

No. 28

Empresa de Viação Aérea Rio Grandense, S.A. (VARIG), Convair 240,  
PP-VCQ, accident at Brasília Airport, Brazil on 22 December  
1962. Report, dated 27 March 1963, released by the  
Brazilian Air Ministry (SIPAer).

1. Historical1.1 Circumstances

The aircraft was flying a non-scheduled domestic flight from Rio de Janeiro to Belo Horizonte and Brasília. It carried 5 crew members and 35 passengers. It departed Belo Horizonte for Brasília at 2002 hours GMT on 21 December on an IFR flight plan. At 0040 hours on 22 December the flight reported to Brasília Area Control Centre that, according to its approved flight plan, it was flying on Airway Green 3 at 3 300 m and passing over Cacique, the last reporting point. It then changed to the Brasília tower frequency and was authorized to descend to 1 800 m. At 0048 hours it received the altimeter setting (QFE) 893,3 mb from the airline. Two minutes later the Brasília tower advised that the wind was 330°/10 kt, the altimeter setting (QNH) was 1,016 mb, and asked the flight to report when reaching Brasília. At 0054 the flight reported at 1 800 m. It was instructed to report when outbound for runway 28 and was given the latest weather conditions. Initial approach was begun at 0056 hours. At 0059 the flight reported it was on final approach. The tower gave it the latest wind conditions, 330°, velocity 8 - 10 kt, and the aircraft was cleared to land. The message was acknowledged. Nothing further was heard from the flight. The tower controller saw a flash of light in the direction from which the aircraft was expected, however, he did not think anything abnormal had occurred. After a few unsuccessful calls, search and rescue services were alerted. The aircraft had struck trees and the ground 8 400 m from the runway and continued over uneven ground for 300 m.

As the aircraft fell on its side, only the side exit facing upward could be used for evacuation. Because of the failure of normal lights and the fact that no flashlights were available, it was difficult to find the emergency exit.

1.2 Damage to the aircraft

The aircraft was substantially damaged.

1.3 Injuries to persons

Of the 5 crew and 35 passengers aboard the flight, only the pilot-in-command was killed. The co-pilot was seriously injured, and one of the hostesses was slightly injured.

2. Facts ascertained by the Inquiry2.1 Aircraft information

The aircraft had flown a total of 21 728 hours including 11 994 hours since its last overhaul. Maintenance on the aircraft had been carried out properly, and the maintenance reports contained no mention of any difficulty which could have caused the accident.

The weight of the aircraft and its centre of gravity at the time of the accident were within the prescribed limits.

## 2.2 Crew information

The pilot-in-command was qualified to fly the aircraft. He held a valid instrument rating and was physically fit. He had a total flying time of 7 165 hours of which 2 392 hours were on the Convair 240.

The co-pilot was also physically fit. He had a total flying time of 3 395 hours of which 178 hours were on the Convair 240.

Both pilots were known to comply regularly with operational and traffic procedures, and their flying time during the last 30 days does not indicate any possibility of fatigue.

## 2.3 Weather information

In the last communication with the flight, when it was cleared to land, the tower provided the latest wind conditions: 330°, velocity 8 - 10 kt. Visibility at the time was 20 km, and there were no dangerous cloud formations. It was raining slightly at the time of the accident. The general weather situation was not considered to be poor enough to cause the accident.

## 2.4 Navigational Aids

The non-directional beacon at Brasilia was operating properly.

## 2.5 Communications

Communications between the flight and Air Traffic Control were made without difficulty. The last contact with the flight was at approximately 0059 hours GMT.

## 2.6 Aerodrome Installations

The rotating beacon and the runway lights at Brasilia were operating satisfactorily.

The aircraft was landing on runway 28. The elevation of the airport is 1 059 m.

## 2.7 Fire

There is no mention of fire in the report.

## 2.8 Wreckage

No description of the wreckage appears in the report.

