

COMMAND OF AERONAUTICS
AERONAUTICAL ACCIDENT INVESTIGATION AND
PREVENTION CENTER



FINAL REPORT
A - 055/CENIPA/2013

<u>OCCURRENCE:</u>	ACCIDENT
<u>AIRCRAFT:</u>	PT-OFD
<u>MODEL:</u>	F90
<u>DATE:</u>	8 FEB 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 8 February 2012 accident with the F90 aircraft, registration PT-OFD. The accident was classified as Fuel Exhaustion/Starvation.

During the approach for landing, one of the engines flamed out and the other one had a failure, leading the crew to making a ditching at a distance of approximately 1,200 meters short of the runway.

One of the pilots and both passengers got out uninjured, while the other pilot sustained minor injuries.

The aircraft was substantially damaged.

An accredited representative of the TSB (*Transportation Safety Board of Canada*) was designated for participation in the investigation.

GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ACC-AZ	Amazonia Area Control Center
ANAC	(Brazil's) National Civil Aviation Agency
APP-BE	Belém Approach Control
ATS	Air Traffic Services
CENIPA	Aeronautical Accident Investigation and Prevention Center
CHT	Technical Qualification Certificate
CMA	Aeronautical Medical Certificate
FL	Flight Level
IAM	Annual Maintenance Inspection
IFR	Instrument Flight Rules
INFRAERO	Brazilian Airports Infrastructure Enterprise
Lat	Latitude
Long	Longitude
MLTE	Airplane Multi-engine Land
NM	Nautical Mile
PLA	Airline Transport Pilot (Airplane category)
PLEM	Aeronautical Emergency Plan
PPR	Private Pilot (Airplane category)
QAV-1	Aviation Kerosene
RAB	Brazilian Aeronautical Registry
RBHA	Brazilian Aeronautical Homologation Regulation
SBBE	ICAO Location designator – Belém Aerodrome
SBSN	ICAO Location designator – Santarém Aerodrome
SBSP	ICAO Location designator – Congonhas Aerodrome
SERIPA	Regional Aeronautical Accidents Investigation and Prevention Service
SIPAER	Aeronautical Accidents Investigation and Prevention System
TSB	Transportation Safety Board of Canada
TWR-BE	Belém Control Tower
UTC	Coordinated Universal Time
VFR	Visual Flight Rules

AIRCRAFT	Model: F90 Registration: PT-OFD Manufacturer: Beech Aircraft	Operator: <i>Mônaco Diesel Caminhões e Ônibus Ltda.</i>
OCCURRENCE	Date/time: 08FEV2012 / 01:44 UTC Location: Guajará Bay Lat. 01°23'30"S – Long. 048°29'38"W Municipality – State: Belém – Pará	Type: Fuel Exhaustion/Starvation

1 FACTUAL INFORMATION

1.1 History of the occurrence

The aircraft departed from SBSP at 19:30 UTC, bound for SBBE, with two pilots and two passengers on board.

During the approach for landing in SBBE, one of the engines flamed out and, minutes later, the other engine had a failure. The captain was forced to make a ditching at a distance of approximately 1,200 meters short of the runway 06 of SBBE, close to the Naval Base of Val de Cans of the Brazilian Navy.

The aircraft occupants were rescued by servicemen of the Naval Base who were on duty at the moment of the accident.

1.2 Injuries to persons

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

1.3 Damage to the aircraft

The aircraft sustained substantial damage on account of the time it remained underwater (twelve days).

1.4 Other damage

Nil.

1.5 Personnel information

1.5.1 Information on the crew

HOURS FLOWN		
	PILOT	COPILOT
Total	5,500:00	6,750:00
Total in the last 30 days	38:00	47:30
Total in the last 24 hours	13:00	01:10
In this type of aircraft	70:00	07:40
In this type in the last 30 days	19:00	01:10
In this type in the last 24 hours	13:00	01:10

NB: Information provided by the pilots.

1.5.1.1 Professional formation

The pilot did his Private Pilot course (Airplane category) in the *Aeroclube do Pará* in 1999.

The copilot did his Private Pilot course (Airplane category) in the *Aeroclube do Pará* in 1997.

