

COMMAND OF AERONAUTICS
AERONAUTICAL ACCIDENT INVESTIGATION AND
PREVENTION CENTER



FINAL REPORT
A - 003/CENIPA/2014

<u>OCCURRENCE:</u>	ACCIDENT
<u>AIRCRAFT:</u>	PT-OQR
<u>MODEL:</u>	C208
<u>DATE:</u>	09 JULY 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.

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SYNOPSIS

This is the Final Report of the 9 July 2012 accident involving the model C208 aircraft, registration PT-OQR. The accident was classified as skydiving operation.

During a flight for dropping skydivers (one in solo jump and two other skydivers in tandem jump), the aircraft collided with the solo skydiver.

The solo skydiver suffered fatal injuries. The other two were seriously injured.

The aircraft sustained damage to its left wing.

An Accredited Representative of the NTSB (USA's National Transportation Safety Board) and two class entity representatives of the Brazilian Confederation of Skydivers were appointed for participation in the investigation.

GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	(Brazil's) National Civil Aviation Agency
ATS	Air Traffic Services
CBPq	Brazilian Confederation of Skydivers
CCF	Medical Certificate
CENIPA	(Brazil's) Aeronautical Accident Investigation and Prevention Center
CHT	Technical Qualification Certificate
FAI	International Aeronautical Federation
IFRA	Instrument Flight – Airplane
IFR	Instrument Flight Rules
IPC	International Parachuting Commission
Lat	Latitude
Long	Longitude
LPQD	Skydive Drop
MNTE	Airplane, single engine, land (ASEL)
PCM	Commercial Pilot (Airplane)
PPR	Private Pilot (Airplane)
RBAC	Brazilian Civil Aviation Regulation
RTA	Technical Manager of Activities
SDOI	ICAO location designator – National Parachuting Center, Boituva, SP
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SIPAER	Aeronautical Accident Investigation and Prevention System
SOP	Standard Operating Procedures
STJD	Superior Tribunal of Sport Justice
TAC	Conduct Adjustment Agreement
UTC	<i>Coordinated Universal Time</i>
VFR	<i>Visual Flight Rules</i>
VNE	Never Exceed Speed

AIRCRAFT	Model: C208 Registration: PT-OQR Manufacturer: Cessna Aircraft Co.	Operator: <i>Clube Escola Flyfactory de Paraquedismo.</i>
OCCURRENCE	Date/time: 09 July 2012 / 17:00 UTC Location: <i>Centro Nacional de Paraquedismo</i> (National Parachuting Center) Lat. 23°17'53"S – Long. 047°41'31"W Municipality – State: Boituva – São Paulo	Type: Skydiving Operation

1 FACTUAL INFORMATION

1.1 History of the occurrence

The aircraft departed from SDOI on a skydiving flight for the dropping of two groups of skydivers.

Upon reaching the altitude of 14,000 feet (FL140), the first group (four skydivers) was dropped.

Then, the second group was launched (one solo skydiver, plus two skydivers in tandem jump).

About ten seconds after leaving the aircraft, the three skydivers were on a free fall, when a collision occurred between the aircraft and the solo skydiver.

1.2 Injuries to persons

Injuries	Crew	Passengers	Third Parties
Fatal	-	-	01
Serious	-	-	02
Minor	-	-	-
Uninjured	01	-	-

1.3 Damage to the aircraft

There was damage to the left wing leading edge (breaking of the landing light) and to the Pitot tube.

1.4 Other damage

Nil.

1.5 Personnel information

1.5.1 Information on the crew

HOURS FLOWN	
	PILOT
Total	6,500:00
Total in the last 30 days	48:00
Total in the last 24 hours	06:00
In this type of aircraft	800:00
In this type in the last 30 days	48:00
In this type in the last 24 hours	06:00

NB.: Data obtained from the pilot's flight log records.

1.5.1.1 Professional formation

The pilot did his Private Pilot course (Airplane category) in the *Aeroclube de Guaratinguetá* (State of São Paulo) in 1999.

1.5.1.2 Validity and category of licenses and certificates

The pilot had a Commercial Pilot license (airplane category) and his ASEL was valid.

