *São José do Rio Preto*, SP
SIC	Second in Command
SISCEAB	Brazilian Airspace Control System
SIGWX	Significant Weather Chart
SIPAER	Aeronautical Accidents Investigation and Prevention System
TCAS	Traffic Collision Avoidance System
TCU	Towering Cumulus Cloud
TMA	Terminal Control Area
TPP	Private Air Services Aircraft Registry Category
TPR	Regular Public Air Transport Service Aircraft Registry Category
UTC	Coordinated Universal Time
VMC	Visual Meteorological Conditions

1. FACTUAL INFORMATION.

Aircraft	**Model:** A320-214/PA-31T1 **Registration:** PR-MYW/PT-OLF **Manufacturer:** *Airbus S.A.S./Piper Aircraft*	**Operator:** TAM Linhas Aéreas S.A./Private.
Occurrence	**Date/time**: 13OUT2020 - 17:48 (UTC) **Location:** Airspace under jurisdiction of ACC-AZ **Lat.** 16°04'60"S **Long.** 055°29'22"W **Municipality – State:** *Cuiabá* - MT	**Type(s):** [MAC] Airprox/ACAS alert/loss of separation/(near) midair collisions

1.1. History of the flight.

Aircraft PR-MYW took off from SBGR (*Guarulhos – Governador André Franco Montoro* – Aerodrome, *São Paulo*, SP), bound for SBCY (*Marechal Rondon* Aerodrome, *Cuiabá*, MT) on a regular passenger transport flight with 162 POB (06 crew, 156 passengers).

Aircraft PT-OLF took off from SBCY, bound for SBRD (*Maestro Marinho Franco* Aerodrome, *Rondonópolis*, MT) on a private flight, with 04 POB (01 pilot, 03 passengers).

Aircraft PR-MYW was descending toward SBCY, while aircraft PT-OLF was in cruise flight on an opposite course.

At 17:48:24 UTC, both aircraft crossed paths with separation below the minimum safety standards established in regulations. After the crossing, the aircraft proceeded to their respective destinations without any further abnormalities.

1.2. Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	7	159	-

1.3. Damage to the aircraft.

There was no damage to the airplanes involved in the occurrence.

1.4. Other damage.

NIL.

1.5. Personnel information.

1.5.1. Crew's flight experience.

Hours Flown		
	PIC - PR-MYW	SIC - PR-MYW
Total	12,000:00	9,850:00
Total in the last 30 days	45:00	00:00
Total in the last 24 hours	02:15	04:30
In this type of aircraft	8,058:30	6,637:00
In this type in the last 30 days	45:00	00:00
In this type in the last 24 hours	02:15	00:50

Note: Flight time data relative to the crew of aircraft PR-MYW obtained through records of the pilots' CIVs (Digital Pilot-Logbooks).

Hours Flown	
	PIC - PT-OLF
Total	8,000:00
Total in the last 30 days	20:00
Total in the last 24 hours	01:00
In this type of aircraft	35:00
In this type in the last 30 days	20:00
In this type in the last 24 hours	01:00

Note: Flight time data regarding the pilot of aircraft PT-OLF obtained through an interview and statement provided by the very pilot.

1.5.2. Personnel training.

The Pilot in Command (PIC) of aircraft PR-MYW did his PPR course (Private Pilot – Airplane) in 2000.

The Second in Command (SIC) of aircraft PR-MYW did his PPR course in 2000.

The PIC of aircraft PT-OLF did his PPR course in 1998.

1.5.3. Category of licenses and validity of certificates.

The PIC of aircraft PR-MYW held a PLA License (Airline Transport Pilot – Airplane)) and had valid ratings for A320 type aircraft (which included the A320-214 model) and IFR-A (Instrument Flight Rules – Airplane).

The SIC of aircraft PR-MYW held a PLA License and had valid ratings for A320 type aircraft and IFR-A.

The PIC of aircraft PT-OLF held a PLA License and had valid ratings for MNTE (Single-Engine Land Airplane), MLTE (Multi-Engine Land Airplane), and IFR-A.

1.5.4. Qualification and flight experience.

The pilots were qualified and had experience in the types of flight involved.

1.5.5. Validity of medical certificate.

The pilots held valid CMAs (Aeronautical Medical Certificates).

The air traffic controllers on duty at ACC-AZ (*Amazonic* Area Control Center) and at APP-CY (*Cuiabá* Approach Control) at the time of the occurrence held valid Medical Certificates and all required ratings.

1.6. Aircraft information.

Aircraft PR-MYW, serial number 5240, was manufactured by Airbus in 2012. It was registered under the Private – Regular Public Air Transport Service (TPR) category.

The aircraft had a valid CVA (Certificate of Airworthiness).

The aircraft's maintenance records were up to date.

This aircraft was equipped with a Traffic Collision Avoidance System (TCAS).

Aircraft PT-OLF (serial number 31T-8004039) was manufactured by Piper Aircraft in 1980. It was registered under the Private Registry category – Private Air Services (TPP).

The airplane's CVA was valid, and the records of the airframe, engine, and propeller logbooks were up to date.

1.7. Meteorological information.

The routine Meteorological Aerodrome Reports (METAR) from SBCY, located approximately 40 NM from the location of the serious incident, provided the following information:

METAR SBCY 131700Z 04003KT CAVOK 38/16 Q1009=

METAR SBCY 131800Z 23005KT 9999 FEW030TCU 38/15 Q1007=

The reports indicated visibility greater than 10 km, few clouds at 3,000 ft., and presence of TCU (Towering Cumulus) clouds.

The Significant Weather Chart (SIGWX), valid at 06:00 UTC, forecast the presence of few TCU clouds with base at 7,000 ft. and tops at FL140, northwest of the State of *Mato Grosso*.

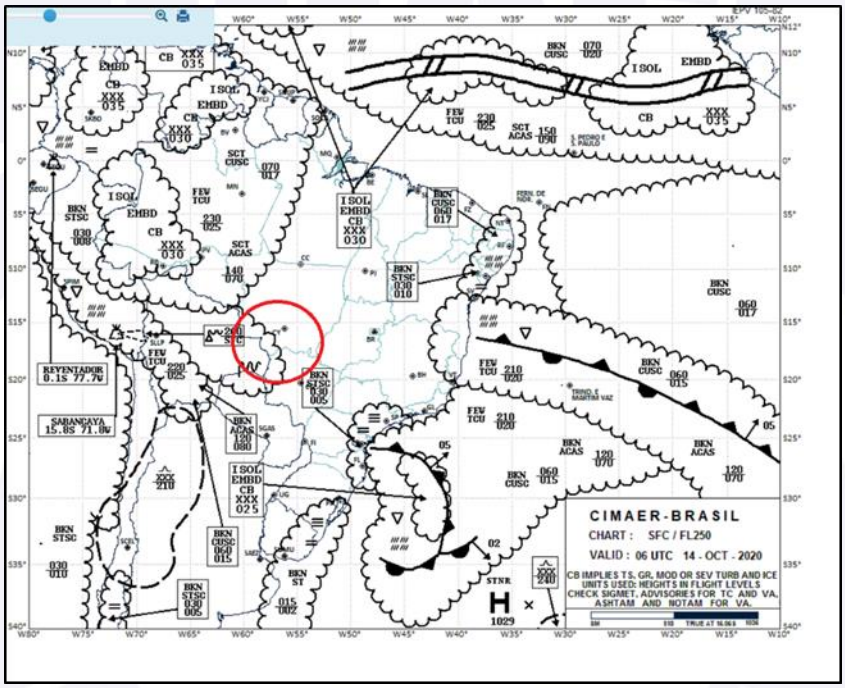

Figure 1 – SIGWX chart valid at 0600 UTC.
In red, the highlighted region where the incident occurred.
Source: adapted from the Aeronautics Command Meteorology Network (REDEMET).

The weather conditions were above the minimums required for both aircraft to operate under the applicable flight rules.

