

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A-582/CENIPA/2014

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PR-TKB
MODEL:	ATR 42-500
DATE:	06 JAN 2012



NOTICE

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

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

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

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

This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with item 3.1, Annex 13 to the 1944 Chicago Convention, which was incorporated in the Brazilian legal system by virtue of the Decree n° 21713, dated 27 August 1946.

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

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

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

SYNOPSIS

This is the Final Report of the 6 January 2012 accident with the ATR 42-500 aircraft, registration PR-TKB. The accident was classified as “*with person in flight*”.

While the aircraft was descending toward the destination, the flight crew performed TCAS RA maneuvers for preventing an air traffic conflict, and a person standing in the aircraft got injured (bone fracture).

The crew and the other passengers were not injured.

The aircraft did not sustain any damage.

An accredited representative from the French *Bureau d'Enquetes et d'Analyses pour la Sécurité de l'Aviation Aerienne* (BEA) was designated for participation in the investigation.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
ATCO	Air Traffic Controller
ATS	Air Traffic Services
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CG	Center of Gravity
CHT	Technical Qualification Certificate
CIV	Pilot's Flight Logbook
CM	Registration Certificate
CMA	Aeronautical Medical Certificate
GSO	Operational Safety Manager
IFR	Instrument Flight Rules
INFRAERO	Brazilian Airports Infrastructure Enterprise
Lat	Latitude
Long	Longitude
METAR	Aerodrome Routine Weather Report
MGSO	Manual on Operational Safety Management
MLTE	Airplane, Multi-Engine, Land – AMEL
MNTE	Airplane, Single-Engine, Land – ASEL
NTSB	National Transportation Safety Board (USA)
PCM	Commercial Pilot – Airplane category
PPR	Private Pilot – Airplane category
PLA	ATP – Airline Transport Pilot
RBHA	Brazilian Aeronautical Certification Regulation
RELPREV	Prevention Report
RS	Safety Recommendation
SBGR	ICAO location indicator – Guarulhos Aerodrome
SBJV	ICAO location indicator – Joinville Aerodrome
SERIPA V	5 th Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
UTC	Universal Time Coordinated
VFR	Visual Flight Rules

1. FACTUAL INFORMATION.

Aircraft	Model: ATR 42-500	Operator: TRIP <i>Linhas Aéreas</i>
	Registration: PR-TKB	
	Manufacturer: ATR	
Occurrence	Date/time: 06 JAN 2012 / 20:20 UTC	Type(s): Inflight accident with person.
	Location: TMA - SP	
	Lat. 23°40'12"S Long. 046°22'45"W	
	Municipality – State: Guarulhos – SP	

1.1 History of the flight.

The aircraft departed from SBJV, destined for SBGR, operating as Flight TIB5333.

As the aircraft was passing FL110 (descending) while performing the RONUT1 STAR procedure in SBGR, its TCAS equipment delivered a Traffic Advisory message followed by a Resolution Advisory message.

The crew made the prescribed maneuvers for preventing an air traffic conflict. During the maneuver, a female passenger, who was standing near the lavatory, fell on the floor and ended up being injured.

After the aircraft landed, the passenger was taken to the INFRAERO medical unit in SBGR and later transported to the Hospital of Guarulhos, where she was diagnosed to have suffered fractures in her right foot and ankle.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	1	-
Minor	-	-	-
None	3	13	-

1.3 Damage to the aircraft.

None.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

	Hours Flown	
	Pilot	Copilot
Total	23,000:00	3,800:00
Total in the last 30 days	63:45	41:10
Total in the last 24 hours	02:30	02:30
In this type of aircraft	267:25	2,557:20
In this type in the last 30 days	63:45	41:00
In this type in the last 24 hours	02:30	02:30

N.B.: Data provided by the aircraft operator.

1.5.2 Professional formation.

The pilot did his Private Pilot course (airplane category) at the *Aeroclube do Rio Grande do Sul* in 1972.

The copilot did his Private Pilot course (airplane category) at the *Aeroclube de Votuporanga* in 2004.

1.5.3 Category of licenses and validity of certificates.

The pilot held an Airline Transport Pilot license. His technical qualification certificates for ATR-42 type aircraft, AMEL, and IFR rating were valid.

The copilot held an Airline Transport Pilot license. His technical qualification certificates for ATR-42 type aircraft, AMEL, and IFR rating were valid.

1.5.4 Qualification and flight experience.

The pilots had qualification and enough experience for the type of flight.

1.5.5 Validity of medical certificate.

Both pilots held valid aeronautical medical certificates (CCF).

1.6 Aircraft information.

The aircraft (SN610) was manufactured in 2001.

It had a valid airworthiness certificate.

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

The last inspection of the aircraft ("Check 4A" type) was done in the workshop of the TRIP company in Belo Horizonte (Minas Gerais State) on 29 October 2011. The aircraft flew 304 hours and 44 minutes after the inspection.

The last overhaul of the aircraft ("Check C" type) was done in the workshop of the TRIP company in Belo Horizonte on 22 June 2010. The aircraft flew 4,273 hours and 42 minutes after the overhaul.

1.7 Meteorological information.

Nil.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Flight TIB5333 (SBJV – SBGR) entered the São Paulo Terminal Control Area through the Southeast Sector via *Asono* position at FL230.

In accordance with the Letter of Operational Agreement (CAOP) between Curitiba Control Center (ACC-CW) and São Paulo Approach Control (APP-SP), all aircraft destined for SBGR have to be instructed by the ACC to join the Standard Arrival Route (STAR) being used at the moment.

As for the type of ATC clearance, it is worth highlighting that the APP may authorize the aircraft to follow the STAR while navigating horizontally and vertically in accordance with the altitude limits contained in the Chart until reaching the flight level designated in the clearance (in which case, the expression "Via Arrival" is used).

The pilot is responsible for the horizontal/vertical navigation, following the CHART level/altitude limits until reaching the level/altitude designated in the clearance. Upon reaching the clearance limit, the APP may define another clearance with a new flight level/altitude.

Another type of clearance would entail the use of the term “Arrival” – explicitly cancelling the level/altitude limits in a certain segment of the STAR, such as, for example: “RONUT 1 Arrival, descend to level FL100, minimum level restriction at LOVE cancelled”.

Still flying in the ACC-CW area of responsibility, the PR-TKB flight crew inquired about which STAR would be used for the approach to SBGR.

For purposes of traffic coordination, ACC-CW contacted APP-SP, prior to the control and communications hand-over, and APP-SP stated that the aircraft had to intercept the STAR (still not informed) at ASONO position.

At that moment, the information provided by APP-SP was not accurate, since SBGR did not have any published STAR starting at ASONO position.

The recordings of the communications between ACC-CW and Flight TIB5333 show that ACC-CW informed that RONUT 1 (Figure 1) was the STAR prescribed for the approach to SBGR.