The validity dates of his instrument rating and skydive dropping qualifications had expired.

1.5.1.3 Qualification and flight experience

Despite the pilot's experience for the type of flight, his skydive dropping qualification was out of date.

1.5.1.4 Validity of medical certificate

The pilot's aeronautical medical certificate validity date had expired.

1.6 Aircraft information

The aircraft (SN20800219) was manufactured by Cessna Aircraft in 1992.

The airworthiness certificate was valid.

The airframe, engine and propeller logbooks had up-to-date records.

The last inspection of the aircraft ("100 hours" type) was carried out by the *Triângulo Manutenção de Aeronaves* workshop in the municipality of Vera Cruz, State of São Paulo, on 21 June 2012. After the inspection, the aircraft flew 41 hours and 4 minutes.

The last overhaul of the aircraft ("1,600 hours" type) was carried out by the *Triângulo Manutenção de Aeronaves* workshop in Vera Cruz, São Paulo, on 6 July 2011. The aircraft flew 583 hours and 1 minute after the overhaul.

1.7 Meteorological information

Prevailing weather conditions were VMC.

1.8 Navigational aids

Nil.

1.9 Communications

Nil.

1.10 Aerodrome information

The private aerodrome was managed by the *Centro Nacional de Paraquedismo – CNP* (National Parachuting Center). Operation was VFR during day and night time.

The aerodrome had a dirt runway, with thresholds 06/24, measuring 700m x 30m, at an elevation of 2,051ft.

There was no ATS unit. Refueling was available.

1.11 Flight recorders

Neither required nor installed.

1.12 Wreckage and impact information

The left wing of the aircraft hit the solo skydiver. There was damage to the left wing leading edge (ripping and denting), landing light and Pitot tube.

The aircraft flying characteristics were not significantly changed after the impact. The pilot said that he felt the collision and noticed the damage, but managed to control the aircraft satisfactorily up to landing in Boituva.

The tandem jump skydivers and witnesses on the ground reported not having sighted the collision between the aircraft and the solo skydiver.

At an interview, one of the witnesses informed having observed the fast rate of closure between the solo skydiver and the tandem jump skydivers.

Another witness reported having become surprised by the aircraft passing very close to the skydivers. From the video that was made, the investigation commission considered that the aircraft may have collided with the tandem jump skydivers, soon after it hit the solo skydiver.



Figure 1 - Croquis of the moment of collision.

1.13 Medical and pathological information

1.13.1 Medical aspects

The medical aspect related to the aircraft pilot was not investigated.

In relation to the solo skydiver, who perished in the collision, the necropsy result of the Corpus Delicti Evidence report n. 159/2012 (Team of Forensic Expertise of Itapetininga, State of São Paulo, determined that the death cause was traumatic brain injury on account of a contusing agent.

The report aforementioned did not show results concerning alcoholic or toxicological dosage.

1.13.2 Ergonomic information

Nil.

1.13.3 Psychological aspects

1.13.3.1 Individual information

There was a friendly environment between pilots and skydivers, as learned from the investigation. In the flight in question, the pilot and the fatally injured skydiver had been friends for 12 years.

In relation to the moments preceding the accident, no evidence was found of pilot's tiredness or stress, capable of having influenced him in the psychological aspect.

1.13.3.2 Psychosocial information

Images in the folders of the local skydiving schools, as well as pictures in promotional material and in the classrooms of the majority of the skydiving schools of the municipality of Boituva, State of São Paulo, depicted photographs of skydiving aircraft in a vertical diving attitude. Other skydivers still in the air also appeared in the photographs.

This type of culture of photographing and filming the skydive also exists in other countries. An abundance of such material may be found in the social media on the internet.

Moreover, the fact that skydiving, being a sport activity, sometimes requires the jump to be recorded by means of a camera for a later evaluation on the ground.

1.13.3.3 Organizational information

In the organizational context, the diving of aircraft after dropping the skydivers was not prohibited by the CNP (National Parachuting Center).

It was considered an *extreme* maneuver – thus similar to the very sport with which it was associated – and it could be seen that the majority of the pilots liked to perform it.

There was also a habit of making a low pass over the CNP with all the aircraft, marking the closing of the activities for the day.