1.8. Aids to navigation.

The point at which the two aircraft came into close proximity was located within the Amazonic Flight Information Region (FIR), in lower airspace, outside an airway, at coordinates 16°04'60"S / 055°29'22"W.

All navigation aids were operating normally at the time of the occurrence.

1.9. Communications.

From the transcriptions of the audio recordings of communications between PR-MYW, PT-OLF, PR-BBZ, and the ATC units, one verified that the flight crews maintained radio contact with APP-CY and ACC-AZ, and that there were no technical anomalies in the communication equipment during the incident in question.

To support the analysis of the sequence of events that preceded the traffic conflict, the Investigation Committee highlighted selected transmissions, including telephone coordination between control units, which may assist in understanding the dynamics of the

serious incident. The time reference mentioned herein refers to *Coordinated Universal Time* (UTC). Communications between control units were carried out via TF-3 telephone line.

At 17:31:25, PT-OLF called APP-CY to report departure from runway 35.

At 17:31:31, APP-CY informed PT-OLF under radar contact after takeoff and instructed the aircraft to climb to FL130 following the KOKLI ONE ECHO SID.

At 17:31:35, the ASST APP-CY asked the ATCO ACC-AZ whether PT-OLF could be cleared to fly direct *Rondonópolis*.

At 17:31:39, the ATCO ACC-AZ replied affirmatively.

At 17:31:40, the ASST APP-CY informed the ATCO ACC-AZ that PT-OLF would maintain FL130.

At 17:31:41, the ATCO ACC-AZ expressed agreement.

At 17:35:24, PR-BBZ called APP-CY and reported climbing through 1,300 ft.

At 17:35:29, APP-CY responded to PR-BBZ, confirming radar contact after takeoff and instructed a climb to FL210 following the *Kokli One Echo* SID.

At 17:35:50, the ATCO ACC-AZ called PR-MYW.

At 17:35:52, PR-MYW responded and requested descent.

At 17:35:55, ACC-AZ cleared PR-MYW to descend to FL110.

At 17:35:58, PR-MYW read back, “FL110”.

At 17:40:39, APP-CY instructed PT-OLF to climb to FL130 and to contact ACC-AZ on 134.95 MHz (secondary frequency 125.25 MHz).

At 17:40:39, the ASST APP-CY asked the ATCO ACC-AZ the flight level to which PR-MYW was descending.

At 17:40:42, the ATCO ACC-AZ replied that PR-MYW was flying at FL110.

At 17:40:42, the Asst ATCO of APP-CY questioned whether FL110 had in fact been cleared and began to mention something about PT-OLF and PR-BBZ... but did not complete the sentence.

At 17:40:48, the ATCO ACC-AZ used expressions indicating acknowledgement and that he was considering the situation ... but did not complete his train of thought.

At 17:40:49, the ASST APP-CY began commenting, "they have the same..." and did not finish.

At 17:40:49, the ATCO ACC-AZ confirmed with a "yes".

At 17:40:50, the Asst ATCO of APP-CY seemed to complete the earlier sentence by referring to “his route,” without specifying to which aircraft he was referring.

At 17:40:52, the ATCO ACC-AZ said, “*estou vendo!*” (meaning, “I see it!”).

At 17:40:53, the ATCO ACC-AZ thanked.

At 17:40:56, PT-OLF called ACC-AZ.

At 17:41:01, ACC-AZ asked PT-OLF to stand by and then called PR-MYW to change its cleared level to FL140.

At 17:41:08, PR-MYW read back “restricted to FL140.”

At 17:42:31, the ASST APP-CY called the ATCO ACC-AZ.

At 17:42:32, he asked what ACC-AZ intended to do regarding PR-MYW and PT-OLF.

At 17:42:36, the ATCO ACC-AZ asked him to wait.

At 17:42:42, the ATCO ACC-AZ told the ASST APP-CY to "maintain heading" without specifying the aircraft.

At 17:42:45, the ASST APP-CY suggested directing PR-MYW to CY001 or UDUNU, and stated that PT-OLF was not the issue, but PR-BBZ was, as it was conducting a MEDEVAC and would maintain heading 149° after KOKLI.

At 17:42:48, PT-OLF called ACC-AZ.

At 17:42:57, the ASST ACC-AZ asked PT-OLF to stand by.

At 17:43:02, the ASST ACC-AZ called the ASST APP-CY and asked him to stand by, as he was just assuming the position on the occasion.

At 17:43:07, the ASST ACC-AZ asked the ASST APP-CY which aircraft should maintain heading.

At 17:43:15, APP-CY instructed PR-BBZ to climb restricted to FL120 to avoid traffic.

At 17:43:15, the ASST ACC-AZ transmitted something unintelligible, mentioned one of the flights was a MEDEVAC, said he would request or perform something, but the message was again unintelligible.

At 17:43:19, the ASST ACC-AZ informed the ASST APP-CY that he was told (possibly by the ATCO of ACC-AZ) to have PR-BBZ maintain heading and clear direct to destination once separation with PR-MYW was ensured, and asked whether PR-MYW was not the issue.

At 17:43:29, the ASST APP-CY asked the ASST ACC-AZ whether to maintain heading, without specifying the aircraft.

At 17:43:31, the ASST ACC-AZ confirmed.

At 17:43:31, the ASST APP-CY informed that he would restrict the aircraft in level (aircraft not specified) and asked whether he could instruct the aircraft to contact ACC-AZ.

At 17:43:36, the ASST ACC-AZ confirmed.

At 17:43:55, APP-CY instructed PR-BBZ to initially climb to FL120 and contact ACC-AZ on 134.95 MHz, with secondary frequency 125.25 MHz.

At 17:44:04, PR-BBZ read back, citing incomplete frequency numbers.

At 17:45:22, ACC-AZ called PR-MYW and instructed to contact APP-CY on 119.4 MHz, alternate frequency 120.35 MHz.

At 17:45:28, PR-MYW read back incomplete frequency numbers.

At 17:45:45, PR-MYW called APP-CY and reported being aware of ATIS information X-RAY.

At 17:45:46, the ASST ACC-AZ informed the ASST APP-CY that PR-MYW had been instructed to contact APP-CY, and that PR-BBZ would maintain FL120 and proceed direct to destination.

At 17:45:51, APP-CY replied to PR-MYW, instructing to squawk IDENT and descend to FL060 on heading to position UDUNU.

At 17:45:56, the ASST APP-CY asked for clarification regarding the "direct to destination" part of the previous message.

At 17:45:57, the ASST ACC-AZ confirmed, saying, “Yes, if possible.”

At 17:46:00, the ASST APP-CY asked whether PR-MYW would remain on APP-CY frequency and cross PR-BBZ, which was on ACC-AZ frequency.

At 17:46:05, ACC-AZ cleared PT-OLF to FL130 and requested the estimated time of arrival in *Rondonópolis*.

At 17:46:07, the ASST ACC-AZ, sounding nervous, called the ASST APP-CY and stated that one aircraft had just squawked IDENT, one was on APP-CY frequency and that PR-BBZ reported being unable to be vectored due to weather formations and chose to maintain FL120.

At 17:46:20, the ASST APP-CY reiterated his concern about aircraft being on different frequencies – one with APP-CY and another with ACC-AZ.

At 17:46:25, the ASST ACC-AZ asked whether PR-BBZ should be instructed to contact APP-CY.

At 17:46:28, the ASST APP-CY replied that it would be better to keep PR-MYW with ACC-AZ, but that it had already contacted APP-CY.

At 17:46:31, the ASST ACC-AZ agreed without offering alternatives.

At 17:46:33, the ASST APP-CY and the ASST ACC-AZ agreed to keep one aircraft at FL120 (referring to PR-BBZ).

At 17:46:36, the ASST ACC-AZ concurred.

At 17:47:00, APP-CY called PR-MYW.

At 17:47:02, PR-MYW responded.

