

No. 25

Empresa de Viação Aérea Rio Grandense, S.A., (VARIG), Boeing 707, PP-VJB, accident on La Cruz Peak, Surco District, Lima Province, Peru on 27 November 1962. Report, dated 16 October 1963, released by the Ministry of Aviation, Peru.

1. Historical1.1 Circumstances

Flight 810 departed Galeão Airport (Rio de Janeiro) at 0353 hours GMT on 26 November on a scheduled international flight to Lima-Callao Airport. Aboard were 17 crew members and 80 passengers. In accordance with its flight plan, the aircraft reported over the following points: Pisasununga (0430), Campogrande (0524), Curumbá (0548), Santa Cruz (0630), Cochabamba (0652), Charaña (0715) and Pisco (0813). Based on radiocommunications between the aircraft and the tower and data prepared by Boeing, based on the aircraft's flight recorder, the final portion of the flight Pisco-Lima was as follows. At 0809 the flight reported to Air Traffic Control, Lima, at 36 000 ft, estimating Pisco at 0813 and Lima-Callao Airport at 0836 and requested permission to descend. Lima ATC advised of a DC-6, which had departed Lima at 0735 and was also estimating Pisco at 0813 when it would be cruising at 13 500 ft. After passing Pisco at 0813, and leaving 36 000 ft at 0814, Flight 810 reported at 0819 hours that it had reached 26 000 ft. Authorization to continue descending for a straight-in approach to runway 33 was granted. At 0824 it reported to Approach Control ten minutes from the station, at 15 000 ft, still in descent. By 0830 hours it had reached 12 000 ft over Las Palmas. As it was too high for a straight-in approach to runway 33, Approach Control suggested that it make a 360° turn over Las Palmas and report again overhead Las Palmas. The aircraft continued descending. It turned slightly right of its 330° heading, passing east of Lima-tambo Airport, then made a left turn and passed over Lima-Callao Airport. It continued turning until it was headed south, passing west of Las Palmas in order to initiate the outbound procedure from the ILS back course, and then made a 180° turn to intercept the ILS back course (327°). However, it kept to the normal intercept course for almost three minutes before starting its turn to the north. Its heading was 333° when it hit La Cruz Peak, about 8 miles east of the approach track of the Morro Solar ILS back course. The time of the accident was believed to be 0837 hours when the flight broke off communications with Lima Approach Control. The emergency phase was declared at 0855. The wreckage of the aircraft was located by Peruvian Air Force personnel at 1800 hours.

1.2 Damage to aircraft

The violence of the impact caused the aircraft to explode and burn. It was completely destroyed.

1.3 Injuries to persons

All 17 crew members and 80 passengers aboard the flight were killed.

2. Facts ascertained by the Inquiry

2.1 Aircraft information

The aircraft's Certificate of Airworthiness was renewed on 12 September 1962 and was valid until 22 May 1963. The aircraft had flown 6 326.41 hours since manufacture and 1.27 hours since its last check. VARIG uses the progressive overhaul system.

The weight of the aircraft and its centre of gravity are not given in the report.

2.2 Crew information

Although the report stated that there were 17 crew members on the flight, it only contained detailed information concerning two pilots-in-command and two second officers.

Both pilots-in-command held airline transport pilot licences, valid IFR ratings and were medically fit. They had been with this Airline for approximately sixteen years. Their experience was as follows:

time flown up to November 1962	13 640 hours	16 304 hours
total night flying	2 125 "	1 997 "
flying time on Boeing 707s	1 200 "	433 "
night flying on Boeing 707s	441 "	209 "
IFR flying time	8 184 "	9 782 "

The two second officers held the required licences and had been with the Airline 15 years and 9 years 8 months. Their flying experience was:

time flown up to November 1962	16 520 hours	11 081 hours
total night flying	1 856 "	2 266 "
flying time on Boeing 707s	1 614 "	388 "
night flying on Boeing 707s	606 "	114 "
IFR flying time	9 800 "	6 000 "

Flying times during the last 30 days and last 24 hours for the above did not indicate the possibility of crew fatigue.

2.3 Weather information

The meteorological office at Lima provided weather information for 0700 hours, 0800 hours, 0837 hours and 0900 hours. The conditions at 0837 hours, the assumed time of the accident, were:

wind 200°/5 kt, visibility 14 km, cloud 8/8 stratus at 570m

The conditions between Pisco and Lima were good.

2.4 Navigational Aids

The aircraft was equipped with radar, ADF, VOR and ILS (glide slope indicator and localizer).

There was a scarcity of navigation aids along the route flown. This is believed to be one of the reasons why the aircraft arrived overhead at Lima 8 or 9 minutes before the estimated time of arrival.

Aids available at Pisco and Lima were:

<u>Pisco</u>	NDB
<u>Lima</u>	NDB Las Palmas
	" Limatambo (2)
	" Callao
	" Ventanilla
	ILS localizer
	glide slope

All navigation aids were operating normally before, during and after the accident.

Two of the NDB stations - Limatambo LIM 335 and Limatambo R 400 - have the same name but operate on different frequencies with different call signs and at different locations. They appear on Jeppesen Approach Chart 21-2, dated 16 January 1962, for Lima International, which was used by the crew on the subject flight.