During the maneuvers aforementioned, the pilots had a feeling of “participating in the action” not as support providers, but as protagonists in the same manner of the skydivers.

Since skydiving is an intrinsically risky activity, the skydivers were requested to sign a disclaimer for the case of an accident. The wording of the disclaimer was as follows:

“The Passenger/Student/Athlete, upon signing this term, exempts the (NAME OF SCHOOL), the (NAME OF AIRCRAFT OPERATOR) and the BRAZILIAN PARACHUTING CONFEDERATION, as well as its managing staff, employees, representatives, agents, pilots, instructors and institutors of any nature, from every and any responsibility on account of material, personal, or moral damage to his/her image, or from any other type of damage, which may be result to him/her.”

1.14 Fire

There was no fire.

1.15 Survival aspects

Nil.

1.16 Tests and research

After the accident, the images recorded by the camera attached to the helmet of the solo skydiver were requested from the local police. This material was made available to the investigation commission.

Fourteen months after the occurrence, the commission received from the police department of Boituva, the technical report no. 327360/12 prepared by the forensic department of Sorocaba, State of São Paulo, containing the transcript of the video made by the camera.

1.17 Organizational and management information

The skydiving sport is regulated by the CBPq (Brazilian Parachuting Confederation).

Eighteen schools compose the National Parachuting Center in Boituva, State of São Paulo. The location, known as “national parachuting capital” concentrates the majority of the amateur and professional activities related to skydiving in Brazil.

The Brazilian rules, in turn, are in agreement with the rules of the International Parachuting Commission (IPC), which belongs to the International Aeronautical Federation (*Fédération Aéronautique Internationale – FAI*) whose headquarters is in Lausanne, France.

Each school has a person who is the technical manager of the activity (RTA), under the RBAC 105 (Parachute Jumping) and under the CBPq’s Sport Code.

One of the characteristics of the skydiving operation is that it involves the performing of several landings and takeoffs per day.

For the “passengers” (lay people in tandem jump with experienced skydivers), a video of the jump experience was made by a solo skydiver with a camera attached to his/her helmet, or by the very instructor with a camera attached to his/her wrist.

In the first situation mentioned above, the video was used for evaluation of the jump training.

The prevailing organizational culture in the environment of skydiving operations led to two situations which, in correlation, were detrimental to flight safety.

Aircraft pilots would utilize high rates of climb/descent with the purpose of reaching the ground more quickly and do a larger number of flights with skydivers.

In addition, diving was a common practice, with the pilot pointing the aircraft nose toward the ground, while controlling the engine power so that the Never Exceed Speed was not surpassed.

The airplane/skydiver proximity was encouraged, since, in addition to the emotion of the proximity by itself, one could possibly take a photograph or make a video of a moment considered as the “trade mark” of the activity: an aircraft diving alongside skydivers, a scene that translated the “plasticity” of this type of sport.

In the flight in question, it was not clear whether or not such photographic record was to be obtained.



Figure 2 – Images obtained on the internet (Brazil and abroad) and from skydive schools, showing the culture of taking photographs of “a diving plane *versus* skydivers”.

1.18 Operational information

Skydiving flights were a routine in Boituva, State of São Paulo; the location had eighteen companies operating flights with aircraft of their own or belonging to other operators.

Such activity was continuous during daytime on weekends and holidays, as was the case on July 9, a holiday in the State of São Paulo.

The CNP of Boituva promoted an average of one hundred thousand jumps annually, corresponding to more than 1,500 jumps per weekend.

This reality resulted in a big commercial competition involving the CNP schools, since 90% of the jumps were in tandem, which generated revenues for the institutions.

The ANAC RBAC 105, EMD 00, dated 24 May 2011, is the regulation governing the skydiving in civil aviation.

The regulation details issues such as qualification, issuance of NOTAMs, airspace classification, type of aerodrome, and weather conditions to be observed, to name but a few.

Additionally, there are the Brazilian Parachuting Regulation and the CBPq Sport Code.

These regulations refer to aspects related to administration, competition and safety.