At 17:47:03, APP-CY asked whether PR-MYW could maintain FL130 due to opposing traffic – MEDEVAC – on ACC-AZ frequency, maintaining FL120.

At 17:47:11, PR-MYW informed APP-CY that it would pass through FL130, but could return if desired.

At 17:47:21, PR-MYW confirmed it would return to FL130.

At 17:47:39, the ASST ACC-AZ called the ASST APP-CY.

At 17:47:39, the ASST APP-CY responded, without further information.

At 17:47:41, the ASST ACC-AZ again called ASST APP-CY, with no further content.

At 17:47:42, the ASST APP-CY informed the ASST ACC-AZ that PR-MYW had crossed PT-OLF and asked whether it (unspecified) was on ACC-AZ frequency.

At 17:47:48, the ASST ACC-AZ replied “no” and asked whether PR-MYW had called APP-CY.

At 17:47:52, the ASST APP-CY said the aircraft (referring to PT-OLF) was on ACC-AZ frequency.

At 17:47:54, the ASST ACC-AZ began stating the aircraft was cleared to FL14... but the message was blocked.

At 17:47:56, APP-CY instructed PR-MYW to descend, initially, and then immediately amended the clearance to FL120 due to conflicting traffic with ACC-AZ at FL130.

At 17:47:56, the ASST APP-CY called the ASST ACC-AZ, with the initial part unintelligible, then asked ACC-AZ to descend “the aircraft,” unspecified (likely referring to PR-MYW).

At 17:47:59, the ASST ACC-AZ said PR-MYW was... but did not complete the sentence.

At 17:48:02, the ASST APP-CY asked the ASST ACC-AZ whether he had received an alert, as one aircraft was two nautical miles from another at the same flight level.

At 17:48:05, the ASST ACC-AZ replied that PR-MYW was cleared to FL140.

At 17:48:11, the ASST APP-CY asked the ASST ACC-AZ to have ACC-AZ call PT-OLF.

At 17:48:13, the ASST ACC-AZ asked the ASST APP-CY to call PT-OLF.

At 17:48:15, ACC-AZ called PT-OLF.

At 17:48:29, ACC-AZ repeated the call.

At 17:48:32, PT-OLF confirmed it was on frequency.

At 17:48:40, PT-OLF reported to ACC-AZ that it had crossed a "*Boeing*" with 100 ft. separation at FL130.

At 17:48:46, ACC-AZ acknowledged and asked PT-OLF to stand by.

No technical anomalies were observed in the communication equipment of the Air Traffic Control (ATC) units or the aircraft involved in the occurrence, nor in the coordination systems.

1.10. Aerodrome information.

Not applicable: the serious incident was off-aerodrome.

1.11. Flight recorders.

NIL.

1.12. Wreckage and impact information.

NIL.

1.13. Medical and pathological information.

1.13.1. Medical aspects.

There was no evidence that physiological factors or incapacitation affected the performance of the air traffic controllers or flight crewmembers.

1.13.2. Ergonomic information.

NIL.

1.13.3. Psychological aspects.

The ATCO APP-CY had one year and one month of professional experience, and this was the first operational unit in which he had worked in his career.

The ASST APP-CY had two years and eight months of experience in the role of air traffic controller.

Both the ATCO ACC-AZ and the ASST ACC-AZ from had one year and four months of professional experience.

The APP-CY team began duty at approximately 17:20 UTC. At the time of the occurrence, the ATCOs had been in the operational position for approximately twenty-seven minutes, in what was the first afternoon subshift.

The ACC-AZ team was in the morning shift, with about thirty minutes remaining until the end of duty. No evidence of fatigue was identified in the controllers.

No evidence was found in the ACC-AZ or APP-CY rosters indicating work schedules exceeding the prescribed duty hours.

Some investigative elements related to psychological aspects are consolidated within the factual data in item 1.18 (Operational Information). This approach was adopted because,

in this occurrence, human and operational factors were intrinsically related, and the psychological evidence emerged organically from the documented operational context.

Therefore, keeping such information integrated with the other factual elements will contribute to a comprehensive understanding of the incident.

1.14. Fire.

There was no fire.

1.15. Survival aspects.

NIL.

1.16. Tests and research.

No evidence of malfunction or failures in the systems and equipment of the aircraft or of the ATC units was identified.

1.17. Organizational and management information.

Operation of *Cuiabá* Approach Control (APP-CY)

According to the Operational Model APP-CY 2019-01, the operational service team, as a whole, was responsible for the safe and efficient provision of Air Traffic Services and was required to comply with, and enforce compliance with, general air traffic regulations as well as the orders and procedures set forth in the following local documents:

- Operational Model;
- Operations Manual;
- NOTAMs;
- Letters of Operational Agreement; and
- Operational Notices.

The staffing of APP-CY teams was defined as follows:

- Controller;
- Assistant; and
- Instructor, when required.

The Reference Number (NRef) represented the optimal number of aircraft that a given ATC unit could simultaneously manage without, at any point, creating a workload overload for the ATCO.

The NRef for APP-CY was ten aircraft, as established by the Air Navigation Management Center (CGNA).

According to the Operational Model of ACC-AZ/2019, an Air Traffic Service (ATS) occurrence was categorized as AIRPROX when separation of less than 10 NM was observed within the airspace of FIR-AZ.

The APP-CY Manual 2019-01 was intended to supplement the contents of the unit's Operational Model through detailed descriptions of the technical and operational resources required for ATS provision, the organizational and functional structure, and additionally, local management guidelines.

Letter of Operational Agreement (LOA) – Transfer Procedures (Hand-Off) from APP-CY to ACC-AZ

According to the Letter of Operational Agreement that established the responsibilities and specific procedures regarding the transfer of communication and air traffic control between ACC-AZ and APP-CY, dated June 11, 2014, the term Hand-Off was defined as “the transfer of control of an aircraft through an automated transfer system.”

The Hand-Off process was initiated by the transferring unit, which, through the appropriate operation, executed the Hand-Off action, either manually or automatically, as indicated in the Data Display System.

According to the LOA, APP was responsible for initiating the Hand-Off of aircraft climbing to cruise levels at or below FL145 when such aircraft were 10 NM from the lateral boundary of the Terminal Control Area (TMA), simultaneously conducting the communication transfer and instructing them to contact ACC-AZ.

The 2014 LOA established in Chapter 2 – Coordination Procedures, item 2.1 – Radar Operations, subitem 2.1.3.3, the following requirement:

> Before initiating or accepting a Hand-Off, APP-CY must ensure that there is no risk of conflict.

1.18. Operational information.

The occurrence involved three passenger transport flights converging toward a crossing point within the airspace of the Amazonic Flight Information Region (FIR-AZ).

ACC-AZ provided ATS surveillance service through the *SAGITÁRIO* System. This system is a national software platform used by the Brazilian Airspace Control System (SISCEAB), which facilitates the work of air traffic controllers by processing data from various sources, generating alerts and reports, and integrating radar data with satellite information such as the Global Positioning System (GPS), thereby enhancing safety for traffic within FIR-AZ.

SAGITÁRIO displayed three types of system alerts to assist controllers in detecting potential conflicts within FIR-AZ:

a) Air-to-Ground conflict alert;

b) Air-to-Air conflict alert; and

c) Flight Plan conflict alert.

The Air-to-Air conflict alert was triggered when two or more tracks (term used in SISCEAB to indicate traffic displayed on radar, including position and trajectory) met the following conditions:

a) Horizontal separation equal to or less than 3 minutes from the conflict point;

b) Lateral separation equal to or less than 6.5 NM (slow convergence) or 10 NM (rapid convergence), as automatically calculated by the system;

c) Vertical separation:

- For RVSM-approved aircraft flying level in RVSM airspace, when the minimum separation was less than 680 ft.;
- For non-RVSM-approved aircraft, when separation was less than 1,200 ft.