Before the hand-over of Flight TIB5333 from ACC-CW to APP-SP, there was coordination via telephone between the two ATC units, so that APP-SP could ratify the pertinent STAR and the point at which Flight TIB5333 would intercept the Arrival for SBGR. APP-SP informed ACC-CW that the STAR prescribed for the flight was RONUT 1.

After the coordination, with the aircraft already under the control of APP-SP by means of the ATS Surveillance System, the approach controller inquired Flight TIB5333 whether the aircraft was able to proceed to GURU position direct (GURU position is a specific point located in the intermediary portion of the STAR – see Figure 1), with the objective of shortening the initial trajectory of the RONUT 1 STAR prescribed for the Arrival in SBGR, while placing the aircraft into the traffic sequence within the São Paulo Terminal Control Area.

After receiving an affirmative answer from Flight TIB5333, the APP-SP ATCO authorized the aircraft to fly toward GURU position.

It is important to stress that APP-SP never stated the STAR name (RONUT 1), as well as the remainder of the clearance after GURU position, that is, which one of the two following situations would apply to the aircraft: 1) Flight TIB5333 was authorized to fly along the profile of the STAR while navigating horizontally and vertically until reaching the flight level/altitude designated by the ATC unit (complying with the flight level/altitude restrictions contained in the informed approach chart (VIA ARRIVAL), or 2) Flight TIB5333 was authorized to perform the STAR (just not considering the prescribed minimum level for a certain point), descending to the flight level/altitude designated, while maintaining the other restrictions contained in the procedure (ARRIVAL).

While flying toward GURU position, the aircraft was consecutively authorized by APP-SP to descend to the flight levels FL180, FL150, and then FL120.

Still according to the transcript of the communication between the Flight TIB5333 pilots and ATC, there were doubts on the part of the crew relative to the descent instructions received.

Upon receiving the ATC instruction to re-intercept the arrival at GURU position, the aircraft replies: “Affirm, after GURU, maintain the arrival profile”.

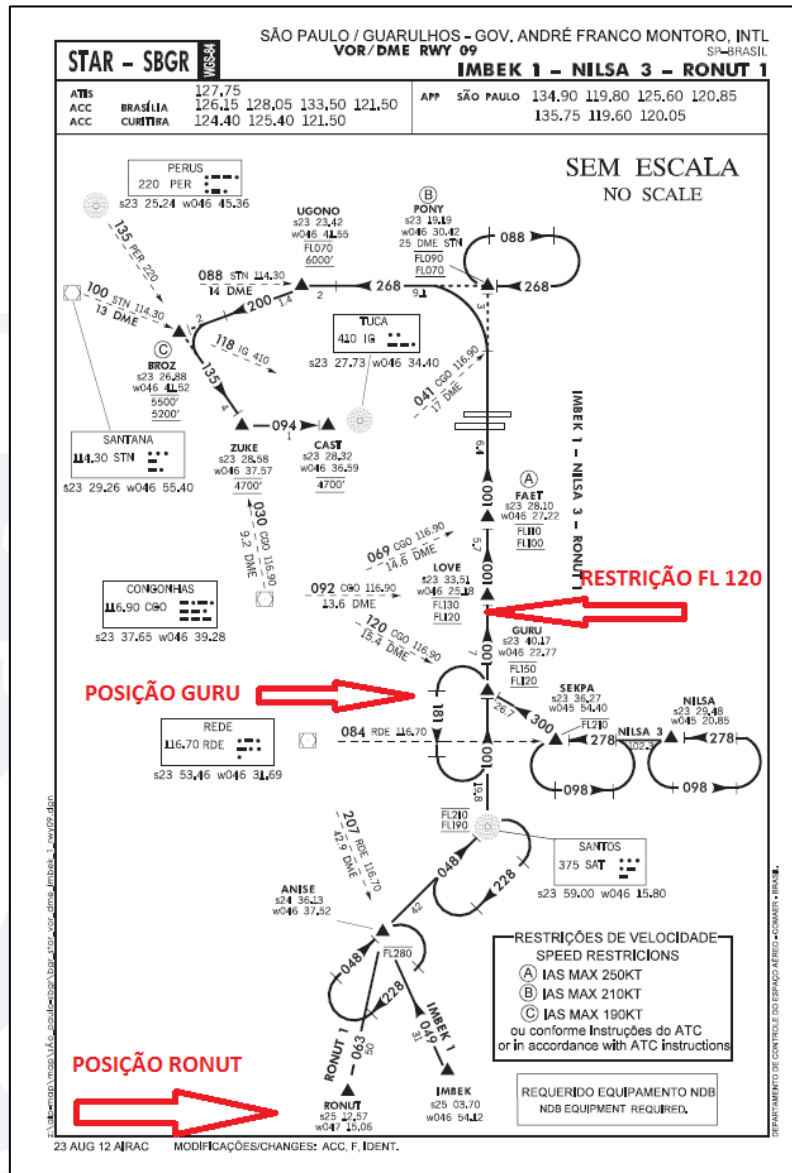


Figure 1 – RONUT 1 STAR

The expressions “Re-intercept the Arrival” and “Maintain Profile”, utilized by the APP-SP ATCO and by Flight TIB5333, respectively, were not part of the standard phraseology contained in the ICA 100-12. The APP-SP ATCO should have either questioned Flight TIB5333 or reinforce the instructions to the aircraft after the use of non-standard phraseology, but this did not happen.

After checking GURU position, the copilot (PF) continued the descent below the designated FL120 restriction.

Upon intercepting the RONUT 1 STAR at GURU position, Flight TIB5333 failed to comply with the instruction given by APP-SP concerning the descent to FL120. It also failed to comply with the FL120 restriction in the segment between GURU and LOVE positions contained in the RONUT 1 STAR.

When passing FL117, Flight TIB5333 was alerted by APP-SP about essential traffic climbing to FL100.

Nevertheless, Flight TIB5333 continued descending and, since it had already passed FL120 (clearance limit), APP-SP re-cleared the aircraft to descend and maintain FL110 on account of its proximity with the traffic (GOL1516), which was performing an SID procedure from Congonhas Airport and climbing to FL100.

Almost reaching FL110, the captain inquired ATC whether he had to maintain FL120, and said that he was complying with “Via Arrival”.

Although Flight TIB5333 did not observe the FL120 restriction, there was enough time for coordination between the APP-SP sectors.

Soon after the aircraft leveled off at FL110, the radar visualization showed a variation (climb) of almost 500 feet without any instructions being given by APP-SP.

APP-SP did not receive any information from either Flight TIB5333 or GLO1516 concerning TCAS evasive maneuvers.

1.10 Aerodrome information.

Not applicable.

1.11 Flight recorders.

Since the Initial Action took place only a few days after the occurrence and, owing to the fact that the aircraft continued the flight program scheduled on that day, it was not possible to retrieve pertinent data from its flight recorders.