The CBPq Sport Code document explains the role of the Technical Manager of Activities (RTA), besides presenting the Code, which deals with issues such as documentation and compliance with CBPq rules.

This same Sport Code prescribes the holding of a briefing involving aircraft pilots and skydivers only for high altitude jumps, i.e., above 20,000 feet AGL.

Neither the Brazilian civil aviation authority rules nor the sports rules disciplined the issue of aircraft/skydiver proximity as a risk to be prevented.

In an informal fashion, one of the skydivers of the group that was going to jump would assume the task of informing the pilot and “the air traffic controller” of the CNP about general data related to the jump, such as the existence of a novice skydiving trainee, for

example. "Air traffic controller" was an expression used by the CNP to refer to the professional on the ground responsible for the coordination of the jumps, maintaining a two-way radio contact with the various aircraft in the drop zone.

This person, who stayed on the ground and was in radio contact with the pilots, had visualization of both the traffic and the jumps, and would advise an aircraft, for example, of the position of another aircraft in the area, as well as the position of the skydivers in the air.

His work was not standardized by any formal document. On the day of the accident, no one was doing this job. It was not required by regulations.

The accident occurred in the eleventh sortie of the day. It was the first flight after lunchtime. On weekends, up to 20 flights (20 minutes each on average) were operated by a given pilot.

In the accident flight, an operational evaluation of the tandem jump skydiver was under way. He was doing an instructor course.

It was the second team to jump from the aircraft in that flight. The jumps were from an altitude of 12,000ft AGL.

There had been a briefing for the skydivers, but the pilot in command was not present.

The rules prescribed coordination between the skydivers, but did not detail the safety standards in terms of coordination between the pilot and the skydivers. The rules did not specify any safe after-drop spacing between aircraft and skydivers.

The fatally injured skydiver had jumped from the aircraft before the two tandem jump skydivers. His intention was to make a video of the movements made by the two skydivers in tandem jump.

The objective was to use the video for evaluation of the instructor that had jumped in tandem with another skydiver (he was doing a course to become a "pilot", a qualification required for taking a "passenger" with him in tandem jumps).

It should be noted that, in skydiving, the word "pilot" is used in reference to a graduated skydiver. In this report, however, this word will be used to refer only to the aircraft crew member.

In this evaluation jump, three loopings had to be made by the tandem jump skydivers in free-fall.

They were training a jump without opening the drogue (a piece of equipment that diminishes the free-fall speed - a small parachute which is activated after the skydiver leaves the aircraft and before the opening of the main parachute).

The jump under such condition was necessary to simulate a failure of the drogue.

Using the drogue, the speed of the tandem jump skydivers is equal to the speed of a solo skydiver in free fall.

Without the drogue, the speed increases significantly (two people, with just one of them exposed to the relative wind).

Approximately nine seconds after leaving the aircraft, the tandem jump skydivers had already made two loopings, and, accompanied with the solo skydiver, were free falling at a speed of 270 Km/h. At that moment, the diving aircraft collided with the solo skydiver.

The aircraft was then diving on a left turn.

One of the tandem jump skydivers reported remembering the aircraft passing close to them. The other one informed that he saw the solo skydiver coming towards them.

It is estimated that the wind on that day and that altitude (14,000ft) had a strength of 50kt.

The tandem jump skydivers activated their parachute and landed with their lower limbs fractured. The solo skydiver had his parachute opened by the automatic barometric device at an altitude of approximately 750ft.

The camera detached from the helmet of the solo skydiver, after the impact against the leading edge of the aircraft wing.

Released from the helmet and free falling, the camera recorded not only the collision between the airplane and the skydiver, but also, while falling and turning, recorded images of the aircraft, the other skydivers that had jumped, the sky and the terrain. One of the images shows the tandem jump skydivers close to the aircraft.

The camera objective was a “wide angle” type, which has an aperture capable of capturing great amplitude of images.

These, when reduced to frames of pictures, may not translate reality in terms of in-depth perspective and dimensions of the objects. The horizon, for example, is seen as a curvature.

The aircraft was within the weight and center of gravity (CG) limits specified by the manufacturer.

