

No. 6

Avianca, DC-4, HK-174, accident at Eldorado Airport, Bogotá, Colombia,  
on 22 September 1966. Report, dated 16 May 1967, released by the  
Departamento Administrativo de Aeronautica Civil, Colombia

1.- Investigation1.1 History of the flight

Flight 870 was a scheduled domestic cargo flight from Bogotá/Eldorado International Airport to Barranquilla/Soledad Airport. The aircraft took off from runway 30 at 0315 hours local time. According to some witnesses it appeared to lift off with difficulty opposite the control tower and when it reached the airport boundary the crew announced that they were returning to land. The Control Tower asked why they were returning but received no reply. After the accident tower control personnel stated that during take-off the noise of the engines was louder than usual, as if more than one engine was overspeeding, and that when the aircraft started to turn they observed a sudden flash following which they lost visual contact with the aircraft. Shortly thereafter the aircraft struck some trees 400 m from the "San Ramón" property, in a field belonging to the "Laguna Vieja" estate, between the roads leading to Funza and Engativá.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	2		
Non-fatal			
None			

1.3 Damage to aircraft

The aircraft was totally destroyed as a result of the impact and subsequent fire.

1.4 Other damage

There was no other damage.

1.5 Crew information

The pilot-in-command, aged 42, held a commercial pilot's licence, an airline transport pilot's licence and a flight radio-telephone operator's licence. His medical certificate was valid until 26 December 1966. He passed his last instrument flying check on 19 September 1966 and had flown a total of more than 13 000 hours including 3 244 hours on DC-4 aircraft.

The co-pilot, aged 26, held a DC-4 and an instrument flying rating. He had flown 1 965 hours with Avianca and his medical certificate was valid until 28 January 1967.

#### 1.6 Aircraft information

The certificate of airworthiness of the aircraft was valid until 11 July 1967 and its radio certificate was valid until 7 July 1967. On 14 December 1965 it was overhauled and the last maintenance inspection for the revalidation of the certificate of airworthiness was carried out at Eldorado Airport. The certificate made no mention of any technical defect.

On take-off the all-up weight of the aircraft was 29 000 kg which was below the maximum authorized take-off weight, and the centre of gravity was at 25 per cent MAC, which was within permissible limits.

There were 996 gal. of fuel aboard. The type of fuel being used was not stated in the report.

#### 1.7 Meteorological information

At the time of the accident the weather conditions were generally good:

wind ENE/6 kt, temperature 12/09°C, altimeter pressure 30.20 in. Hg; overcast, visibility 20 km.

The flight took place at night.

#### 1.8 Aids to navigation

Not pertinent to this accident.

#### 1.9 Communications

The aircraft was in contact with the control tower up until 0317:30 when the aircraft requested authorization to land back at Eldorado Airport. This was the last message from the aircraft.

#### 1.10 Aerodrome and ground facilities

No information was contained in the report.

#### 1.11 Flight recorders

Not mentioned in the report.

#### 1.12 Wreckage

Inspection at the site of the accident indicated that the aircraft first struck a tree with such force that it had nearly uprooted it. The wreckage of the aircraft was scattered widely some 150 m from the point of the main impact.

#### 1.13 Fire

Fire broke out following impact.

#### 1.14 Survival aspects

This was a non-survivable accident.

#### 1.15 Tests and research

Extensive investigation and testing of No. 2 powerplant and No. 1 engine were conducted.

### 2.- Analysis and Conclusions

#### 2.1 Analysis

An examination of the low and high pitch stops of the propeller of engine No. 2 revealed that the dome ring regulating the low pitch was at the maximum setting. This showed that the engine had been overspeeding.

Inspection of the governor revealed that the rack adjusting mechanism had jammed at the top of the rack as a result of a failure of the gear teeth of the pinion. As a result the governor was set for high speed and the flyweights were at the most outward position, both were indicative of maximum rpm.

After the rack and pinion gear assembly had been changed in the Avianca propeller workshop, the governor functioned normally.

Examination of No. 2 engine tachometer revealed that this instrument was unserviceable.

From the foregoing it may be deduced that because of

- (1) the lack of rpm indications on take-off,
- (2) the possible jamming of the propeller pitch control with the rack and pinion gear assembly of the governor set for maximum rpm corresponding to full fine pitch,
- (3) malfunctioning of the electric motor with resulting damage to the rotor, and finally,
- (4) the high rpm resulting from the overspeeding,

the crew was unable to feather the propeller.

A thorough examination of No. 1 engine carried out some hours after the accident, showed signs of a violent fire involving the accessories mainly and particularly the carburettor, the air intake of which had melted. Part of the engine mount and some of the accessories near the carburettor, such as the fuel, oil and vacuum pumps, were subjected to such high temperatures that part of the fire wall had been destroyed as well as the voltage regulator and some fire-proofed connexions, such as those of the auxiliary feathering rump.

As a result of the almost total destruction of the engine accessories it was difficult to determine how the fire started. It might have been caused by a major leak in the carburettor of No. 1 engine, since the extent of the fire damage appeared to indicate a heavy leakage of gasoline, or it may have been initiated by an overload in the voltage regulator.

It was considered possible that in the absence of any rpm indication for No. 2 engine, the crew may have reduced power on No. 1 engine instead of on No. 2 engine, the runaway one, and that, when realizing their mistake, the crew then re-applied power on No. 1 engine so quickly that it may have flooded it thus causing the fire.

It was concluded that No. 2 engine started to overspeed during take-off without the pilot being able to control it or to feather the propeller, then a fire broke out in No. 1 engine. The aircraft, which was being operated near its maximum take-off weight did not have sufficient power left to maintain its altitude. As a result it lost height and crashed.

## 2.2 Conclusions

### (a) Findings

The crew were satisfactorily certificated.

The aircraft had a valid certificate of airworthiness and its weight and centre of gravity at take-off were within permissible limits.

The weather conditions were generally good but it was night.

Examination of No. 2 engine revealed that this engine had been overspeeding as a result of a fatigue failure in the propeller governor assembly. Examination of No. 2 tachometer revealed that this instrument was unserviceable. Examination of No. 1 engine revealed that there had been a severe fire in the accessories part of the engine.

It was believed that the crew had been unable to control the overspeeding of No. 2 engine and that when the fire started in No. 1 engine the aircraft had insufficient power left to maintain its altitude, it therefore lost height and because of the darkness the crew was unable to avoid striking some trees.

### (b) Cause or Probable cause(s)

Material failure consisting in fatigue failure of a number of teeth of the pinion of the governor control unit, which was jammed against the rack in the "up" position and therefore set for maximum rpm, thus causing the engine to overspeed. This would be in keeping with the fact that the dome ring was at maximum low pitch setting, i.e. high rpm and a runaway propeller on take-off.

### Contributing factor

Faulty supervision by the Company. This consisted in briefing the pilot-in-command of the aircraft to make a night flight when he was not qualified for DC-4s, since he was still undergoing training for conversion to L-759.

## 3.- Recommendations

None were contained in the report.

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