1.12 Wreckage and impact information.

Nil.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

Not investigated.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

Individual information

The crew had the prescribed qualification for exercising their duties. The captain was an experienced pilot, with approximately 23,000 hours flown in airline companies. In the model of the aircraft involved in the accident, he had accumulated approximately 300 flight hours.

The copilot had more experience than the captain in the aircraft model, with 2,500 flight hours. His previous experience in aviation was in the non-regular segment, most of which in the northern region of the country.

The stewardess had been in the company for one year and three months. She also had worked in three flights as a single cabin crew. By email, she received the revised instructions for the flight attendants' manual relative to working as a single cabin crew member. Until the day of the accident, she thought it was OK to work alone, since there were usually just few passengers on board.

Psychosocial information

Interpersonal communication in the cockpit was apparently reduced to the exchange of indispensable information.

The instructions delivered by ATC were understood in part by the copilot, and the aircraft captain may not have supervised this process.

One could think that there was poor integration between the members of the crew, as if the cockpit was independent of the remainder of the aircraft and as if the occurrences did not interrelate.

The two pilots had not yet had the experience of flying with just one cabin crew member onboard the aircraft. After the TCAS resolution advisory which led to a more abrupt maneuver, there was no concern about the possible effects on the passengers and cabin crew member.

The flight crew did not realize the seriousness of the event, and was willing to proceed to the next leg of the flight, as though what had happened had just been part of the routine. The crew was removed from the flight after following the instructions given by the company safety-sector.

Organizational information

The decision to start flying with just one flight attendant on board was made in a compartmented fashion, and the novelty was not communicated to the company aircraft captains by means of formal documents.

Management of risk was not done for implementation of the change, nor evaluation of the risks considering that a single flight attendant could suffer incapacitation in flight, as it nearly occurred in this case, in which the stewardess needed to provide assistance to the injured passenger, despite being alone.

There was not any guidance for the pilots on what should be done when the crew had that configuration.

Another aspect that is worth being highlighted is that the company was undergoing a process of expansion in the last two years, with changes (on account of growth) leading to communication difficulties between the sectors.

The safety sector and the operations management of the company were not aware of the result of an organizational diagnostic questionnaire applied to the company crew members by an outsourced organization. The audiovisual material of the classes delivered was not in the company.

The company was undergoing a renewal of training processes, which involved both operational and simulator training. The operational training was delivered to pilots and flight attendants in a de-centralized fashion. The investigation commission did not identify systems for monitoring the training of flight attendants.

The entity in charge of providing medical service when the aircraft arrived in SBGR was outsourced by the Airport administration, and according to investigation, was not knowledgeable of the aircraft interior, a fact that hindered the conduction of a prompter and more adequate action. The physicians did not have knowledge of either aerospace medicine concepts or the routine of airline companies.

As for the crew, they did not receive any kind of support after the event. The copilot was fired a few days after the occurrence.

Despite the statement of the company management that they supported the actions taken by the Safety sector, this latter was rather limited in terms of manning and support.

In comparison with the 1,160 members of flight and cabin crews (680 pilots and 480 flight attendants), the Safety sector counted on a team of just five professionals.

Only one person in the Safety sector was designated as responsible for the response-to-crisis program, and was also in charge of monitoring and delivering training to 87 bases. An outsourced company was hired to give support should the crisis room be activated, but it was not summoned following this event.

The Operational Safety Manager, in addition to his organizational duties, was identified as one of the few examiners of the company, both for enroute and simulator

checks. Thus, he was constantly required for this type of activity, and would spend a large part of his time away from the company and from the country.

1.14 Fire.

No fire occurred.

1.15 Survival aspects.

The casualty suffered fracture in the right ankle and foot. After the landing, a person who introduced itself as a professional of the medical field, told the injured passenger to get off the airplane without assistance, being severely refuted by the passenger.

In the sequence of the facts, the commission verified a lack of appropriate equipment for transporting the injured person, with a wheel chair being used as an improvised means of transportation.

The medical staff, in a later interview to the investigation commission, said that they were not familiarized with the aircraft lay-out.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

During the investigation of this accident, the commission verified that the CRM training was delivered to the company employees by outsourced organizations. The training given to the flight attendants was different from the one received by the pilots, something that went against a basic principle of this tool, namely, to allow all professionals of the company to work together in a harmonic and efficient way.

The commission also verified that the training oversight on the part of the company was not appropriate. Good oversight would have allowed identifying that the CRM training objectives were not being accomplished accordingly.

It is worth highlighting that this type of training, when appropriately delivered, also contributes to the strengthening of the flight safety culture.

The Prevention Reports (RELPREV) filed by the flight attendants had to pass through the sector manager, in contradiction with one of the four subcomponents of flight safety culture – report culture – in which the professionals feel motivated to report situations of risk, without being afraid of suffering any retaliation on account of their actions, understanding that this is the simplest way for participating in the activities of prevention. In other words, those professionals would seldom write RELPREVs.

The Safety sector was undersized for the company. There were only five people to perform all the activities related to the prevention of aeronautical accidents and incidents – including management of the RELPREV tool, investigation of aeronautical incidents and ground occurrences, educational and promotional activities aimed at prevention, supervision of the activities performed by other sectors – with direct impact on flight safety, such as, for example, CRM training and Risk Management on account of the change of the number of flight attendants on board.

1.18 Operational information.

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

The utilization of just one flight attendant for the flights of the company with this type of aircraft was in accordance with the company documentation and the regulations of the National Civil Aviation Agency.

The Flight Attendants' Manual, Rev. 03, Section 7, of TRIP *LINHAS AÉREAS*, dated 1 July 2010, reads:

The flight attendant shall assist the Captain in the tasks done in response to an emergency: he/she shall assist the passengers in relation to the procedures to be adopted, and shall coordinate all the actions aimed at the safety of the aircraft and its occupants, among other duties.

The ATR-42/72 Standard Operating Procedures (SOP) manual, dated 26 February 2008, had the objective of establishing the TRIP *Linhas Aéreas* policy relative to the operation of the ATR42 aircraft, as well as presenting the differences pertinent to the ATR72 model. In its item 3.20 (descent/approach/landing briefing), it prescribed that the restrictions of the Minimum Sector Altitude (MSA) and other remarks of the descent trajectory in relation to the relief and descent steps were to be commented in the briefing.

The Flight Crew Operation manual (FCOM) was utilized by TRIP *Linhas Aéreas* for purposes of pilot training, with focus on technical procedures and performance characteristics. All the manual contents and updates to be forwarded to the crews were controlled by the company.

In relation to the operation of the TCAS, the manual stated that the pilot should not start evasive maneuvers based just on traffic information depicted in the equipment indicator (traffic display) or following a *Traffic Advisory* alert. Such kind of information had just the purpose of facilitating the visual spotting of the pertinent aircraft by the pilots.