1.19 Additional information

The investigation commission observed that some of the member-countries of the FAI/IPC possessed written material, and adopted Standard Operating Procedures (SOP) such as the Jump Pilots Manual (from the UK) and the Jump Pilots and Aircraft Operations Manual (from Australia). In these procedures, special emphasis was placed upon the separation between the aircraft and the skydivers.

A few days after the accident, the Civil Police of the State of São Paulo found the video made by the deceased skydiver in the hands of a local public servant who had participated in the rescue actions.

A month after the accident, the CNP handed in to the investigation commission a Conduct Adjustment Agreement, which would be signed by all the skydiving federation entities in Boituva, State of São Paulo, and registered in the STJD (Superior Tribunal of Sporting Justice).

The aforementioned document aimed, among other measures, to “prohibit aircraft from diving behind skydivers”.

1.20 Utilization of other investigation techniques

Nil.

2 ANALYSIS

From the analysis of the data collected, one infers that the thrill of skydiving was also culturally shared by the pilots.

The pilots, by participating in the activity and contributing to the accomplishment of the skydivers, as well as by fostering the skydiving appeal before the market, experienced the thrill inherent to this extreme sport when diving with their aircraft.

It was the “adrenalin” culture (in the jargon of the practitioners), disregarding the risk generated by the close physical proximity between man and machine, both of them free falling in the airspace.

If there had been an established parameter for the separation between the aircraft and the skydivers in the air, the situation of risk could have been either eliminated or mitigated.

The risk potential escalated on account of the lack of a briefing for the skydivers and the aircraft pilot.

With the pilot’s habit of diving in a trajectory close to that of the skydivers, without concern to prevent a critical proximity, the aircraft wing ended up hitting the solo skydiver.

At the moment of the accident, the situation was as follows:

- a) Two tandem jump skydivers performing maneuvers of maneuvers that would be evaluated later on;
- b) A solo skydiver, whose job was to make a video of the maneuvers performed by the ones in tandem jump, and for that purpose he had to position himself accordingly; and
- c) The aircraft pilot on a high sink-rate left turn descent, approaching the skydivers.

The pilot, for being unaware that the jump would be performed without the drogue, may have underestimated the skydivers’ fall speed.

The positioning to be reached by the skydivers made the three of them focus their attention on the maneuvers and not on the aircraft.

These facts, together with the existing winds aloft, may have favored the approach between their trajectories.

The images obtained by the camera were fundamental in the process of investigation.

Although the camera used by the solo skydiver had a “wide angle” objective, which would not capture real measures in terms of distance (its aperture propitiates seeing the horizon in curvature), it was this very characteristic that favored the capture of images in high amplitude.

This characteristic made it possible for the solo skydiver’s camera to take additional photographs of the aircraft.

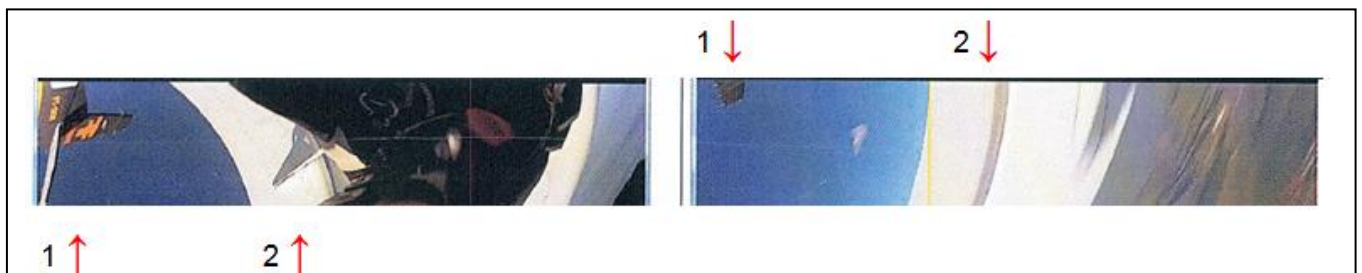


Figure 3 – In the two pictures, obtained from the development* of the video made by the fatally injured solo skydiver (*Forensic Institute, State of São Paulo Civil Police), it is possible to observe the wide angle effect of the camera objective.