2.5 Communications

A tape recording was made of the communications between Lima and Flight 810. Unfortunately the quality of the recording was poor because the tape was old and worn. A call being made by Flight 810 at 0837 hours was not completed. Until that time no difficulty was reported.

Radiotelephony communications pertaining to the subject flight were also made through Lima Radio. A high frequency transmitter at Lima failed at 0633 hours but resumed operation shortly thereafter at 0648 hours.

2.6 Aerodrome Installations

The ground installations at Lima-Callao Airport were operating normally before, during and after the accident. The runway at Callao which is used for landing aircraft is runway 15/33. It is 11 487 ft long and 175 ft wide.

2.7 Fire

The aircraft burned following the explosion at impact.

2.8 Wreckage

Examination of the wreckage showed that at impact the main landing gear was extended. However, it was not possible to determine the position of the nose wheel landing gear.

The ailerons were almost intact and working freely. The aileron trim tabs were at neutral.

There were no breaks in the flap control system, and the flaps appeared to be at 30°. Examination of the outboard flap drive screws on both wings indicated an asymmetric flap condition.

The indicator screw of the rudder trim tab showed the trim tab at neutral.

Markings showed that the elevators were still attached to the aircraft at impact, and there was no evidence of any malfunction.

Threads of the stabilizer jackscrew assembly projecting above the nut corresponded to an approximate 1° nose up position.

3. Comments, findings and recommendations

3.1 Discussion of the evidence and conclusions

The distribution of the wreckage at the site of the accident proved that the aircraft was nearly straight and level at impact and that its speed was approximately 165 - 170 kt, which is normal for final approach. There was no indication that the aircraft was in a state of emergency. Impact marks on the four engine nacelles confirmed the level position of the wings and showed that the nacelles and engines were intact at the time of the accident. Examination of the engine that was not completely destroyed showed that it was operating at approach power at impact.

The flight reported all reporting points on the route in accordance with the estimated time on its flight plan. However, its flight plan allowed 23 minutes for the 113 - mile Pisco-Lima segment, although, based on the experience of other airlines operating jet aircraft, the average flying time is 16 minutes. This resulted in an over-estimated time of 7 minutes and explained the aircraft's altitude on arriving at Lima.

The flight between Pisco and Lima was reconstructed on the basis of flight recorder data and recorded communications. It had been cleared to descend from 36 000 ft before passing Pisco. Twenty-three minutes before the accident the aircraft passed over Pisco where the heading was changed from 286° to 338°, then to 330°. At this point it was at approximately 34 000 ft and descending at an average rate of over 1 500 ft/min, with an average speed of 445 kt, until 8 minutes before the accident. Six minutes after passing Pisco, the flight had been cleared to make a straight-in approach to runway 33, which implies reaching Las Palmas at 2 000 ft. The aircraft reached the Las Palmas area around 15 000 ft, and was therefore much too high to carry out a straight-in approach. The flight recorder showed no sudden descent or levelling off to avoid collision with known traffic in the Lima area. Possibly, on sighting the lights of Lima through the cloud cover over the city, the aircraft was flying with the Pisco NDB behind it, and the pilot asked for the Lima NDB to be switched on. It was assumed that he then tuned to the Limatambo airport NDB (R400) instead of the proper NDB used for the ILS back course procedure (LIM 335). This may be why the aircraft changed heading from 325° to 342° and passed within a mile of Limatambo Airport. This assumption was confirmed by the following. The aircraft completed its turn, passing over Callao Airport, and came out facing the NDB station. It then turned to fly southward. About 30 seconds after passing Las Palmas, where it received the beacon signal, the outbound track from the ILS course was initiated. The maximum outbound track is one minute.

The entire procedure was carried out in the vicinity of the ILS course. Therefore, when the 180° left turn was made to put the aircraft on a heading of approximately 012° for interception of the ILS course, (327°), the aircraft passed through this course and, when it assumed a 012° heading, the aircraft was east of the ILS course. As for the reading on the Collins integral instrument, it may be assumed that the heading shown was not 147°, the correct figure for entering the ILS front course, but 327°, the figure for the back course. As a result the equipment would give reversed indications. These would explain why the flight was continued for almost three minutes on a 012° heading, with the instrument showing the ILS course forward and to the right, whereas with the correct setting for course interception, it would have made a turn immediately to intercept the ILS back course on the west side.

Based on the foregoing, the last turn could be explained as follows: the pilot tuned in erroneously to the Limatambo NDB R400 believing it to be LIM 335. Thus, he inferred from the ADF indications that the ILS course was in front of him. Added to this error was the fact that the Collins integral instrument was incorrectly adjusted. After the prescribed number of minutes of flight, the Limatambo radio beacon (R400) showed 90° to the left. The pilot may have believed that the ILS system was out of order and started his turn to a heading of 330°. He had only reached 333° when the accident occurred. However, this assumption could not be ascertained as the Collins integral equipment was not found in the wreckage.

3.2 Probable cause

The Accident Board has determined that the accident involving the Boeing 707 aircraft, registration PP-VJB, was probably caused by a deviation, for reasons unknown, from the track prescribed for the instrument approach along the ILS back course of Lima-Callao Airport.

3.3 Recommendations

No recommendations are contained in the report.