In the cases of *Resolution Advisory*, the pilot was to comply with the avoidance maneuver given by the TCAS, unless he considered that the maneuver would be unsafe for the aircraft. However, the FCOM clarified that making maneuvers in an opposite direction to the one determined by the *Resolution Advisory* were extremely dangerous and thus prohibited, except if the pilot was able to determine visually that the maneuver would result in safe separation.

In addition, the maneuvers were to be performed with the autopilot disengaged, so that at least the minimum prescribed by the TCAS was complied with. Moreover, the pilot was to return a.s.a.p. to the profile previously authorized by ATC after hearing the "Clear of Conflict" message.

1.19 Additional information.

The Civil Aviation Instruction (IAC) 060-1002A of 14 April 2005 served as a foundation for all the segments of the Civil Aviation System in the application of the CRM Philosophy, aiming at the refinement of operational efficiency and efficacy for the benefit of Flight Safety.

From the title *Corporate Resource Management (CRM)*, for the exclusive effects of the aforementioned IAC, one understands that the word *Corporate* was utilized to refer to all the teams composing an organization involved with air activity, such as (but not limited to) technical and cabin crews, maintenance professionals, ground and inflight operational dispatchers, ramp agents, check-in/check-out personnel, high management, administrative staff, and other segments.

The item 2 (*Definitions*) of the aforementioned IAC reads:

2.2 Corporate Resource Management (CRM) Training:

Application of modern management concepts, both in the flight deck and other operative and administrative activities which interfere in the flight, aiming at the efficient and effective utilization of all the available human, equipment, and information resources which interact in the situation.

The item 3, which refers to the basic concepts of CRM Training, reads:

3.1: The CRM concepts are based on the premise that a high level of technical proficiency is essential for the attainment of safe, efficient, and effective air operations. Knowledge of CRM concepts will never counterbalance the lack of technical proficiency. By the same token, a high level of technical proficiency will not guarantee safe operations if the entire team does not work in a coordinated manner.

3.4: The insertion of routine operation situations in the CRM training has a strong positive effect on the participants by virtue of the exercises presented, which contribute to reducing the stress at moments of high workload. Continuous CRM practice also foster satisfactory performance in situations of emergency, when time pressure demands quick response.

The item 4.2 (High Staff Commitment) highlights that:

The CRM Philosophy is best incorporated in the organizational culture when the segment made up by the high management (president, directors and managers) works in consonance with the CRM concepts, and provides the necessary resources for the implementation of training.

One of the most important CRM concepts is communication, by means of which all the management levels, in an interactive and synergetic fashion, are committed with safety culture. The presence of all CRM concepts in the various manuals of the organization, providing the different groups with guidance on procedures and necessary policies, contributes to a tacit acceptance of the CRM Philosophy and its subsequent implementation on all levels of the organization.

In order to comply with the pertinent regulation (Civil Aviation Instructions 200-1001 of 26 January 2005), containing directives relative to the Plan of Assistance to Victims of Aircraft Accidents and Support to Family Members, the company developed its own specific local plan (Assistance to Victims and Families in Case of Aircraft Accident – Guarulhos, São Paulo, dated 27 September 2001), determining procedures and establishing responsibilities for ensuring an efficient and expeditious management of crises resulting from accidents, serious incidents, and other situations capable of hindering normal operations of company aircraft.

In accordance with this document, the Flight Safety Management had the duty of delivering training and simulations at least once a year, aimed at the verification of its effectiveness. The managers, supervisors, agents, mechanics, and other workers included in the Plan, had to make sure that everyone was aware of, and familiarized with, their designated functions and responsibilities.

The 24 September 2009 Aeronautical Information Circular 24/09 (AIC 24/09) of the Airspace Control Department (DECEA) established the procedures and phraseologies to be utilized for authorizing an aircraft to climb above the level/altitude specified in a Standard Instrument Departure (SID), or to descend below the level/altitude specified in a STAR (Standard Terminal Arrival Route). The circular applied to ATS units and users of the Brazilian Airspace Control System.

The aforementioned AIC stated, as one of its general rules:

“When, as part of a STAR, an aircraft is authorized by ATC to descend to a level/altitude below the ones specified in the chart, the aircraft shall comply with the published level/altitude restrictions, unless such restrictions are explicitly cancelled by ATC.”

The item 4 of the document addressed the specific rules, especially concerning the authorization for an aircraft to descend to a level/altitude below the ones specified in the STAR. This subitem explained that, if the aircraft was authorized to descend to a level/altitude below the ones specified at a certain point of the STAR, the aircraft in question had to maintain the route of the STAR, disregarding the level/altitude restriction

for the point defined by ATC, and descend to the level/altitude authorized, complying with the other restrictions prescribed in the referred STAR.

The Command of Aeronautics' Instruction (ICA) 100-32/2008, in force from 20 November 2008 on, addressed Operational Procedures and Training Guidance for Pilots and Air Traffic Controllers in relation to the Airborne Collision Avoidance System (ACAS).

The aforementioned ICA had the purpose of publicizing information and operational procedures relative to the ACAS, as well as presenting the training directives concerning the capacities and limitations of the ACAS system. It established that the pilots had to utilize the warning generated by the ACAS for the prevention of potential collisions, for improving situational awareness, in addition to making an active search for sighting the conflicting traffic.

Under no circumstances could the procedures specified in this ICA be an impediment for the pilot-in-command to make decisions at his best discretion and with full authority for choosing the best solution for a traffic conflict or for preventing a potential collision.

The ACAS capability to perform its function of assisting the pilots in preventing potential collisions would depend on the correct and opportune pilots' response to the ACAS warnings.

The operational experience has shown that a pilots' correct response depends on the effectiveness of initial and recurrent training of the ACAS procedures.

Following the reception of a *Resolution Advisory*, the pilots must respond immediately to the RA directives unless their response jeopardizes aircraft safety.

One has to bear in mind that the traffic observed visually may not be the same that is causing the RA. The visual perception of an encounter may be erroneous, mainly at night.

Also, it's worth stressing that that it is the pilot's duty to follow the RA in case of discordance between the RA and ATC instructions

This ICA also established that, as soon as possible, subject to their workload, the crew was to notify the pertinent ATC unit of any deviation from an ATC instruction or authorization in force.

Unless informed by the pilot, an ATC unit would not be aware of an ACAS resolution advisory. It is even possible for an ATC unit to issue instructions that are in opposition with an ACAS *resolution advisory*. Then, it is important for the ATC unit to be notified of a deviation from an instruction or authorization due to conflict with the RA.

According to the instruction, the pilot also had to limit the alterations of the flight trajectory to the minimum necessary for compliance with the RA, and promptly return to the terms of the ATC instruction or authorization previously issued when the traffic conflict no longer existed, notifying ATC of his return to the authorization in force.

N.B.: The phraseology to be utilized for notification of maneuvers in response to a Resolution Advisory is contained in the ICA 100-12, "Rules of the Air and Air Traffic Services".