RMK: 1 (empennage) and 2 (left wing intrados) appear at different angles, as if they did not belong to the same airplane.



Figure 4 – “Frame” obtained approximately 13 seconds after the skydivers jumped from the aircraft, when it was passing close to the tandem jump skydivers (shown by the arrow).

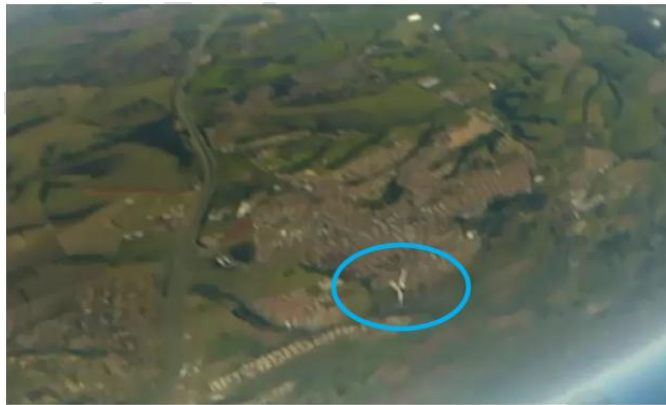


Figure 5 – “Frame” obtained approximately 3 seconds after the one shown in the previous figure, depicting the aircraft still in a turn. The horizon is in the bottom right corner.



Figure 6 – Wing damage, as observed during the initial action.

In spite of the statement by one of the tandem jump skydivers, saying that he “felt the body of the other skydiver coming towards them, being thrown against them”, from the analysis of the film development, it is possible that the injuries sustained by the two tandem jump skydivers was caused by the aircraft, which passed very close to them.

There was a gap in terms of legal provision in relation to an effective previous coordination between skydive groups, solo skydivers and skydiving pilots for jumps below 20,000 ft, for the prevention of an intentional approach between aircraft and skydivers in the air.

Likewise, the Brazilian regulations lacked recommendations for the skydiving pilot to perform a surveillance of the space around his/her aircraft, in order to perform a safe descent.

The figure of the “air traffic controller” was not contemplated in any document, and his/her job was not effective, as long as there was no written standardization concerning his/her obligatoriness and function.

The pilot, despite his long experience, was flying the aircraft with skydiving operations and medical certificates whose validity dates had expired.

3 CONCLUSIONS

3.1 Facts

- a) The pilot’s medical certificate validity date had expired;
- b) The validity date of the pilot’s technical qualification certificate related to skydiving operations had expired;
- c) The pilot had enough experience for the flight;
- d) The aircraft had a valid airworthiness certificate;
- e) The aircraft was within the weight and center of gravity limits;
- f) The pilot was on a skydiving flight in Boituva, State of São Paulo;
- g) After dropping the second (and last) skydive group of that flight (one solo skydiver, and two tandem jump skydivers), with the aircraft already descending, there was a collision between the aircraft and the solo skydiver of this second group;
- h) The aircraft sustained damage to the left wing, and landed in SDOI;
- i) The solo skydiver suffered fatal injuries;
- j) The two tandem jump skydivers suffered serious injuries to their lower limbs.

3.2 Contributing factors

3.2.1 Human Factor

3.2.1.1 Medical Aspect

Nil.

3.2.1.2 Psychological Aspect

3.2.1.2.1 Individual information

a) Attention – a contributor

At the moment of the impact, the attention of the pilot was focused on the left turn diving maneuver, making him unaware of the risk of collision with the skydivers who had jumped from the aircraft.

b) Attitude – a contributor

The pilot displayed characteristics of overconfidence in himself, in the group and in the situation, leading him to perform a diving maneuver in close proximity with the skydivers, without considering the possible risks. There was also carelessness with rules and procedures, since he was flying with a medical certificate and a technical qualification certificate with expired dates.

c) Decision Making process – a contributor

The pilot decided to make a dive to the left after dropping the last skydivers, without having previously held a briefing with them, and without knowing the characteristics of their jump. Elements for an appropriated decision-making were missing.