1.5.1.2 Validity and category of licenses and certificates

The pilot had an Airline Transport Pilot license (Airplane category) and valid technical qualifications for BE9F aircraft, Airplane Multi-engine Land, and IFR rating.

The copilot had an Airline Transport Pilot license (Airplane category) and valid technical qualifications for Airplane Multi-engine Land, and IFR rating.

1.5.1.3 Qualification and flight experience

The aircraft captain had qualification and enough experience for the type of flight in question.

The copilot was still under training in that type of aircraft.

1.5.1.4 Validity of the medical certificate

The pilots had valid aeronautical medical certificates (CMA).

1.6 Aircraft information

The aircraft (SN LA-118) was manufactured by Beech Aircraft in 1981.

The airworthiness certificate of the aircraft was valid.

The airframe, engine, and propeller logbooks were not found.

The last inspections of the aircraft (type Phase 1, Phase 2, and Annual Maintenance Inspection) were performed by *Uirapuru Serviços Aeronáuticos Ltda.* workshop in Fortaleza, State of Ceará, on 22 September 2011.

The PT-OFD registration certificate contained information that the company *Mônaco Diesel Caminhões e Ônibus Ltda.* was the owner and operator of the aircraft.

However, the investigation determined that the aircraft had been purchased by a private person, and that it was being prepared to be incorporated into the fleet of a company known as *Tail Taxi-Aéreo Ltda.*

The sale and purchase contract, which transferred the ownership of the aircraft to the new owner had not been protocolled in the Brazilian Aeronautical Registry (RAB) yet.

The owner did not present the aircraft documentation, and said that it was lost when the aircraft submerged after ditching.

1.7 Meteorological information

The prevailing meteorological conditions in SBBE at the moment of the approach for landing were night-time VMC.

The winds-aloft chart forecast headwind components at an altitude of 24,000ft (FL240) for a great part of the route flown by the aircraft

1.8 Navigational aids

Nil.

1.9 Communications

The two-way communications between the crew and ATC units were normal.

During the coordination between ACC-AZ and APP-BE, information was given that the aircraft was transporting a sick person.

The flight plan, filed in SBSP, also contained a piece of information relative to transport of a sick person.

At 01:30:43 UTC, the aircraft captain made the first contact with APP-BE. As there was another (faster) aircraft on the approach to SBBE, his aircraft (PT-OFD) was sequenced as number 2 for landing on runway 02.

At 01:34:09, the captain, having learned that he would be overtaken by a large aircraft, passed the information that he would reduce speed.

At 01:40:14, the copilot called APP-BE, and informed that the aircraft was transporting a patient in a serious condition, and requested a direct track to join the final for runway 02.

At 01:42:17, the aircraft captain called TWR-BE, declared emergency, confirmed that he was transporting a sick person, and requested immediate landing on runway 06.

At 01:43:52, TWR-BE cleared the aircraft to land on the requested runway, and transmitted wind and altimeter information. At 01:44:02, the PT-OFD captain acknowledged the information. That was the last transmission from the aircraft during the flight.

1.10 Aerodrome information

Not applicable.

1.11 Flight recorders

Neither required nor installed.

1.12 Wreckage and impact information

The aircraft made a ditching on the waters of Guajar Bay, without any previous impact.

After ditching, the aircraft remained afloat for a short period of time, which was enough for the occupants to be evacuated.

Due to the difficulty finding a company to remove the aircraft from the bay waters, and also due to a concern of not causing further damage during the removal, the aircraft stayed submerged for twelve days.

The muddy waters caused extensive damage to the aircraft electronic equipment.

During the Initial Action performed by the investigation go-team, it was verified that the aircraft tanks contained only residual non-utilizable fuel.

1.13 Medical and pathological information

1.13.1 Medical aspects

Not investigated.

1.13.2 Ergonomic information

Nil.

1.13.3 Psychological aspects

1.13.3.1 Individual information

The captain, since his graduation from the flying school, had been working as a pilot. Now he was working on-call for an air-taxi company. In interviews given to the investigation commission, he was portrayed as an experienced and responsible pilot. This was the third accident in his career.

At that specific moment of his life, he was in need of a more rewarding activity in financial terms, and this led him to accept the invitation for that private flight.