A color code system was used to indicate each Flight Plan State, helping both controllers and supervisors to manage traffic. The color scheme was as follows:

COLOR	Status Description
BLUE	Flight plan in transfer (incoming)
WHITE	Active flight plan – non-controlled status
YELLOW	Flight plan with automatic transfer proposal
GREEN	Pre-active flight plan
BLACK	Controlled flight plan
RED	Non-RVSM flight plan operating within RVSM airspace
ORANGE	Flight plan in transfer (outgoing)
GREY	Flight plan server inoperative

Table 1 – Flight Plan Status Color System.
Source: Amazonic Area Control Center (ACC-AZ) Manual.

At 17:29:42 UTC, PR-MYW, flying from SBGR to SBCY via airway AM776 at FL360, made its first radio contact with ACC-AZ.

PT-OLF departed SBCY at 17:31:12 UTC and was cleared to climb to FL130. At that time, APP-CY had one aircraft under control. A controller and an assistant-controller, in accordance with the unit's operational model, staffed the operational position.

Three minutes later, PR-BBZ, on a MEDEVAC mission, took off and requested direct routing to SBSR (São José do Rio Preto Aerodrome, SP), climbing to FL210.

At ACC-AZ – *Porto Velho* Region (ACC-AZ R – PH), there was an active operational position managing sectors S11, S12, S13, S14, and S15 (grouped together), staffed by a single controller, in accordance with the Air Navigation Service Provider (ANSP) operational model, since the limit of seven simultaneously controlled aircraft had not yet been reached.

Thus, the ATCO handled both voice communications and telephone coordination with other sectors of the ACC and adjacent units.

However, shortly thereafter, the expected entry of an eighth aircraft into the ACC-AZ R – PH sector prompted the supervisor to assign an additional ATCO to assume the Assistant position, as required under item 5, subitem "b" of the ACC-AZ Operational Model.

The lateral separation standard for ACC-AZ, set at 10 NM, would not be guaranteed if PR-BBZ continued on its current heading (149°). As a result, APP-CY proactively restricted PR-BBZ to FL120 and proposed transferring its communications to ACC-AZ, an arrangement that was accepted by ASST ACC-AZ.

Subsequently, PT-OLF requested direct routing to SBRD. The ASST APP-CY coordinated with ACC-AZ and received clearance for the requested direct routing.

At 17:35:50 UTC, PR-MYW (TAM 3368) requested descent clearance from ACC-AZ and was cleared to descend to FL110 (Figure 2).

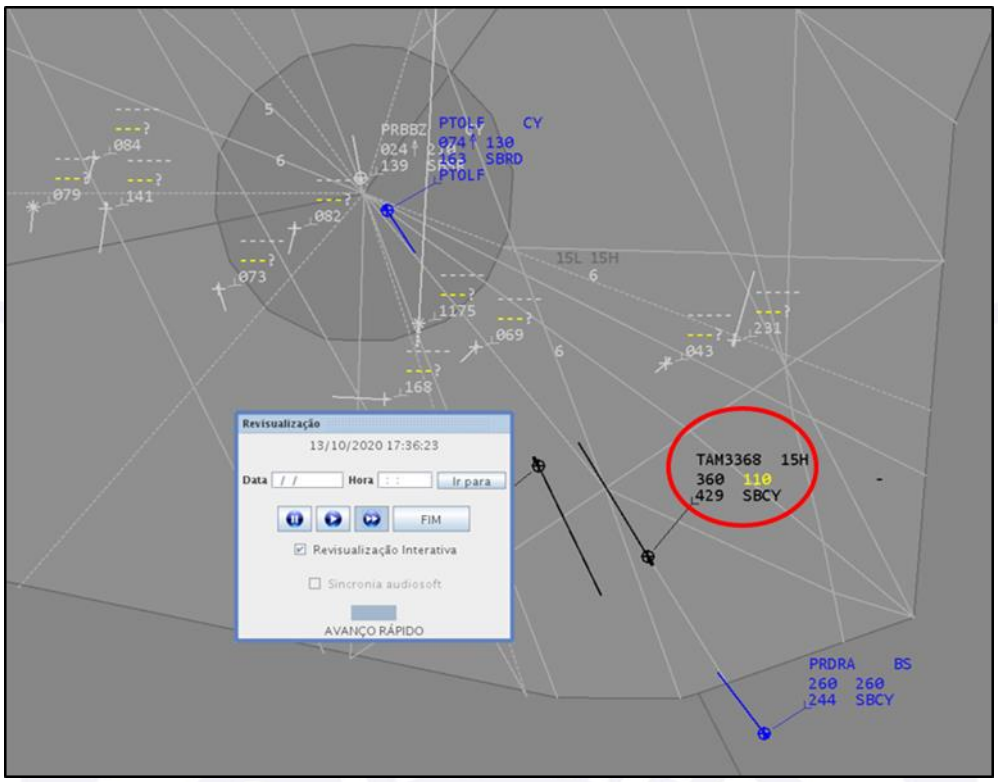

Figure 2 – PR-MYW (TAM 3368) highlighted at FL360,
with cleared descent to level FL110 (in yellow).

At 17:40:39 UTC, with PT-OLF at 21.3 NM from the TMA-CY boundary, passing FL124 climbing to FL130, APP-CY initiated the Hand-Off and instructed the aircraft to contact ACC-AZ.

Had this transfer not occurred at that time, the aircraft would have been displayed in black on the controller's radar screen. Since the Hand-Off was executed, it appeared orange and then white, indicating the aircraft was no longer under APP-CY's responsibility.

At 17:40:57 UTC, PT-OLF made the first radio contact with ACC-AZ, which asked him to stand by. At that moment, the aircraft was 22 NM away from the VHF Omnidirectional Radio Range (VOR) CIA, flying at FL132.

At 17:41:05 UTC, PR-MYW was re-cleared by ACC-AZ to descend, restricted to FL140. No traffic information was provided to the aircraft at that time. The aircraft involved were 65 NM apart, approximately 10 minutes from crossing.

At 17:42:32 UTC, ASST APP-CY questioned ASST ACC-AZ – who had just assumed the position and was still familiarizing himself with the traffic – about what action to take with PR-MYW, which was descending to SBCY, since separation from PR-BBZ was still not assured. ACC-AZ instructed maintaining PR-MYW's heading for a while longer. ASST APP-CY pressed for a defined traffic separation plan.

At 17:42:48 UTC, PT-OLF called ACC-AZ again. The controller instructed it to continue monitoring the frequency and then instructed PR-MYW to contact APP-CY, descending to FL140.

Subsequently, ASST ACC-AZ called ASST APP-CY and reported that PR-BBZ could not be vectored due to weather formations in the sector, and would remain at FL120 direct to SBSR. He also stated that PR-MYW would contact him.

At that moment, ASST APP-CY questioned the appropriateness of PR-MYW remaining on APP-CY frequency while PR-BBZ was on ACC-AZ frequency, suggesting that both aircraft should remain with the same control unit until the crossing.

While this coordination was being made, at 17:45:25 UTC, PR-MYW contacted APP-CY while descending through FL160, 26 NM from PT-OLF, and was cleared to descend to FL060. This triggered the first Air-to-Air Conflict Alert from the *SAGITÁRIO* system on ACC-AZ's radar display, approximately two and a half minutes before PT-OLF and PR-MYW would cross their paths. The Air-to-Air Conflict Alert feature was not a requirement for the version of *SAGITÁRIO* used at APP-CY, which is why the alert did not appear on the Approach Control radar display.

At 17:46:06 UTC, PR-MYW (TAM 3368) squawked IDENT at the request of APP-CY while descending through FL150, proceeding direct to position CY001 of the ILS X RWY35 approach procedure, on a converging course with PT-OLF (Figure 3).