3.2.1.2.2 Psychosocial information**a) Communication – a contributor**

There was poor communication between the pilot and the skydivers, since the briefing prior to the jump was not held. Such briefing could have alerted the pilot of the risk posed by the aircraft dive.

b) Work group culture – a contributor

The group culture influenced the conduct of the pilot, who made the aircraft dive, something that was accepted and valued by the group, but that also jeopardized flight safety.

3.2.1.2.3 Organizational information**a) Organizational climate – undetermined**

It is possible that the practitioners of this sport, which mixed financial interests, competitiveness, pleasure, emotion and boldness, may have interfered with the management of the air activity by the pilot and by the owner of the aircraft, at the expense of flight safety.

b) Organizational culture – a contributor

The organization did not comply with the rules and procedures that aimed at maximizing safety.

c) Work organization – undetermined

The pilot would perform up to twenty takeoffs in one day. On the day of the accident, he had already made his eleventh takeoff. It is possible that the workload and the waste with which the takeoffs, the skydive drops and the landings had to be made deprived him from the time necessary for preparation and respite between flights.

3.2.2 Operational Factor**3.2.2.1 Concerning the operation of the aircraft****a) Pilot Judgment – a contributor**

With the making of tight turns and accentuated pitched-down maneuvers, the surveillance of the airspace was compromised, favoring the creation of dangerous proximity between the aircraft and skydivers.

b) Managerial oversight – a contributor

The poor managerial oversight, evidenced by the lack of clear standards about the risk posed by the proximity between the aircraft and the skydivers in the air, influenced the organization culture of the group. There was not stimulus for the holding of a formal briefing involving pilots and skydivers.

3.2.2.2 Concerning ATS units

Not a contributor.

3.2.3 Material Factor

3.2.3.1 Concerning the aircraft

Not a contributor.

3.2.3.2 Concerning ATS equipment and technology systems

Not a contributor.

4 FLIGHT SAFETY RECOMMENDATION (RSV)

A safety recommendation is the establishment of an action which the Aeronautical Authority or SIPAER-Link issues to their respective area of responsibility, aiming at eliminating or mitigating the risk of a latent condition or the consequence of an active failure.

From a SIPAER perspective, a safety recommendation is essential for the safety of flight, refers to a specific hazard, and has to be complied with by a certain deadline.

Safety Recommendations made by the CENIPA:

To the National Civil Aviation Agency (ANAC)

A-003/CENIPA/2014 – RSV 001

Issued on 17/FEB/2014

Reevaluate the supervision of the professional skydive activity in championships and events, as well as the constant monitoring of the amateur skydive activity in Brazil.

A-003/CENIPA/2014 – RSV 002

Issued on 17/FEB/2014

Reevaluate the RBAC 105, describing the necessity of a detailed briefing between crewmembers and skydivers, for the clarification of relevant safety aspects, such as the type of jumps to be performed, separation standards between the aircraft and skydivers, and others deemed opportune.

A-003/CENIPA/2014 – RSV 003

Issued on 17/FEB/2014

Reevaluate the RBAC 105, defining and describing the duties of the technical manager of activities mentioned in the RBAC 105.3.

To the National Skydiving Center (CNP):

A-003/CENIPA/2014 – RSV 004

Issued on 17/FEB/2014

Immediately reevaluate the CNP's *modus operandi*, establishing strict safety standards and complying with proven international legislation related to the sports activity.

A-003/CENIPA/2014 – RSV 005

Issued on 17/FEB/2014

Promote the registration of a Conduct Adjustment Agreement and the strict adherence to the risk management system, aiming at a systematic and constant analysis of the hazard potential inherent to the amateur and professional skydive activity.

5 CORRECTIVE/PREVENTATIVE ACTION ALREADY TAKEN

- The CNP wrote a Conduct Adjustment Agreement (TAC), aimed at prohibiting the aircraft to dive while descending, and at promoting risk management.
- During the Investigation, the CENIPA made the Safety Recommendations 292 and 293/2012, and forwarded them to the ANAC.

6 DISSEMINATION

- (Brazil's) National Civil Aviation Agency (ANAC)
- (USA's) *National Transportation Safety Board* (NTSB)
- Brazilian Skydiving Confederation (CBPq)
- SERIPA IV

7 APPENDICES

Nil.

On 17 / FEB / 2014