According to accounts made by the crew, the captain insisted on returning to Belém on that same day. In São Paulo, the passengers questioned him on the reason why they would not stay in the city overnight, considering that a return to Belém would result in a crew day of 16 hours. However, it was only during the leg from São Paulo to Belém that the captain informed that he would be available on-call for the air taxi company which hired him. His duty-hours were to begin at 22:00 of that same day. According to a company's requirement, he would have to be ready for departure in 60 minutes, and thus he had to be near the aerodrome at all times.

The pilot under training had only 7 hours of flight in the aircraft. He was described as an experienced, safe and careful pilot. He also worked for an air taxi company.

He said that he trusted the instructor. He also said that an intermediate landing in the segment from São Paulo to Belém was important, but he accepted the captain's calculations and agreed to the direct flight without questioning.

1.13.3.2 Psychosocial information

In flight, the tasks were shared in a way that the pilot under training was flying the plane, whereas the captain provided guidance, did radiotelephony with ATC, and planned the flight.

When the captain showed him the calculations relative to the fuel, saying that it would be possible to proceed non-stop to the destination, the pilot under training did neither question nor report discomfort with the situation (although in his opinion a landing for refueling would be safer), and agreed to the captain's planning.

1.13.3.3 Organizational information

The accident flight was an aeromedical flight hired by an air-taxi company which had clients whose needs it had to accommodate.

Since the aircraft of this company was under maintenance, they asked another air taxi company to operate the flight.

Their decision was that the plane for the flight would be a King Air (faster and with more endurance than the E-110 Bandeirante), another plane of the company.

The contracted company did not have a captain qualified in the King Air, and so they were training the other pilot for that purpose.

The captain had already flown two training flights with the pilot being trained. But prior to that, he made his own operational revalidation in the aircraft, as it was approximately one year since he had last flown a King Air.

At about 20:00 of the day before the occurrence, the company invited the captain for that flight, being aware that he worked for another air taxi company, and that he was used to working during his rest periods.

There was no employment relationship between the captain, the pilot under training and the owner of the aircraft.

The mission had not been planned by the contractor of the flight, and the pilots were in charge of the flight details.

Since the aircraft departed from Belém at about 06:00, and was expected to return on the same day, it would probably land in SBBE at about 23:00, meaning that the crew day would be longer than 16 hours and without any rest.

1.14 Fire

There was no fire.

1.15 Survival aspects

The occupants abandoned the aircraft through the main door, and remained on top of the wing for a few minutes.

The pilots and passengers tried to find objects for flotation, because the aircraft lacked survival equipment on board.

One of the passengers swam towards the river bank. All aircraft occupants were rescued by Brazilian navy sailors of the Val de Cans Naval Base. A motor boat was used for supporting the rescue.

While the aircraft was approaching for landing, the servicemen on duty on the Naval Base noticed that it seemed to have an engine malfunction. So, just after the ditching, they rushed to give the necessary support to the occupants.

At the moment of the activation of the Aeronautical Emergency Plan (PLEM) of SBBE, the INFRAERO team did not have a direct radio and/or telephone contact with the Naval Base, making it difficult to coordinate the PLEM actions and getting access to the installations of the Naval Base.

Despite the difficulty faced by the INFRAERO team, the help provided by the Navy servicemen made it possible for the aircraft occupants to be rescued safe and sound.

1.16 Tests and research

Nil.

1.17 Organizational and management information

Nil.

1.18 Operational aspects

The crew was composed of a captain and a pilot (this latter was still being trained in the aircraft).

The aircraft took off at approximately 09:00 UTC from SBBE, destined for SBSN. In addition to the crew, the aircraft was transporting two passengers (a doctor and a nurse). The primary mission of the aircraft was to transport a patient from SBSN to SBSP.

There was no employment relationship between the pilots and the aircraft operator, but the pilot in command belonged to the board of employees of a company by the name of *Sete Taxi-Aéreo Ltda.*

The aircraft had a register in the Private Air Services category. It was engaged in the transport of a sick person without being certified for this type of service.

In order to fly the leg from SBBE to SBSN, the aircraft was refueled to its maximum capacity (473 gallons - 1,790.49 liters - of which 470 gallons - 1,779.14 liters - were utilizable, as described in the Weight Sheet and in the Type Certificate Data Sheet N. A31CE - FAA).