### 3. Comments, findings and recommendations

#### 3.1 Discussion of the evidence and conclusions

The instrument approach chart for runway 28 published by the Directorate of Air Routes establishes the following:

initial approach	2 minutes
altitude to be reached by the end of the intermediate approach	1 350 m (QNH)
final approach	1 minute 29 seconds
critical altitude	1 209 m
minimum horizontal visibility	1 500 m

For scheduled flights the established minima for runway 28 are ceiling 100 m and visibility 1 000 m.

Normally the aircraft complete the intermediate approach 3 600 m from the non-directional beacon (approximately over the site of the accident) at an altitude of 1 350 m, i.e. 200 m above the ground.

The approach chart used by the pilots on the subject flight was issued by the Operator. It was similar to the one published by the Directorate of Air Routes with the following amendments:

- a) critical altitude = 1 159 m  
or a height of 100 m
- b) duration of final approach -  
1 minute 32 seconds at a speed of 260 km/h
- c) the minima for night landings and take-offs appear as footnotes -  
ceiling = 150 m  
visibility = 1 000 m
- d) the minima at the bottom of the page were deleted and new minima, established by Notam 51, issued by the Operator, were handwritten on the lower edge of the sheet -  
ceiling 200 m  
visibility 1 500 m (for runway 28)

The co-pilot, who survived the accident, said he followed the approach procedure with the instrument approach chart in hand. No holding was performed, and no delay was observed as far as the non-directional beacon silence cone

determinations were concerned. When he reported the aircraft was on final approach, the altimeter was indicating 1 350 m, which is in accordance with the approach chart. All altimeter settings were QNH. The aircraft continued descending at the prescribed rate on bearing 230° of the Brasilia non-directional beacon. Fifteen to twenty seconds later the main landing gear struck trees. Shortly before the accident he could see the land beneath the aircraft but not the runway. He noticed no change in engine power or in the aircraft's attitude.

A Convair captain, who was a passenger on the subject flight, stated that he sighted the runway lighting during the intermediate approach and that the aircraft's altitude at that time appeared to be normal. He estimated that the main impact occurred 10 to 15 seconds after the beginning of the final approach. It was concluded from the reconstruction of the approach, based on testimony, that the intermediate approach ended about 10 000 m from the non-directional beacon. The pilots should have seen the airport lighting at the end of the intermediate approach at an altitude of 1 350 m. The fact that they did not see the runway lights indicates that they were at an altitude below that indicated by the altimeters - where the ground was an obstruction to the line of sight of the aerodrome.

The normal rate of descent being 150 m/min, it takes 1 min 20 sec to lose 200 m. To lose 200 m in 20 sec the pilot would have to increase the rate of descent to 600 m/min immediately following the base turn. Such an abrupt descent would have been noticed by the passengers and crew.

Past accidents similar to this one were studied. The only one in which the pilot survived was as follows: after a night flight, an instrument descent was being carried out with ceiling and visibility unlimited. The aircraft levelled off at the critical altitude and was on final approach when it struck the ground in an area full of trees. The pilot-in-command and the co-pilot, both well-experienced in instrument flight, stated that the difference between the altitude indicated on the altimeters and the actual altitude was approximately 200 m.

The Investigating Board concluded that, in view of the preceding, there is a possibility in the subject accident of erroneous altimeter indications for undetermined reasons.

### 3.2 Probable cause

The aircraft descended below the prescribed altitude for undetermined reasons.

### 3.3 Recommendations

The following recommendations were made during the investigation:

1. A review of the instrument approach chart(s) should be made for runways 10 and 28 at Brasilia.
2. Any changes to instrument approach charts should be kept up-to-date until new ones are issued.

3. When night minima are different from day minima, the differences must be pointed out.
  4. Every instrument approach chart must show the profile of the ground overflown with distance references for the outbound portion of the approach, if there is no non-directional beacon marker. Also, all elevations should be marked.
  5. Until Recommendation 3 is adopted, pilots must study carefully the minima contained in the regulations, which have been written in as footnotes to instrument approach charts. They should also study the Notams for the routes to be overflown.
  6. Flashlights must be carried aboard aircraft and stored in locations easily accessible to the crew.
  7. Emergency exits must be marked with phosphorescent paint.
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