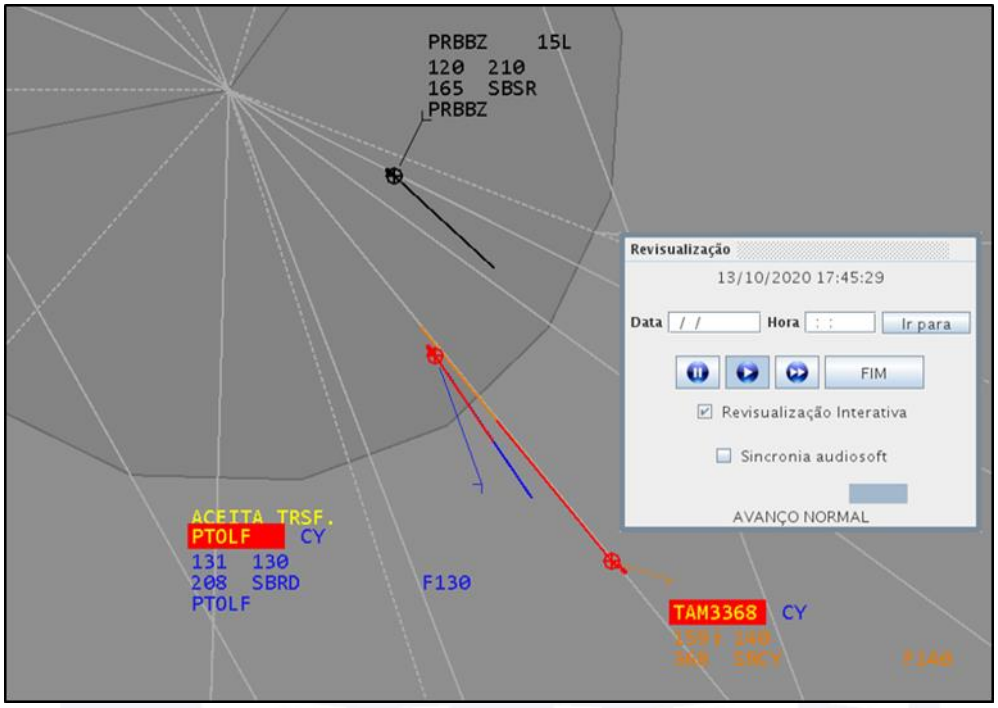

Figure 3 – Aircraft on converging courses, approximately 26 NM apart.

At 17:46:33 UTC, PR-MYW (TAM 3368) passed FL140 while descending, 16 NM from PT-OLF (Figure 4).

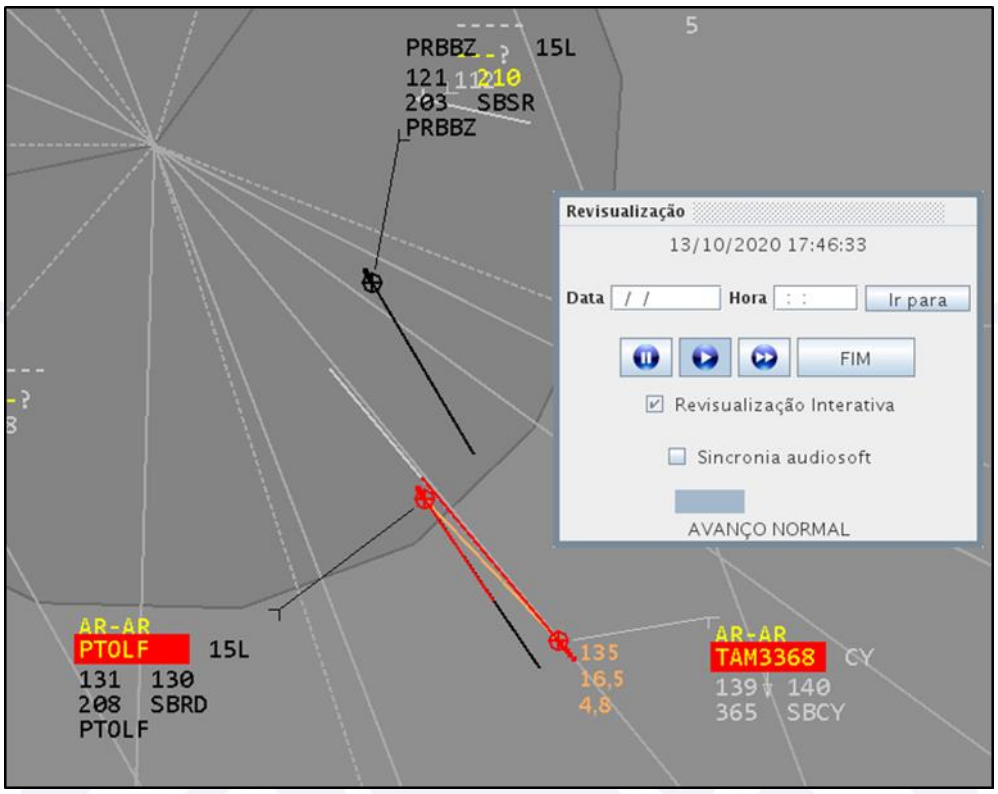

Figure 4 – PR-MYW (TAM 3368) passing FL140 during descent.

At 17:47:22 UTC, during the descent of PR-MYW, which was approximately 2 NM from PT-OLF, on an opposite course, the ASST APP-CY identified that the traffic had been cleared to FL060 and requested the ATCO APP-CY to restrict PR-MYW to FL130, while informing that PR-BBZ was maintaining FL120 (Figure 5).

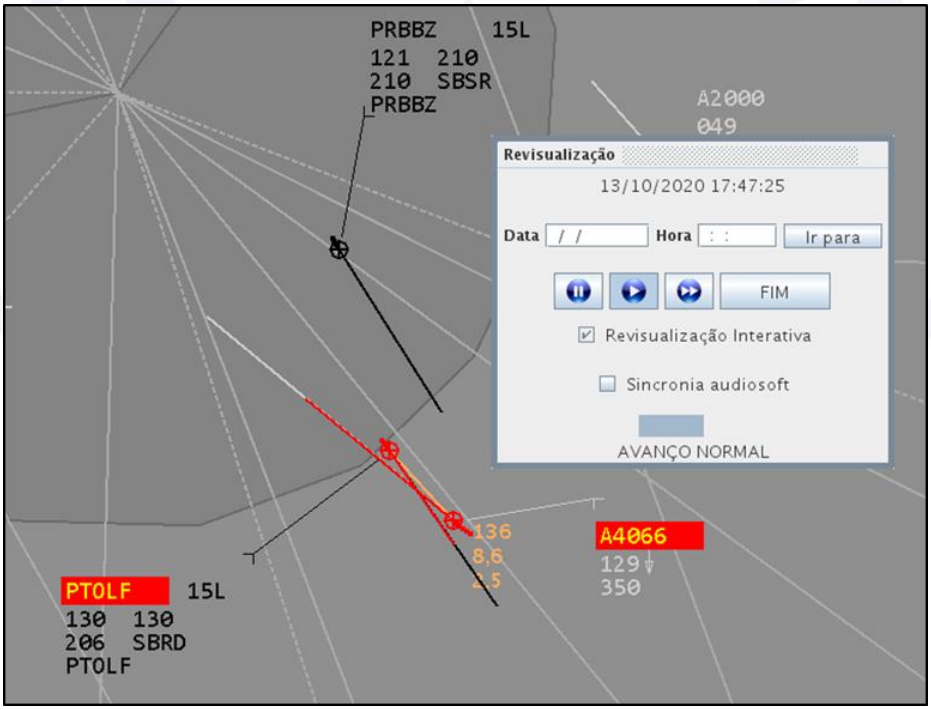

Figure 5 – PR-MYW (TAM 3368) passing FL130, approximately 2 NM away, on an opposite course to PT-OLF.

The ATCO APP-CY immediately issued the restriction. However, as PR-MYW was approaching FL130, it briefly descended below the assigned level, reaching FL128 before returning to FL130. At that moment, APP-CY identified the conflict between PR-MYW and PT-OLF.

The ATCO APP-CY immediately re-cleared PR-MYW (TAM 3368) to descend in order to vacate FL130. However, the pilot reported that he was performing an evasive maneuver due to a Resolution Advisory (RA).