In the leg from SBSN to SBSP, the pilots had already found out that the fuel quantity indicators were not dependable, and that the indications of the fuel flow indicators were not consistent with the situation of the flight.

Thus, they decided to land in SWGI, where the aircraft was again refueled to its maximum capacity.

After landing in SBSP, the aircraft received 1,007 liters of QAV-1, to the full capacity of its tanks.

As already mentioned, the planning of the flight from SBSP to SBBE was done by the pilot in command, with the aircraft tanks being considered completely loaded with fuel.

So, the aircraft takeoff weight was calculated taking into account the aircraft basic weight of 3,349.79Kg (7,385lb), the weight of two crew and two passengers (80Kg each), the weight of the luggage/cargo (150Kg or 330.69lb), and the weight of the fuel (1,452.11Kg or 3,197.48lb).

Adding up the values of the above paragraph, the resulting takeoff weight was 5,271.89 (11,618.17lb). This value is higher than the maximum ramp weight and maximum takeoff weight, which were respectively 5,003Kg (11,030lb) and 4,967Kg (10,950lb).

Thus, at the moment of departure from SBSP, the aircraft had an excess 290Kg (639lb), as far as the maximum takeoff weight was concerned.

The captain and the pilot under training knew each other since long before. This was the third training flight in the aircraft, but the first one of long duration.

The pilot under training was flying the aircraft, and the captain, besides giving training, was doing the radiotelephony with ATC, as well as managing the flight.

When they were still in SBSP, a possibility was raised of staying in São Paulo overnight, but such hypothesis was turned down by the captain, and the pilot under training agreed with him.

The decision of not refueling the aircraft in the last leg was made jointly by the two pilots when they were flying over the city of Palmas, State of Tocantins.

The captain showed his calculations to the pilot, stating that the fuel endurance was higher than 7 hours and that they had fuel to arrive in Belém (State of Pará), divert to the alternate aerodrome of Macapá (State of Amapá), and fly more 30 minutes.

The pilot under training, even though thinking that a stop for refueling would be wiser and safer, did neither object nor present any arguments in favor of a stop, and agreed to the direct leg.

According to pilot, the quantity of fuel was enough for the leg SBSP - SBBE, and for a diversion to the alternate aerodrome of SNMQ (as filed), with endurance of 7 hours and 30 minutes of flight for an estimated elapse time of 5 hours and 40 minutes at FL230.

According to the *Pilot Operating Handbook and the FAA Approved Airplane Flight Manual*, PN 109-590010-3A12, revised in October 2001, in order to fly the leg from SBSP to SBBE at FL230, and depending on the power regime utilized, the aircraft endurance might vary between 5h30min and 7h10min of flight.

The maximum range of the aircraft, depending on the operating conditions along the route, would vary between 1,325 and 1,460 nautical miles.

The distance between SBSP and SBBE was verified as 1,324.70 nautical miles.

It was observed that the flight plan, in its item 18 (*Other Data*), contained a request for special treatment on the part of ATC, on account of sick person transportation (STS/TREN).

Upon departure from SBSP, the weather conditions were favorable, and the aircraft climb to the planned flight level (FL230) was done in a continuous manner.

During the en-route phase of the flight, the pilots noticed that the fuel quantity indicator on the left remained stuck at the mark of 600lb of fuel, while the one on the right showed an oscillation between 0 and 1,400lb (maximum value). In addition, the fuel flow indicators were not presenting dependable information.

When the aircraft was flying over the city of Palmas, State of Tocantins, the pilots made a joint decision to continue flying non-stop direct to the destination, thus discarding the necessity for refueling either in Imperatriz, State of Maranhão, or Marabá, State of Pará.

On the occasion, as already mentioned, the pilot in command explained to the pilot under training, by means of calculations, that they were able to reach SBBE with the quantity of fuel they had in the tanks.

On the final approach for landing in SBBE, the right engine stalled, and the aircraft captain managed to feather its respective propeller. Shortly thereafter, the left engine began to present problems due to lack of fuel, but the pilot did not have enough time to perform the feathering procedures.