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

The aircraft was operating as Flight TIB5333 from SBJV to SBGR at FL230.

The flight proceeded via ASONO position, cruising at FL230.

There was coordination incorrectness on the part of the Assistant Controller at APP-SPP, since there was no publication of a STAR for SBGR starting at ASONO position.

The prevailing meteorological conditions in SBGR were VMC, with visibility higher than 10 km.

When Flight TIB5333 was about to enter the TMA in São Paulo, the crew requested the ideal heading for ASONO position.

The APP replied by asking whether they could fly direct to GURU position (a specific point of the STAR located in the intermediate segment) in order to complete the RONUT 1 STAR, the prescribed arrival procedure in SBGR. Upon receiving an affirmative answer from Flight TIB5333, APP-SP cleared the aircraft to fly direct toward GURU position. APP-SP never informed Flight TIB5333 about the arrival prescribed for landing in Guarulhos, and whether the clearance would be either “*Arrival*” or “*Via Arrival*”.

The clearance was transmitted to the aircraft while it was still flying in the area under jurisdiction of the ACC, in coordination with the Approach Control (APP) responsible for the flight of the aircraft. This procedure was adopted because the initial point of the STAR was located outside of the TMA, and it would allow the aircraft to descend without unnecessary interruptions.

In the specific case of São Paulo, any aircraft approaching the TMA would be informed of the prescribed STAR by either Curitiba ACC or Brasilia ACC, depending on the airway or approach sector. APP-SP, complying with an Operational Agreement with adjacent ATC units, informed the prescribed arrival procedures to the ACCs, so that the aircraft could receive the STAR clearance before reaching the initial point of the descent procedure.

It is important to stress that APP-SP cleared Flight TIB5333, as it entered the TMA, to fly direct to GURU position and “re-intercept” the arrival procedure at GURU. The investigation commission understands that the term “re-intercept” is not appropriate since, until checking GURU position, Flight TIB5333 would not have flown the RONUT 1 STAR profile. Anyway, considering that ACC-CW informed about the prescribed arrival in SBGR (RONUT 1), it is possible to understand why the TIB5333 crew did not question the clearance until reaching the point of intercepting the STAR (GURU position) and, therefore, any “lack of familiarization” with the Arrival in Guarulhos was ruled out.

In interviews with the pilots, it became clear that they were flying the RONUT 1 profile, but for them it was not clear whether the clearance was either “*Arrival*” or “*Via Arrival*”. However, this fact did not contribute to the accident since, between the GURU and LOVE positions, the minimum flight level was FL120.

The chart depicting RONUT 1 STAR, also had the STARs IMBEK 1 and USABA 3, and all three had the same profile after GURU position. In other words, considering that Flight TIB5333 was instructed to fly direct to GURU and “re-intercept” the arrival, doubts should not exist in relation to the minimum levels to be complied with (the RONUT 1 STAR prescribed FL120 as the minimum level between the positions GURU and LOVE).

This new clearance issued by APP-SP, coherent with the projection of the flight and of the RONUT 1 STAR, aimed at shortening the initial trajectory of the STAR, while placing the aircraft in the desired sequence within the TMA.

After receiving the instruction to “re-intercept” the arrival at GURU, Flight TIB5333 acknowledged the instruction, as follows: “*Affirm, after GURU, maintain the arrival profile*”*

(*translated from Portuguese). The word “re-intercept” utilized by APP-SP is not contained in the ICA 100-12 (2009). Nor is the expression “maintain the arrival profile” utilized by Flight TIB5333. “*Maintain the profile*” was an expression which, although not prescribed in the legislation, was frequently utilized by pilots and air traffic controllers. Since it is not listed in the SISCEAB definitions, the expression may become vague for a number of procedures, especially in the case of a STAR. Such situation may originate doubts and lead to unnecessary risks.

The DECEA Aeronautical Information Circular (AIC) 24/09 established the procedures and phraseologies to be used for authorizing an aircraft to climb above the level/altitude specified in a SID (Standard Instrument Departure), or to descend below the level level/altitude prescribed in a STAR (Standard Terminal Arrival Route), and was applicable to both ATS units and users of the Brazilian Airspace Control System. The procedures described in the item 1.19 of this report clarify that, in order to authorize a descent below the level/altitude specified in a STAR (FL120, in the case of the RONUT 1 STAR), the ATC unit has to explicitly cancel the restriction.

Flight TIB5333, while flying toward GURU position, was cleared by ATC to descend to the levels FL180, FL150 and then FL120, with the crew acknowledging the sequential level instructions transmitted by ATC. After clearing Flight TIB5333 to descend to FL120, APP-SP informed that after checking GURU position the aircraft was to “intercept the arrival”, and the aircraft acknowledged by saying “Affirm, after GURU, maintain the arrival profile”.

Next to GURU, Flight TIB5333 reached FL120. However, the copilot (who was the *pilot flying* at that moment) selected FL100 on the “altitude select”. FL100 was the minimum level at FAET (next position after GURU), and thus the aircraft continued descending to this level.

As the aircraft was passing FL117, the crew was alerted about essential traffic at the 9 o'clock position, climbing to FL100. The traffic in question was a GOL *Linhas Aéreas* aircraft which had departed from SBSP. Flight TIB5333, still descending, acknowledged the alert, stating that they were cleared to FL120 and that they were flying “*Via Arrival*” (an indication of the crew’s poor situational awareness).

Noticing that Flight TIB5333 continued descending (it had already passed FL115), APP-SP told the aircraft to level off at FL110. As it was about to reach FL110, the aircraft received a “*Traffic Advisory*” and, shortly after, a “*Resolution Advisory*”. The copilot (PF) performed an evasive maneuver, climbing approximately 500 ft (coming back to FL115). Upon hearing the “*Clear of Conflict*” message, the copilot put the aircraft in an abrupt pitch-down attitude, causing a “negative G”. A female passenger, who was standing at the moment, was thrown upward (with her head hitting the aircraft ceiling), and fell back on the floor, fracturing her right foot.

The investigation commission understood that the captain did not realize that the copilot was neither complying with the procedure prescribed for the descent, nor following the ATC instructions appropriately.

In relation to procedure standardization, the Standard Operating Procedures required a descent briefing, which contemplated, among other important issues, the Minimum Sector Altitude (MSA) and other aspects of the descent trajectory on account of the relief and descent steps, as well as the description of the entire approach path and landing (either VFR or IFR), including point and trajectory of a contingent missed approach procedure.

If the briefing had been done as required, the minimum flight level (FL120) would have been commented by the crew (copilot/captain), and their situational awareness would have been enhanced. The captain did not notice that the copilot had selected FL100 on

the “altitude select”, an indication of the low situational awareness of the crew in the cockpit.

At interviews with several employees of the company, the commission learned that the CRM training in the company was delivered in a rather incoherent and isolated manner. It went against the prescriptions of the IAC 060-1002A, which recommends that *Corporate Resource Management* – CRM was to be utilized for qualifying and motivating all the teams of an organization involved with air activity.

