

No. 50

C-47, PP-CCC, crashed near Belém Airport, Belém, Pará on 1 December 1955.  
Brazilian Commercial Accident Report No. 13-C-55, released 15 March 1956.

Circumstances

The aircraft took off at 0957 hours Greenwich Mean Time from Belém Airport, carrying 4 crew and 2 passengers, and had climbed to approximately 100 to 250 metres when the pilot noted signs of malfunctioning in the left engine. A violent stall and loss of power in this engine followed although the propeller continued to revolve. No emergency message was sent and the pilot did not press the feathering control. However, the rest of the emergency procedure appears to have been carried out or to have been in progress at the time of the crash. The hydraulic pump was off and this had the effect of stopping the retraction of the undercarriage half-way. The aerodynamic resistance of the semi-retracted undercarriage prevented the aircraft from maintaining altitude, carrying it down to 20 or 30 metres above the tree tops, possibly without this being noticed. There is reason to believe that the pilot was in the act of switching the fuel selector from one tank to the other when the left wing tip hit a tree breaking off 2.5 metres of the wing and half the aileron. The aircraft swerved 20 degrees to the left and nosed-up violently. The right engine at this time was on full power. The aircraft stalled and hit the ground 200 metres farther on. Explosion of the fuel tanks and fire followed. All occupants were killed.

Investigation and Evidence

At the time of the crash the flap control lever was in the retracted position (routine), the trimming tabs were on the proper setting, the propeller pitch control appears to have been set almost to the "minimum" position (as it was found) and the fuel selector was being switched from the main to the auxiliary tank or vice versa.

It appears that at that time while still flying some 30 to 40 metres above the trees and having close-by, on his left, the clear area of the teletype station and other areas with low shrubs extending to the river's edge, the pilot still considered himself in comparative safety. It is, therefore, believed that the emergency operations claimed his attention within the cockpit, partly distracting it from outside obstacles. This would also account for the right engine not being at full power.

It was proved during the inquiry that although the left propeller was revolving, it was doing so freely i.e., disconnected from the engine, which had stopped some time before. It is assumed that, believing the undercarriage to be fully retracted and seeing the left propeller still revolving, it did not occur to the pilot to switch the hydraulic system selector to the right engine.

It is assumed that the failure of the left engine probably occurred as follows: -

- 1 - Breakage at one point of the rear bearing spacer of the propeller shaft, allowing one or more rollers to operate outside the raceway and cause distortion of the whole.
- 2 - Material disintegrated from the above bearing, being ground between the reduction gear and the power section of the engine, caused intermittent longitudinal compression stresses on the above-mentioned bearing and on the front bearing of the power section. These stresses led to fatigue fracture of the rim of the inner raceway of the former bearing and of the outer raceway and casing flange of the latter one.
- 3 - The above process, which must have gone on for some time, finally led to fracture of the casing flange of the second bearing, which then came out of alignment and slipped backwards, thus disconnecting the power section and ultimately the propeller.
- 4 - In moving backwards, this bearing came into contact with the middle gear controlling the valve plate, disengaging it from the gear which operates it (crankshaft coupling gear). When this occurred, the valve plate was thrown off phasing, so that explosions occurred out of timing throughout the forward bank of cylinders, causing a back-stroke on the crankshaft, tending to stall it.

5 - At the same time, there occurred a breakage of the end of the axle of the middle valve plate gear, which operates the propeller governor. The oil supply pipe for the propeller pitch control may also have been broken. Consequently, the pitch control was inoperative.

Probable Cause

Failure of the front bearing of the propeller shaft originated a process which led to disconnection of the reduction gear and left propeller and causing sudden stoppage of the left engine.

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