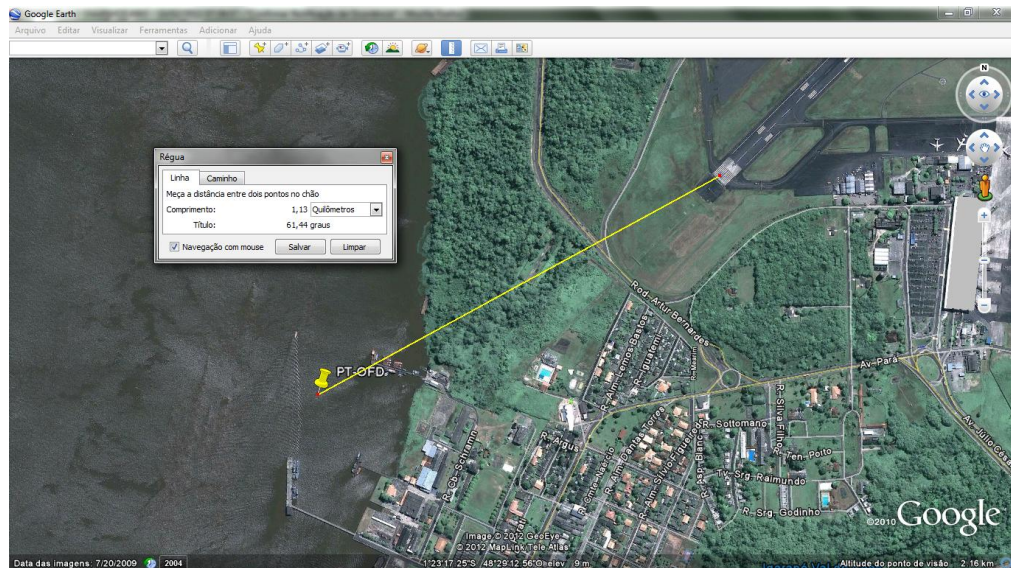


Figure 1 – Point at which the aircraft touched the waters near the banks of Guajar Bay, not far from the threshold of runway 06 of SBBE.

Before the ditching, the pilot in command left his seat in the cockpit to unlock the rear door of the aircraft in order to prevent it from getting blocked, although he did not remember to inform the passengers about the procedure to open the emergency exit.

There had not been any briefing with or guidance to the passengers on the emergency situation. According to statements, they learned of emergency only after the stop of the right engine.

1.19 Additional information

The RBHA 91 (section 91.167) prescribes that no person is allowed to operate a civil aircraft on an IFR flight, unless it has enough fuel (considering the wind and weather conditions) to fly to the aerodrome of intended landing, then fly from this aerodrome to the alternate aerodrome, plus 45 minutes in normal cruise speed.

The *Pilot Operating Handbook and FAA Approved Airplane Flight Manual*, PN 109-590010-3A12, revised in October 2001, Section VI - *Weight and Balance / Equipment List*, page: 6-16 (*Loading Instructions*) reads that it is the operator's responsibility to make provisions for the correct loading of the aircraft.

There were no floating devices available onboard the aircraft, an evidence that the legislation in force was not complied with, since those devices are to be available in accordance with the RBHA 91, section 91.205 (b) (14).

The pilots had a crew day of more than 16 hours, in contrast with the Law of the Aeronaut (Law 7,183) of 5 April 1984, article 21. The captain failed to observe the prescribed norms and procedures by accepting to fly the aircraft on his day of rest, knowing that he would start his on-call duty hours at 22:00 of that same day.

1.20 Utilization of other investigation techniques

Nil.

2 ANALYSIS

The PT-OFD aircraft, which had a register in the passenger transport category, was engaged in transporting sick persons, without being certified for such type of operation.

The transport of sick persons is a prerogative of air-taxi companies adherent to specific regulation issued by the ANAC and by the Federal Council of Medicine.

Thus, such operation by this PT-OFD was in discordance with the Command of Aeronautics' Regulatory Ordinance nº 190/GC-5 of 20 March 2001, configuring a violation of the legislation in force.

The planning of the flight from SBSP to SBBE was done by the pilot in command; thus, there was not participation of the hiring company in this planning, which could have curbed a crew day of more than 16 continuous hours by establishing an overnight stay in the city of São Paulo.