Still according to the aforementioned IAC, the CRM training aimed at creating opportunities for the group to practice and develop leadership and teamwork concepts, in accordance with the real role played in the team.

In this aeronautical accident, it became clear that there was lack of integration between the members of the crew, as if the cockpit was independent of the rest of the aircraft, and as if that occurrence would not affect the flight as a whole. Such fact reflects the way CRM training was dealt with within the company – just as “*Cockpit Resource Management*”. There was poor coordination between the stewardess and the pilots. No instructions were given by the captain in relation to the passengers de-boarding (including the injured passenger) after landing.

The stewardess, who fell on the floor during the TCAS evasive maneuver, gave instructions to the injured female passenger and to the passengers who helped her during the final phase of the descent and landing of the aircraft. The stewardess’ initiative, despite the lack of instructions from the flight deck, contributed to calming down both the injured passenger and the other passengers. After the aircraft landed, it was the stewardess who coordinated the de-boarding of the passengers (including the injured woman), again without any instructions being given by the aircraft captain.

The inclusion of situations involving routine operations in the CRM training, especially in the simulator, has a strong positive effect on the participants, because the exercises contribute to reducing the stress in moments of high workload. In other words, both common normal day-to-day and abnormal situations are practiced with great benefits to flight safety. Also, the continuous practice of emergency situations allows for a satisfactory performance of the crews during real emergency situations, when they need to provide a quick response while being pressed for time.

In the case of the TRIP Linhas Aéreas, different institutions provided training to its different sectors, creating a conflict within the very CRM philosophy, which aims at demonstrating the importance of integration between the sectors in relation to the work to be done. Such incoherence became evident when neither the Flight Safety Sector nor the Operations Management was knowledgeable of the results of the organizational diagnostic questionnaire applied to the crews. The commission also learned that the company (TRIP) was undergoing changes in the processes of training involving both the instruction and the simulator.

The IAC 060-1002A highlighted that TRIP *Linhas Aéreas* had to create a quality control for the CRM training delivered, with monitoring and periodical identification of the demands, so that the training might meet the needs. In other words, a quality control capable of ensuring that the main objectives of the training – efficiency, involvement of everyone in the company, assertiveness, situational awareness, and flight safety – were being fully accomplished.

The investigation commission also identified that the experience of the crew members was different in terms of total flight hours and hours in the aircraft, as well as in terms of time working for the company. Such differences (flight experience, pilots’ culture, and, especially, quality and philosophy of the CRM training delivered by TRIP Linhas Aéreas) were decisive for the (lack of) interaction of the crew (lack of synergy).

TRIP *Linhas Aéreas* followed the ATR aircraft FCOM, utilized by ATR-72 and ATR-42 crews for purposes of training. According to this manual, TCAS evasive maneuvers were to be made with the autopilot disengaged, and limited to the minimum necessary for complying with the *Resolution Advisory* (RA). Still according to the manual, the pilot had to return to the level previously authorized by ATC as soon as the “*Clear of Conflict*” message appeared to the pilot performing the evasive maneuver.

Although the Operations Training Program of the company required, in the initial and recurrent training, the utilization and operation of the TCAS with the objective of allowing the pilot to understand the norms, requirements and procedures for operating the equipment (evasive maneuvers included), the performance of the pilots in this accident shows that the training delivered by TRIP *Linhas Aéreas* was not sufficient to qualify the pilots, especially the copilot, to make the maneuver with safety without exposing the passengers to unnecessary risk.

On the occasion of this accident, it became evident that the copilot, who was the pilot flying (PF), made abrupt inputs on the aircraft controls during the evasive maneuver. This can be said because, in interviews with the crew members, the commission identified that the stewardess, who was standing near the lavatory door, fell at the beginning of the maneuver (on account of positive G).

The copilot with the intention of doing what was required upon completion of the maneuver (return to the flight level previously authorized - FL110), made it in an abrupt manner, causing the female passenger to fall and get hurt.

Another fact that points toward deficiency in the TCAS training was the lack of compliance on the part of the PR-TKB with the required by the legislation (“*as soon as possible, when crew’s workload permits, notify the appropriate ATC unit of any RA requiring deviation from ATC instruction or authorization in force*”). In this event, APP-SP was not notified of the maneuver by the aircraft pilots (although the aircraft was seen on the radar screen climbing from FL110 to FL115).

Considering: - that the pilots had not initially perceived that they had descended below FL120 (the minimum flight level prescribed between GURU and LOVE positions; - that the crew was alerted by APP-SP to level off at FL110; - that they were also alerted by APP-SP about essential traffic leveling off at FL100; - that the pilots were alerted by APP-SP to level off at FL110 when they were passing FL115, with the captain acknowledging the message by saying that the aircraft had been authorized to descend to FL120 and Via Arrival; and finally – that they received a “*Traffic Advisory*” followed by a “*Resolution Advisory*” – it may be said with a high level of accuracy that the pilots’ situational awareness was low.

As for the company’s decision to start flying with just one flight attendant on board: the decision was made in isolation, with the information not being passed to other sectors which would be either directly or indirectly affected by the decision.

This only reinforces that the various sectors of TRIP *Linhas Aéreas* showed poor interaction and information exchange. There was neither evaluation nor management of the risk for the implementation of the change. For example, situations of risk that, due to number of reasons, might render a flight attendant incapacitated for flight were not evaluated.

The flight attendants’ manual had not been updated / adapted in relation to this change. None of the company pilots was officially informed of the change affecting their crews (only one flight attendant on board). There wasn’t any guidance on the part of the company on how to behave in normal or emergency situations with this type of crew configuration. No training was delivered to the company employees after implementation

of the change. On this flight, for example, the captain did not mention the peculiar condition of having just one flight attendant on board during the briefing of the crew.

In other words, an abnormal situation, due to lack of prescribed procedures, could get worse with unpredictable consequences. Such an important change requires evaluation of risk and the implementation of mitigating measures to suppress or reduce the risk to an acceptable level.

As for the *Guarulhos* Local Emergency-Plan for Assistance to the Victims and Their Families, the investigation commission verified that the support provided to the injured person did not comply with the prescriptions of the IAC 200-1001, which established the actions to be taken by the company for the provision of assistance, services and information to the victims, as well as support measures to family members, indicating once again lack of interaction between the different sectors of the company, and lack of interaction between the company and the aerodrome operator.

From the investigation of this accident, the commission concluded that the flight attendants did not have motivation for utilizing the Prevention Reports, the most important tool for preventing accidents. All pieces of information relative to crewmembers had to pass either directly or indirectly through the management.

For a reporting system like the RELPREV to be successful, some characteristics have to be preserved, such as, for example, voluntariness, confidentiality of the source, provision of feedback to the originator (when the RELPREV is identified), and dissemination of the lessons learned to everyone in the organization.