The crossing of paths below the minimum required separation occurred at 17:48:24 UTC. Radar data indicated a crossing with a vertical separation of 100 ft. and a lateral separation of 0.2 NM, within Class G ATS Airspace under ACC-AZ jurisdiction, approximately 0.8 NM from the *Cuiabá* Terminal Area boundary (Figure 6).

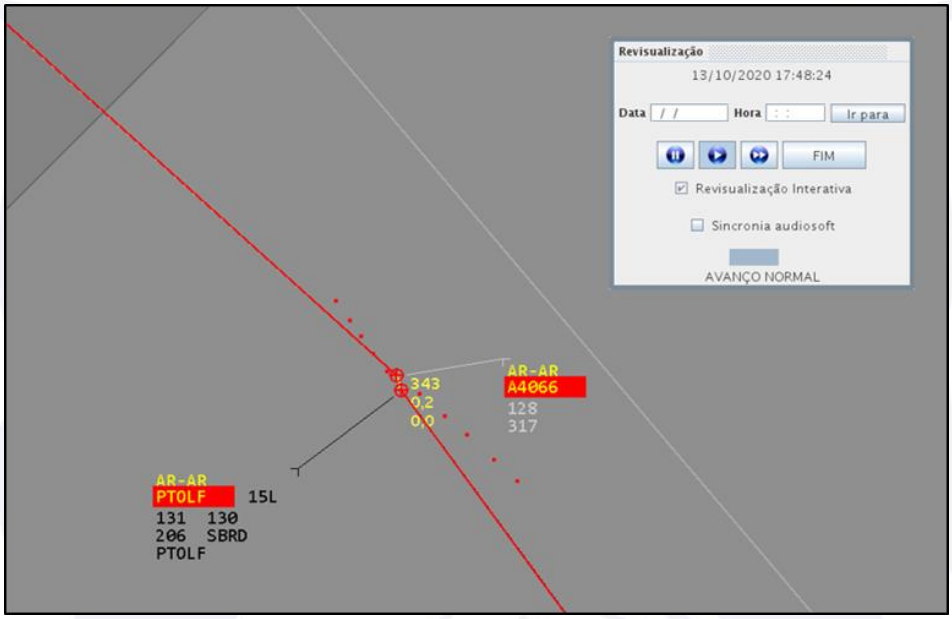

Figure 6 – Air-to-Air Conflict Alert on the *SAGITÁRIO* system showing separation of 100 ft. and 0.2 NM between PT-OLF and PR-MYW (TAM 3368) at 17:48:24 UTC.

At 17:48:35 UTC, PT-OLF reported to ACC-AZ that it had crossed a “Boeing” with a separation of 100 ft.

At the time of the crossing, both aircraft were operating under Instrument Flight Rules (IFR), in Visual Meteorological Conditions (VMC), and were being controlled on different frequencies. PR-MYW was on APP-CY frequency and PT-OLF on ACC-AZ frequency.

After crossing PT-OLF, PR-MYW leveled off at FL120, entering into potential conflict with PR-BBZ. The lateral distance between PR-MYW and PR-BBZ was 8.7 NM, which did not trigger a proximity alert (TCAS) on PR-MYW.

PR-BBZ had been instructed by ACC-AZ to maintain FL120 and proceed with any required deviations. No traffic information was provided at any time by ACC-AZ, and the two aircraft (PR-MYW and PR-BBZ) were on different frequencies.

The airspace in question was CTA-8, classified as Class D airspace, under the jurisdiction of ACC-AZ.

No failures, errors, or malfunctions were identified in the radar display systems available to the controllers. It was confirmed that both aircraft were complying with the routes, altitudes, and clearances issued by the air traffic control units.

During the interview, the ATCO ACC-AZ stated that, having restricted the TAM Airbus to FL140, he expected APP-CY not to continue descending the aircraft and to maintain the altitude restriction until the crossing with PT-OLF was complete.

The ATCO APP-CY stated, in an interview, that his focus was on resolving the conflict between PR-BBZ and PR-MYW, which is why he did not notice the data tag of PT-OLF, which was maintaining FL130 and had already changed to white, indicating that the Hand-Off had been accepted by ACC-AZ.

1.19. Additional information.

The Command of Aeronautics' Instruction (ICA) 100-37, 2017, which addresses Air Traffic Services, stated the following in Chapter 2 – Definitions and Abbreviations, paragraph 2.1 – Definitions:

> TRAFFIC INFORMATION:
>
> Information issued by an ATS unit to alert a pilot of known or observed air traffic that may be in proximity to the position or intended route of the aircraft, in order to assist the pilot in avoiding a collision.

Regarding the use of Class D airspace, ICA 100-37 provided the following:

> 3.4 CLASSIFICATION OF ATS AIRSPACE
>
> 3.4.1 ATS airspace shall be classified and designated alphabetically, as follows:
>
> [...]
>
> d) Class D – IFR and VFR flights are permitted. Air traffic control service is provided to all flights. IFR flights are separated from other IFR flights, and receive traffic information on VFR flights, as well as traffic avoidance advice when requested by the pilot. VFR flights receive only traffic information regarding all other flights and traffic avoidance advice when requested by the pilot.
>
> [...]

Regarding ATS provision, ICA 100-37 further stated:

> 3.8 PROVISION OF ATS
>
> [...]
>
> 3.8.4 A controlled aircraft shall be under the control of only one air traffic control unit at any given time.
>
> 3.8.5 Only one ATC unit shall have jurisdiction over a given airspace.
>
> [...]

Concerning essential traffic information, ICA 100-37 contained the following considerations:

> 3.13 ESSENTIAL TRAFFIC INFORMATION
>
> 3.13.1 Essential traffic is the controlled traffic to which the ATC unit is providing separation but which, in relation to another particular controlled flight, is not or will not be separated by the prescribed minimum.
>
> Note: In accordance with item 3.9, ATC is required to provide separation between IFR flights in Class A through E airspace, and between IFR and VFR flights in Classes B and C. ATC is not required to provide separation between VFR flights, except in Class B airspace. Therefore, IFR or VFR flights may constitute essential traffic to an IFR flight; and IFR flights may constitute essential traffic to a VFR flight. However, a VFR flight would not constitute essential traffic to another VFR flight, except in Class B airspace.
>
> 3.13.2 Essential traffic information shall be provided to the concerned controlled flights whenever they constitute essential traffic to one another.

1.20. Useful or effective investigation techniques.

NIL.

2. ANALYSIS.

This analysis was developed based on the investigative elements collected, including interviews with the ATCOs involved from APP-CY and ACC-AZ, synchronized radar replay images with APP-CY audio recordings, telephone coordination between APP-CY and ACC-AZ, and SISCEAB documentation.

According to the transcriptions of communication audio between the aircraft and ATS units, as well as those related to coordination channels, no technical anomalies were observed in the communication equipment during the occurrence in question.

Likewise, the ATS system software (radar displays, *SAGITÁRIO* system alerts, color transitions, and target visualization) functioned as expected. No failures were identified in the radar systems or in the pictorial presentation on the radar displays.

Therefore, no contributing factors related to air traffic infrastructure were identified for the occurrence in question.

Regarding the meteorological conditions, TCU clouds in certain areas of the Cuiabá Terminal Area and FIR-AZ hindered vectoring of traffic. Nonetheless, this circumstance was not considered a contributing factor to this incident, as only PR-BBZ reported being unable to be vectored due to weather and chose to remain at FL120. None of the other aircraft involved in the conflict requested heading or level changes to avoid weather formations.

Nevertheless, considering the standards established in the ACC-AZ Operational Model/2019, there was a loss of separation of less than 10 NM, both between PR-MYW and PT-OLF and between PR-MYW and PR-BBZ, which characterized the occurrence as an ATS AIRPROX, although no TCAS proximity alert was triggered regarding the aircraft PR-BBZ.