The planning of the flight was based on the values contained in the weight sheet, on an aircraft fully loaded with fuel, on the weight of passengers and crew, and on the weight of the embarked luggage/cargo.

The calculated aircraft weight at the departure from SBSP was 5,271Kg (11,618.17lb), a value that was higher than both the maximum ramp weight and the maximum takeoff weight, which were, respectively, 5,003Kg (11,030lb) and 4,967Kg (10,950lb).

At the moment of departure from SBSP, the aircraft had approximately 290Kg (639lb) above the MTOW, that is, it was outside the operational envelope established by the manufacturer.

As for the previous legs, it was estimated that in the takeoffs from SBSN and SWGI, the aircraft had an excess weight of about 500Kg (1,001lb) in relation to the maximum takeoff weight allowed, because there were two more passengers on board, in addition to the baggage.

The *Pilot Operating Handbook* and *FAA Approved Airplane Flight Manual*, PN 109-590010-3A12, revised in October 2001, Section VI - *Weight and Balance/Equipment List*, page 6-16 (*Loading Instructions*) read that it was the operator's responsibility to make provisions regarding the correct loading of the aircraft.

In those conditions, should one of the aircraft engines have a failure, the aircraft controllability would be jeopardized, making it difficult for the aircraft to make an emergency landing, or return to the runway successfully, besides being considered a violation of the norms and safe operation of the aircraft.

During the initial action by the go-team, it was possible to verify that the aircraft tanks contained only non-utilizable residual fuel.

In their planning of the flight, the crew did not consider the IFR rules, which establish that the amount of fuel must be enough for flying to the destination (SBBE), and then from the destination to an alternate aerodrome plus 45 minutes of flight at normal cruise speed, in accordance with the prescriptions of RBHA 91, section 91.167.

During the en-route phase of the flight, the pilots noticed that the fuel quantity indicator on the left remained stuck, indicating 600lb of fuel, while the one on the right was oscillating between 0 and 1,400lb. They also noticed that the fuel flow indicators' information was not dependable.

When the aircraft was flying over the city of Palmas, State of Tocantins, the pilots made a joint decision to continue the flight directly to the destination, discarding the need of a landing for refueling either in Imperatriz, State of Maranhão, or Marabá, State of Pará.

On the occasion, as already mentioned, the pilot in command demonstrated to the pilot under training, by means of calculations, that it was possible to fly the entire leg to the destination with the amount of fuel existing in the tanks, despite the fact that the fuel quantity and fuel flow indicators were malfunctioning.

Based on the *Pilot Operating Handbook* and *FAA Approved Airplane Flight Manual*, PN 109-590010-3A12, revised in October 2001, the investigation commission concluded that, for the leg flown between SBSP and SBBE at FL230, depending on the power regime utilized, the aircraft fuel endurance would vary between 5 hours 30 minutes and 7 hours 10 minutes of flight.

The aircraft range, depending on the operational conditions along the route, might vary between 1,325 and 1,460 nautical miles.

The measured length of the leg flown between SBSP and SBBE was 1,324.70 nautical miles.

From the facts, it was possible to conclude that there was an error on the part of the pilot in relation to the planning of the flight, since, besides calculating a total flight time of 5 hours and 40 minutes, he did not consider the fuel necessary to fly to the alternate aerodrome plus 45 minutes of flight. The captain and the pilot under training evaluated, in an inadequate manner, the effects of the en-route operational conditions during the flight.

In flight, the crew did not consider that the average fuel consumption had been higher than expected and the influence of the flight level/wind en route. It was observed that for a large part of the route there were forecast winds aloft with headwind components which would diminish the maximum range of the aircraft and increase fuel consumption.

At the moment of their decision to proceed with a non-stop flight, there was an inadequate evaluation on the part of the crew, since they did not consider the hourly consumption up to that point. The malfunctioning of the fuel indicators did not allow them to determine the exact amount of fuel remaining in the tanks.

The pilot under training, even considering that it would be safer to make a landing for refueling, was complacent with the captain's decision, adhering to his decision to proceed direct to the destination without questioning him. The lack of assertiveness on the part of the pilot under training was possibly a result of the fact that they had known each other for a long time, and he trusted the decision made by his instructor.