Thus, upon requiring the RELPREV to pass through the flight attendants' management before it finally reached Safety, that sector demotivated the prevention cycle, many times leading crewmembers to not report events connected with the prevention of accidents on account of fear, depriving the flight safety professionals of necessary information for monitoring processes and, mainly, for developing activities aimed at prevention.

In relation to the company's Operational-Safety sector, the commission verified that the number of dedicated persons and the support received were rather limited in comparison with the size of the organization, hindering an efficient execution of aeronautical accident prevention actions.

For the execution of the various programs, these activities require a widespread capillarity within the company for the dissemination of the concepts associated with flight safety. It is important to highlight that this sector is also responsible for launching investigation of events (e.g., aeronautical incidents and ground occurrences), as well as for analyzing prevention reports.

With a more active Safety sector, a more efficient communication channel would be established (or enhanced), in the effort for a better utilization of the various prevention tools. It is worth noting that a more active Safety sector contributes to the development of flight safety culture within the organization, favoring a more effective response to contingent adversities, and, especially, the identification of latent conditions.

The prevention of aeronautical accidents and incidents is crucial for the success of airline companies, a personal value for the employees of these organizations, and a source of advantages capable of strengthening any institution. The activities of prevention induce all personnel to believing that accidents can and, therefore, must be prevented. An effective Flight Safety Management System requires a systemic approach for the development of the flight safety policy, procedures and practices, allowing the organization to accomplish the objectives related to the prevention of accidents.

The main responsibility in terms of accident prevention belongs to the high staff of the company and must, of course, involve all the employees. Few people will give proper value to the prevention of accidents (and be motivated for active participation) if they do not recognize its importance for the company. This is made possible by means of the policy established and demonstrated by the high management through words and deeds.

Flight safety constantly requires changes in the various sectors of the company, and this, sometimes, means investments. On account of this characteristic, the most important person for the prevention of accidents is not the flight-safety manager, but another authority with power and the necessary resources for implementing the changes: the company president (high management).

If the high management is not genuinely (and visibly) interested in the prevention of accidents, practically nobody in the organization will pay due attention to this area and, also, to the principle that the attitudes of the company professionals reflect the flight-safety culture of the company managers.

The company management staff has both the authority and responsibility for managing the risks within the organization, and this may be accomplished by means of a systematic method for the identification of hazardous situations and management of risk, aimed at suppressing, reducing, or mitigating the factors of risk. Only the high management has the appropriate tools for implementing the necessary changes in the organization structure, personnel, equipment, training, policies, and procedures.

A sector responsible for managing the prevention activities, connected with (and being supported by) the high management of the company, with an appropriate number of persons in relation to the size and complexity of the organization, would be efficient and effective in the development of various activities related to the prevention of aeronautical accidents and, especially, to the strengthening of flight-safety culture.

In this accident, the following series of latent conditions was present in the system and became evident during the investigation:

- a) CRM-training problems –
 - Different companies providing CRM (*Corporate Resource Management*) training;
 - (Lack of) routine situations in the training;
 - Guarulhos Base not ready for dealing with abnormal situations;
 - Training-supervision deficiency;
 - Deficiencies in the control of quality / performance in the different types of crew training;
- b) Deficient Flight-Safety Culture;
- c) Problems in the compliance with SOP and manuals (descent briefing, for example);
- d) Lack of interaction between the various sectors of the company;
- e) Risk Management Failures;
- f) Lack of systems for monitoring crew training;
- g) Little use of the RELPREV tool on the part of the flight attendants;
- h) TCAS training deficiencies: and
- i) Reduced staff for management of flight-safety.

This accident, which may be characterized as an organizational accident, could have been prevented through the development and maintenance of a healthy safety-culture, in which every professional is qualified, motivated, and committed to accident prevention and, throughout all levels of the organization, considers the flight-safety impact resulting from everything they do.

3. CONCLUSIONS.

3.1 Facts.

- a) The pilots held valid Aeronautical Medical Certificates (CCF);
- b) The pilots had valid Technical Qualification certificates (CHT);
- c) The pilots had qualification and enough experience for the type of flight;
- d) The aircraft had a valid airworthiness certificate;
- e) The aircraft was within the weight and balance limits;
- f) The aircraft departed on an IFR flight plan from SBJV, destined for SBGR;
- g) The copilot was the Pilot Flying (PF);
- h) ACC-CW informed that the STAR prescribed at SBGR was RONUT 1;
- i) APP-SP instructed the PR-TKB aircraft to proceed to GURU position direct;
- j) APP-SP did not clarify whether the clearance after GURU position would be "Cleared Arrival" or "Cleared Via Arrival";
- k) The PR-TKB aircraft was authorized by APP-SP to descend to FL180, FL150, and then to FL120, heading for GURU position;
- l) Upon checking GURU position, the PR-TKB aircraft continued descending below the FL120 restriction;
- m) When passing FL117 (descending), the PR-TKB aircraft was warned by APP-SP of the existence of essential traffic climbing for FL100;
- n) The PR-TKB aircraft continued descending, and, since it had already passed FL120, was re-cleared by APP-SP to maintain FL 110, on account of the proximity with flight GOL1516, which was performing an SID from SBSP, climbing to FL100;
- o) Upon realizing that the PR-TKB aircraft was still descending (it had already passed FL115), APP-SP told the aircraft to level off at FL110;
- p) Practically at FL110, the PR-TKB aircraft received a *Traffic Advisory*, and shortly after, a *Resolution Advisory*;
- q) The copilot made an evasive maneuver, climbing approximately 500 ft;
- r) Upon finishing the maneuver (message "*Clear of Conflict*"), the pilot put the aircraft in a abrupt pitch-down attitude, generating a negative G-force;
- s) A female passenger, standing on the aisle at the time of the abrupt maneuver, was thrown upwards, hit the ceiling of the aircraft with her head, and fell, fracturing her right foot;
- t) The captain did not perceive that the copilot was neither following the procedure prescribed for the descent, nor appropriately complying with ATC instructions, thus performing a non-standard arrival procedure.
- u) There was poor coordination between the stewardess and the pilots. There were no instructions from the captain concerning the disembark of the passengers (including the injured one) after landing;

- v) The crew was removed from the flight after following the instructions given by the company Safety sector, but the aircraft continued the flight, resulting in loss of important data in terms of investigation;
- w) There was no damage to the aircraft; and
- x) A female passenger suffered serious injuries; and
- y) None of the other aircraft occupants (crew and other passengers) was injured.

3.2 Contributing factors.

- **Control skills – a contributor.**

The copilot made an evasive maneuver and, upon completion, made an inadequate pitch-down input, causing a “negative G-force”. The female passenger, who was standing at the moment, was thrown upwards, hit the ceiling of the aircraft with the head and fell on the floor, fracturing her foot.