Based on the collected investigation elements, one verified that, at 17:31:12 UTC, APP-CY had one aircraft under control (PT-OLF), which had departed from RWY 35 of SBCY, and was cleared to climb to FL130. Subsequently, PT-OLF requested direct routing to SBRD.

The ASST APP-CY contacted ACC-AZ and received clearance for the aircraft to proceed direct, as requested.

At that moment, a single controller staffed the ACC-AZ position. Therefore, the ATCO was handling both voice communications and telephone coordination with other ACC sectors and adjacent units.

Thus, it is inferred that ACC-AZ was aware that PT-OLF would be climbing to FL130 on a heading opposite to that of PR-MYW, which was flying within ACC-AZ's jurisdictional airspace, from SBGR to SBCY, along airway AM776.

At 17:35:24 UTC, PR-BBZ made its first contact with APP-CY, reported climbing through 1,300 ft., and requested direct routing to SBSR at FL210. Initially, it was instructed to climb to FL210 following the *KOKLI ONE ECHO* SID. Simultaneously, ACC-AZ cleared PR-MYW to descend to FL110.

In this scenario, there were three aircraft on converging trajectories, one of which was descending and would cross the flight level of the other two, which were flying in the opposite direction.

Upon analyzing the audio recordings of communications between the ATS units involved, the Investigation Committee identified several coordination attempts that lacked objectivity and clarity.

Based on the transcripts of conversations between control units from 17:31:35 UTC to 17:47:42 UTC, it was possible to identify numerous exchanges of information regarding the positions of the three aircraft, the clearances issued, the intentions of the flights, and possible courses of action to manage the inbound and outbound traffic flow in the TMA-CY. However, no clear plan was established to ensure separation between these aircraft.

The audio recordings of the coordination showed that, shortly after transferring PT-OLF to ACC-AZ, the ASST APP-CY expressed concern about PR-MYW potentially conflicting with the traffic in the opposite direction. Some pieces of information were shared

between ASST APP-CY and the ATCO ACC-AZ, but no clear or objective coordination emerged from this exchange.

At 17:43:02 UTC, a fourth controller, the ASST ACC-AZ, assumed the position due to the forecasted entry of an eighth aircraft into the R – PH sector of ACC-AZ.

Likewise, the participation of this assistant controller did not result in any coordination effort that took into account the control of the three aircraft or prevented the conflict that would materialize approximately five minutes later.

Thus, it was found that the inadequacy in the exchange of information between the ATS units – characterized by excessive informality and low assertiveness – did not ensure continuity in the provision of air traffic services and failed to guarantee proper separation, particularly between PT-OLF and PR-MYW.

At 17:40:39 UTC, APP-CY instructed PT-OLF to climb to FL130 and contact ACC-AZ. At that moment, the aircraft was approximately 23 nautical miles from the boundary of TMA-CY.

Analysis of the audio recordings also revealed that, at 17:45:22 UTC, ACC-AZ called PR-MYW and instructed the aircraft to contact APP-CY. At that moment, PR-MYW was still flying in airspace under the jurisdiction of ACC-AZ.

Thus, following these transfers, there were two control units responsible for the same portion of airspace, managing traffic on different frequencies, which rendered the appropriate resolution of the air traffic conflict under investigation unfeasible.

These early transfers contradicted the provisions of the Letter of Operational Agreement (LOA), which stipulated that communications should be transferred from APP-CY to ACC-AZ when the aircraft was 10 NM from the TMA-CY boundary, and from ACC-AZ to APP-CY between 15 NM and 10 NM.

Therefore, the failure of the controllers involved to apply the parameters set forth in the LOA indicated a low level of understanding of the applicable rules and procedures during the provision of air traffic services – particularly regarding the rationale behind their implementation – which resulted in an aircraft flying in FIR-AZ airspace (PR-MYW) being placed under the control of APP-CY, while another aircraft already within TMA-CY airspace (PT-OLF) remained under the control of ACC-AZ.

These actions also demonstrated the adoption of inappropriate postures, such as complacency and disregard for operational procedures that are essential to air traffic safety. Within the chain of events that followed, these actions contributed to the convergence between PR-MYW and PT-OLF.

Because of these transfers, the provisions of ICA 100-37 were also violated, particularly subitem 3.8.4, which states, "only one air traffic control unit shall have jurisdiction over a given airspace."

Additionally, the provision of Traffic Information and Essential Traffic Information, as established by ICA 100-37, could have increased the situational awareness and attentiveness of both the converging traffic and the very control unit (ACC-AZ). However, this did not occur during the incident.

In this context, it was observed that the early transfers caused the controllers involved to lose proper situational focus on the aircraft operating within their respective areas of responsibility.

One therefore concluded that this decision demonstrated the controllers' difficulty in perceiving and analyzing the potential developments of the situation, in which two aircraft were on converging paths without the adequate attention of the ATCOs responsible for

ensuring their separation – resulting in a near midair collision between PR-MYW and PT-OLF.

According to his statement, the ATCO APP-CY kept his focus on PR-BBZ due to the nature of the mission (MEDEVAC). Similarly, the ATCOs of the ACC-AZ R – PH also failed to identify the convergence between PT-OLF and PR-MYW.

This reflects a degradation in the activation of information that both control units had at their disposal, which reduced their capacity for quick and precise responses and resulted in fixation, distraction, impaired divided attention, and alert system dysfunction – factors that contributed to this incident.

At 17:47:03 UTC, when APP-CY asked PR-MYW whether the aircraft could maintain FL130 due to traffic on ACC-AZ frequency flying in the opposite direction at FL120 (in an attempt to provide separation from PR-BBZ), a reduction in the controller's situational awareness became evident. This is because the traffic (PT-OLF) that had also been transferred by him to ACC-AZ was flying at FL130 on an opposite course.

In this context, it was verified that, likely due to his attention being focused on PR-BBZ, the ATCO APP-CY exhibited impairments in his ability to organize the information available to him, which resulted in delayed perception and a "tunnel vision" effect regarding the emerging traffic conflict between PR-MYW and PT-OLF.

It is likely that the early transfer of PT-OLF contributed to this degradation in the ATCO's situational awareness at the APP-CY position. Had the transfer not occurred, PT-OLF would have remained displayed in black on the radar screen. However, since the transfer had been executed, it appeared orange and then white, indicating that the aircraft was no longer under APP-CY's responsibility.

It is also possible that the fact that the outbound aircraft from TMA-CY (PT-OLF and PR-BBZ) and the inbound aircraft (PR-MYW) were on different frequencies prior to the paths crossing contributed to reduced situational awareness among the APP-CY controllers.

With both PT-OLF and PR-BBZ on the ACC-AZ frequency, the ATCO APP-CY may not have perceived the potential conflict when authorizing PR-MYW to descend to FL060. It is also likely that the ASST APP-CY did not identify the consequences of this descent clearance, as his attention focused on telephone coordination activities.

During the course of the investigation, it was determined that the Air-to-Air Conflict Alert issued by the *SAGITÁRIO* system was not given due attention by the ACC-AZ team, as those involved believed that vertical separation would be maintained until horizontal separation was assured – which ultimately did not occur.

Thus, upon examining the full dynamics of the occurrence and the actions taken in an attempt to prevent the traffic conflict, it was found that the controllers involved did not employ all available resources of the *SAGITÁRIO* system to foresee and avoid the convergence of traffic, which contributed to the serious incident under investigation.

The investigation indicated that the traffic scenario in the TMA-CY was of low complexity. Nevertheless, significant difficulty in resolving the conflict was observed, possibly due to the limited experience of the ATCO APP-CY, with approximately one year of service at the referred ATC agency, the first operational unit in his career.

It is possible that this condition contributed to an insufficient level of skill in executing procedures and applying the methods available to resolve the air traffic conflict that occurred in this event.

The absence of any intervention by supervisors indicated that oversight of actions at operational positions – which could have prevented the conflict – was not carried out effectively, a circumstance that also played a role in this occurrence.