Additionally, the captain was overconfident in himself and in the aircraft when he decided to fly direct from SBSP to SBBE, believing that the aircraft had a fuel endurance of 7 hours, even after identifying the malfunctioning of the aircraft fuel indicators.

Such attitude before the situation was reinforced by his motivation to accomplish the mission in time to assume another flight duty that was to begin at 22:00 of the same day.

Since the captain was enduring a moment of changes in his private life, which made him apprehensive in relation to what might occur, flying airplanes was seen a mitigation of his situation. Thus, both his emotional state and his high motivation to fly had influence on his decision to fly non-stop up to the destination.

There were no floating devices aboard the aircraft, showing incompliance with the legislation in force, according to which such devices are mandatory [RBHA 91, section 91.205 (b) (14)].

If the ditching had been made in an area without immediate support for rescue, the lack of floating devices could have resulted in a more serious occurrence with catastrophic consequences.

From the transcripts of the voice messages between the aircraft and ATC (APP-BE and TWR-BE), it was verified that the pilots informed that they were transporting a sick person, and such piece of information was not accurate.

The fact that the aircraft declared to be engaged in aeromedical transport in order to obtain priority for landing characterized incompliance with air traffic rules.

If the crew had informed the ATC units of their low fuel condition and declared emergency, or requested priority for landing, they would probably have gotten priority on the approach.

Before the aircraft ditching, the pilot in command left his seat to unlock the aircraft rear door, but did not give instructions to the passengers in relation to the opening of the emergency exit.

This fact made put in evidence a probable deficiency in the process of training previously received by the aircraft captain, since the procedure prescribed for the situation was to abandon the aircraft through the emergency exit, which would have to be unlocked after the ditching of the aircraft.

The opening of the main door after the ditching made the aircraft sink faster, something that could have hampered the evacuation from the aircraft by the occupants, if they had suffered more serious injuries.

The captain failed to comply with norms and procedures, by accepting to make the flight on his day of rest, being aware that he was to start his on-call duty at 22:00 of the same day.

3 CONCLUSIONS

3.1 Facts

- a) The pilots had valid aeronautical medical certificates;
- b) The pilots had valid technical qualification certificates;
- c) The aircraft captain had qualification and enough experience for the flight in question;
- d) The copilot was under training;
- e) The aircraft had a valid airworthiness certificate;
- f) The planning of the flight from SBSP to SBBE was done by the pilot in command, who took in consideration an aircraft with a full load of fuel;
- g) The flight plan read that the fuel endurance was 7 hours and 30 minutes of flight, for an estimated elapse time of 5 hours and 40 minutes at FL230;
- h) When the aircraft was passing over the city of Palmas, State of Tocantins, the pilots decided, in conjunction, to proceed non-stop to the destination, discarding the need to make an intermediate landing for refueling;
- i) The aircraft was registered in the passenger transport category (TPP) and was engaged in the transport of a sick person;

j) The fuel quantity indicators and the fuel flow indicators of the aircraft were not showing dependable information;

k) The flight plan for the leg between SBSP and SBBE contained information of sick person transportation, but there was no sick person on board;

l) The aircraft made a ditching near the banks of Guajar Bay, at a distance of approximately 1,200 meters from the threshold of runway 06 of SBBE;

m) The passengers and crew were rescued by Brazilian Navy servicemen on duty on the Naval Base of Val de Cans;

n) One of the pilots and both passengers got out uninjured, while the other pilot suffered minor injuries; and

o) The aircraft sustained substantial damage.

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) Attitude – a contributor

The captain failed to comply with norms and procedures by accepting to fly an aircraft on his day of rest, even knowing that he was to start his on-call duty hours as soon as he landed in SBBE.

He also showed to be overconfident when he decided to fly directly from SBSP to SBBE, trusting the 7-hour fuel endurance of his aircraft and the fuel consumption information displayed by the instruments, even after identifying their malfunction.

The pilot under training, in turn, was complacent by accepting and agreeing with the pilot-in-command's decision, without questioning his calculations or motivations for flying direct to the destination.

b) Motivation – a contributor

The captain was eager to return to SBBE on that same day, because he was supposed to start his on-call duty hours in the air taxi company for which he worked.

c) Decision-making process – a contributor

The captain failed to comply with important aspects concerning the route conditions and aircraft instruments by making a decision to fly directly from SBSP to SBBE.