- **Attention – a contributor.**

The crew did not conduct the descent briefing prescribed in the company manuals. Such procedure would have raised the awareness of the pilots relative to the altitudes prescribed for the RONUT 1 STAR, as well as the procedures to be performed in the cockpit.

The captain did not perceive that the copilot was neither following the prescribed descent procedure nor adequately complying with the ATC instructions (a non-standard procedure was being performed). He also failed to monitor the indication of the instruments that were showing the aircraft altitude.

- **Organizational climate – undetermined.**

The company was undergoing a re-structuring process on account of growth, which created an unstable organization climate due to the confusing unmonitored expansion of the sectors.

- **Communication – a contributor.**

An error occurred at the moment of informing the descent to the PR-TKB, without clear definition of whether the STAR was to be complied with “Via Arrival” or “Arrival”. In addition, both controllers and pilots utilized non-standard phraseology.

There were faulty communication processes between the crew members during their response to the RA, between the captain and the stewardess in the management of the accident, between the airport staff in the handling of the injured person, and, finally, between the various sectors of the company (Safety, operations, flight attendants, and training) on account of lack of interaction of important processes for the prevention of accidents, such as CRM training and alteration of the number of crewmembers in the ATR-42 aircraft.

- **Cockpit coordination – a contributor.**

Apparently, communication between the crewmembers was kept to a minimum. Besides, it seemed as if the tasks were not coordinated, and the members of the crew were working in isolation.

There was no interaction between the pilots themselves, as well as between the pilots and the stewardess.

- **Work-group culture – a contributor.**

The group was refractory to the accident, did not recognize its seriousness, and went on as if the occurrence was just something normal. The crew was removed from the flight after following the instructions of the company Safety. The aircraft, however, proceeded with the flights programmed, and, thus, important data for the investigation was lost.

- **Organizational culture – a contributor.**

The organizational culture did not favor flight safety. The Safety sector, understaffed, was not effective in its actions of accident prevention management. The reports relative to situations of risk did not always arrive in the Safety sector on account of faulty organizational processes, thus affecting the efficacy of the reactive prevention-methods.

- **Navigation deviation – a contributor.**

The RONUT 1 STAR chart prescribes that the aircraft must consider FL120 as the minimum level between GURU and LOVE positions. Close to GURU, the PR-TKB aircraft reached FL120, but continued descending to what would be initially FL100, since this was the value of the “altitude select”.

This fact (descent to FL110), below the minimum altitude prescribed in the RONUT 1 STAR for that segment, configured an unintentional crew deviation from a standard arrival procedure.

- **Team dynamics – a contributor.**

The dynamics of the teams (crews) did not work properly in relation to the processes of team integration, training, flight attendants, and Safety of the company, as well as in terms of the flight, with poor management in the cabin and poor management of the accident.

- **Training – a contributor.**

The CRM training in the TRIP Linhas Aéreas was done in a disconnect way, with different enterprises providing training to the different sectors of the organization. This fact generated antagonism within the very CRM philosophy, whose objective was, namely, to show the importance of integration of the different sectors in relation to the work to be done.

Another fact identified during the investigation was that the training was delivered in a de-centralized manner to pilots and flight attendants, and topics common to them were treated differently. The commission did not identify systems for monitoring the training of pilots and flight attendants, with consequences for the quality and efficiency of the training delivered.

- **Use of phraseology by ATC units – undetermined.**

By utilizing terms not prescribed in the standard phraseology, such as “Re-intercept the Arrival”, APP-SP may have contributed to diminishing the crew’s situational awareness.

- **Leadership – a contributor.**

The captain did not work in an effective manner, since he failed to monitor processes in the cabin. The pre-flight briefing was not carried out. Such briefing was necessary, among other reasons, due to the fact that there was just one flight attendant on board, a situation that was new in the company.

The captain did not respond appropriately when the copilot failed to comply with the procedure prescribed for the descent and with the instructions given by ATC. He also failed to alert the copilot, when this latter made abrupt inputs in the controls during the

evasive maneuver (TCAS). The captain also failed to instruct the crew on how to handle the injured passenger's situation.

- Perception – a contributor.

The PR-TKB, while heading for GURU, was cleared to descend for FL180, FL150, and, finally, FL120, with the crew Reading back the respective instructions. After clearing the aircraft to descend to FL120, APP-SP told the PR-TKB that, upon checking GURU, it had to “re-intercept the arrival”, to which the aircraft acknowledged: -“Affirm, after GURU, maintain arrival profile.” The copilot, who was the pilot flying, selected FL100 in the “altitude select”. This level was the minimum at FAET position (the next position after LOVE). The captain did not perceive this fact on account of his own poor situational awareness. There was also lack of perception of the seriousness of the RA and its probable consequences on the part of the pilots.

- Organizational processes – a contributor.

The organizational processes showed lack of integration: the decision to start flying with just one flight attendant on board was made in an isolated manner, without involvement of other sectors of the company; no-one conducted a management of the risk for the change, indicating that the group did not have perception that the processes were systemic.

- Managerial oversight – a contributor.

In this accident, a series of latent conditions, allowed to exist at the management level of the organization, was present in the system and became apparent during the investigation. Such failures reflected deficiency of supervision on all management levels of TRIP *Linhas Aéreas*.

4. SAFETY RECOMMENDATION.

A measure of preventative/corrective nature issued by a SIPAER Investigation Authority or by a SIPAER-Link within respective area of jurisdiction, aimed at eliminating or mitigating the risk brought about by either a latent condition or an active failure. It results from the investigation of an aeronautical occurrence or from a preventative action, and shall never be used for purposes of blame presumption or apportion of civil, criminal, or administrative liability.

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

Recommendations issued at the publication of this report:

To the National Civil Aviation Agency (ANAC):

A-582/CENIPA/2014 - 01

Issued on 29/07/2016

Take the necessary measures before the companies operating under the RBAC 121, in order to guarantee that the CRM training be appropriate to the reality of the individual companies, being constantly evaluated and reinforced (through the participation of the high management), involving all the company professionals, guaranteeing the integration of the various corporate sectors, and, above all, making it become part of the flight safety culture of the organization.

A-582/CENIPA/2014 - 02**Issued on 29/07/2016**

Take the necessary measures before the *Guarulhos* International Airport Administration aiming at the delivery of both theoretical and practice training regarding the provision of assistance to persons injured in accidents with the main types of aircraft operating at that Airport, especially those of the Regular Air Transport, with emphasis to aircraft lay-out and methods for rescuing passengers from the aircraft.

To the Airspace Control Department (DECEA):**A-582/CENIPA/2014 - 03****Issued on 29/07/2016**

Provide guidance to the subordinate organizations concerning faithful compliance with the prescriptions contained in the item 5.9.3 of the ICA 100-37 (dated 28 April 2014), and item 2.3.3 of the MCA 100-16 (dated 18 November 2013).

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On September, 1th 2016.