Finally, the onboard technological defense system intended to ensure traffic separation (TCAS, installed on PR-MYW) functioned properly, enabling an evasive maneuver that resolved the conflict.

3. CONCLUSIONS.

3.1. Findings.

a) the pilots of aircraft PR-MYW and PT-OLF held valid CMAs;

b) the pilots of aircraft PR-MYW held valid ratings for A320 aircraft and IFRA;

c) The pilot of aircraft PT-OLF held valid ratings for MNTE, MLTE, and IFRA;

d) the air traffic controllers on duty at ACC-AZ and APP-CY at the time of the occurrence had valid CMA and ratings;

e) the airplanes had valid CVAs (Certificate of Airworthiness);

f) the airplanes were within their weight and balance limits;

g) the weather conditions were above the minima required for the operation of both aircraft under their proposed types of flight;

h) the aircraft PT-OLF departed from SBCY at 17:31:12 UTC and was cleared to climb to FL130;

i) three minutes later, the aircraft PR-BBZ, on a MEDEVAC mission, took off and requested to fly direct SBSR, climbing to FL210;

j) at 17:35:50 UTC, the aircraft PR-MYW called ACC-AZ to request start of descent and was cleared to descend to FL110;

k) at 17:40:39 UTC, the aircraft PT-OLF, at a distance of 21.3 NM from the TMA-CY boundary, climbing to FL130, was handed off by APP-CY, and instructed to call ACC-AZ;

l) prior to the traffic conflict, the ASST APP-CY questioned the ATCO ACC-AZ on the actions that would be taken for traffic separation;

m) at 17:41:05 UTC, the aircraft PR-MYW was re-cleared by ACC-AZ to descend restrict to FL140;

n) at 17:45:25 UTC, upon passing FL160 at a distance of 26 NM from aircraft PT-OLF, the aircraft PR-MYW called APP-CY and was cleared to descend to FL060;

o) At 17:48:24 UTC, the aircraft PT-OLF and PR-MYW crossed paths with each other at FL130, separated 100 ft. vertically and 0.2 NM horizontally;

p) The aircraft PR-MYW made an evasive maneuver in response to a Resolution Advisory (RA) from the TCAS;

q) The PT-OLF had visual with the other aircraft when the paths crossed;

r) After the crossing, both aircraft proceeded with their flights uneventfully;

s) Neither aircraft sustained any damage; and

t) The crew and passengers of both aircraft sustained no injuries.

3.2. Contributing factors.

- **Control skills – undetermined.**

The analysis of the investigation elements indicated that the scenario within TMA-CY was one of low complexity. Nevertheless, significant difficulty in resolving the conflict was observed, possibly due to the limited experience of the ATCO APP-CY, who had

approximately one year of service at the referred ATC unit, the first operational experience in his career.

This condition may have contributed to an insufficient level of skill in executing procedures and applying the methods available to resolve the traffic conflict in this incident.

- **Attention – a contributor.**

Difficulties were identified in the process of activation of the information available to both control units, which reduced their capacity for quick and precise responses and resulted in fixation, distraction, impaired divided attention, and alert system dysfunction – circumstances that contributed to this incident.

- **Attitude – a contributor.**

The failure to apply the parameters established in the *CAOp* (LOA) by the controllers involved demonstrated the adoption of inappropriate postures, such as complacency and disregard for rules and operational procedures essential to air traffic safety. Within the chain of events that followed, these actions contributed to the convergence between PR-MYW and PT-OLF.

- **Communication – a contributor.**

It was found that the inadequacy in the exchange of information between the ATS units – marked by excessive informality and low assertiveness – did not ensure continuity in the provision of air traffic services and failed to guarantee proper separation, especially between PT-OLF and PR-MYW.

- **Knowledge of ATS rules – a contributor.**

The early transfers of PT-OLF to ACC-AZ and of PR-MYW to APP-CY were contrary to the provisions of the CAOp (LOA), which prescribed that communications should be transferred from APP-CY to ACC-AZ when the aircraft was 10 NM from the TMA-CY boundary, and from ACC-AZ to APP-CY between 15 NM and 10 NM.

Therefore, the failure to apply these parameters indicated a low level of understanding of the applicable rules and procedures for air traffic service provision – particularly regarding the rationale for their adoption – which resulted in one aircraft operating in FIR-AZ airspace (PR-MYW) being placed under the control of APP-CY, while another aircraft operating within TMA-CY (PT-OLF) remained under the control of ACC-AZ. These circumstances contributed to the incident under analysis.

- **Air Traffic coordination – a contributor.**

The audio recordings of the coordination showed that, although the ASST APP-CY expressed concern that the aircraft PR-MYW would conflict with the aircraft that were coming in the opposing direction, no clear coordination emerged from the exchange of messages between him and ACC-AZ.

Likewise, the participation of a fourth controller, who assumed the position of ASST ACC-AZ, did not result in coordination that considered the control of all three aircraft and prevented the conflict that would materialize minutes later.

- **Employment of ATS means – a contributor.**

During the investigation, it was found that the Air-to-Air Conflict Alert issued by the *SAGITÁRIO* system was not given due attention by the ACC-AZ team, as those involved believed the aircraft would remain vertically separated until horizontal separation was ensured – something which did not occur.

Thus, reviewing the full dynamics of the occurrence and the actions taken to avoid the traffic conflict, it was verified that the controllers involved did not employ all resources available in the *SAGITÁRIO* system to anticipate and prevent the convergence of traffic, which contributed to the incident under analysis.

- **Perception – a contributor.**

When the ATCO APP-CY asked PR-MYW whether the aircraft could maintain FL130 in order to ensure separation from the PR-BBZ, the controller's reduced situational awareness became evident, since the traffic (PT-OLF) he had previously transferred to ACC-AZ was maintaining FL130 on an opposite heading.

In this context, likely due to his attention being focused on the PR-BBZ, the ATCO APP-CY exhibited impairments in organizing the information available to him, which resulted in delayed perception and a “tunnel vision” effect regarding the traffic conflict developing between PR-MYW and PT-OLF.

- **Air Traffic planning (ATS) – a contributor.**

The transcripts of conversations between the control units showed multiple exchanges of information about the positions of the three aircraft, the clearances issued, the intentions of the flights, and possible courses of action to manage traffic entering and exiting TMA-CY. However, no clear plan was established to ensure separation between these flights and to prevent the conflict that occurred.

- **Decision-making process – a contributor.**

It was found that the early transfers caused the controllers involved to lose proper focus on the aircraft operating within their respective areas of responsibility.

Such decision reflected difficulties in perceiving and analyzing the potential developments of a situation in which two aircraft were on converging paths without adequate attention from the ATCOs responsible for ensuring their separation, which culminated in a near collision between PR-MYW and PT-OLF.

- **ATS oversight – a contributor.**

The absence of any supervisory intervention indicated that the monitoring of actions at operational positions – which could have prevented the conflict under investigation – was not effectively carried out, a circumstance that also contributed to this occurrence.

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 DECEA (Department of Airspace Control), it is recommended:

IG-127/CENIPA/2020 - 01 **Issued on 06/02/2025**

Assess the relevance of incorporating the lessons learned from this investigation into the development of simulation training, with the aim of mitigating errors resulting from distractions and deviations from operational models committed by certified air traffic controllers.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

On December 2 and 3, 2020, presentations on the occurrence were delivered to ACC-AZ personnel as part of an Instruction and Operational Maintenance Program (PIMO – Case Study), with emphasis on the regulations referenced in the investigation, particularly, ICA 100-37, item 3.8 – General Provisions for Air Traffic Services; ICA 100-37, item 3.4 – Classification of Airspace; ICA 100-37, item 3.13 – Essential Traffic Information; ICA 100-37, item 2.1 – Definitions – Traffic Information; and the Operational Letter of Agreement ACC-AZ/APP-CY/2014.

On June 2nd, 2025.