3.2.1.2.2 Psychosocial information

a) Communication – a contributor

There was lack of assertiveness on the part of the copilot since he did not question the captain's calculations and/or motivations to fly non-stop, when he (the copilot) considered that making a stop for refueling would be safer.

b) External influence – a contributor

The involvement of the captain with activities of another company on that same day, in addition to events belonging to his private life, had influence on his decisions in the initial planning of the flight and during the flight en route.

3.2.1.2.3 Organizational information**a) Work organization – a contributor**

The company delegated responsibility for the entire planning of the flight to the pilots. Therefore, there was not any interference on the part of the company in the crew's work day and in the legs defined for the flight.

b) Organizational culture – a contributor

The fact that the company performed an operation for which it was not certified reflected the fragility of an organizational culture which allowed it to perform activities unfavorable to operational safety.

3.2.2 Operational Factor**3.2.2.1 Concerning the operation of the aircraft****a) Flight indiscipline – a contributor**

On several occasions during the flight, the pilots failed to comply with the norms and regulations in force, such as the sections 91.167 and 91.205 of the RBHA 91, the Pilot Operating Handbook and FAA Approved Airplane Flight Manual, and the *Lei do Aeronauta* (Law of the Aeronaut, Law nº 7.183 of 5 April 1984).

b) Training – undetermined

Before the ditching, the pilot unlocked the rear door of the aircraft and, then, failed to instruct the passengers as to the opening of the emergency exit.

This fact shows a probable deviation in the process of training previously received by the captain, since the procedure prescribed for the situation was to abandon the aircraft through the emergency exit, which had to be unlocked after the ditching.

c) Piloting judgment – a contributor

At the moment of their decision to proceed non-stop to the destination, there was an inappropriate evaluation on the part of the crew, because they did not consider the hourly consumption until that point, and the malfunction of the fuel capacity indicator did not allow them to know the exact amount of fuel remaining in the tanks.

d) Flight planning – a contributor

There was a mistake on the part of the captain relative to the planning of the flight, since, in addition to a total flight time of 5 hours and 40 minutes, he did not consider the fuel necessary to fly to an alternate airport plus 45 minutes of flight. The captain and the pilot under training made an inappropriate evaluation of the effects brought by the operational conditions along the flight route.

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 technology systems and equipment

Not a contributor.

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 liability.

In accordance with the Law n°12970/2014, recommendations are made solely for the benefit of the air activity operational safety.

Compliance with a Safety Recommendation is the responsibility of the holder of the highest executive position in the organization to which the recommendation is being made. An addressee who judges to be unable to comply with a Safety Recommendation must inform the CENIPA on the reason(s) for the non-compliance.

Safety Recommendations made by the CENIPA:

To the National Civil Aviation Agency (ANAC):

A - 055/CENIPA/2013 – 001

Issued on 29/09/2014

Take steps before the INFRAERO-Belém for a revision of the Airport Emergency Plan of SBBE, aiming at the adjustment of procedures in response to aeronautical emergencies in the area of Guajará Bay, taking into consideration the largest aircraft model authorized to operate in the aerodrome.

A - 055/CENIPA/2013 – 002

Issued on 29/09/2014

Considering that: the aircraft had a register in the category of Private Air Services (TPP); the aircraft was engaged in transporting a sick person without being certified for the type of service; the investigation commission verified that the aircraft had been purchased by a private person and was being prepared to be incorporated in the fleet of the Tail Taxi-Aéreo Ltda. company: - **Make an audit** of the referred company in order to verify its adherence to regulations.

A - 055/CENIPA/2013 – 003

Issued on 29/09/2014

Publicize the contents of this report at seminars, lectures and similar activities held for the benefit of owners, operators and explorers of aircraft.

5 CORRECTIVE/PREVENTATIVE ACTION ALREADY TAKEN

Nil.

6 DISSEMINATION

–(Brazil's) National Civil Aviation Agency - ANAC

–Mônaco Diesel Caminhões e Ônibus Ltda.

–INFRAERO

–SERIPA I

–*Transportation Safety Board of Canada*

7 APPENDICES

Nil.

On 29 / 09 / 2014.