

No. 15

Caledonian Airways (Prestwick) Ltd., DC-7C, G-ASID, accident at Yesilkoy/Istanbul Airport, Turkey, on 28 September 1964. Report undated, released by the Turkish Ministry of Communications. Published by the Ministry of Aviation, United Kingdom, C.A.P. 237.

1. - Investigation1.1 History of the flight

Flight 355 was a scheduled international flight from London to Singapore with a refuelling stop planned at Yesilkoy/Istanbul Airport. It took off from Gatwick on 27 September at 2215 hours GMT on an IFR flight plan. The last part of the flight was conducted at 17 000 ft. After passing the Tekirdag NDB/VOR station severe turbulence was encountered, the speed was reduced from 180 kt to 160 kt, and the ETA was changed.

While approaching the Istanbul radio range, the aircraft was cleared to descend to 4 000 ft. After commencing the descent and upon encountering severe turbulence with heavy rain, the pilot considered diverting the flight to Ankara/Esenboga, the alternate aerodrome on the flight plan, but he decided to land at Istanbul upon hearing a British Eagle aircraft report to the tower that the base of cloud was 1 000 ft. The aircraft was cleared to approach runway 24 and the pilot extended the landing gear, selected 40-degree flap and left the range station outbound at 4 000 ft.

After completing the instrument pattern, the aircraft continued descending inbound to the range to 1 500 ft. Turbulence became moderate, but heavy rain continued. While the co-pilot was trying to locate the runway lights through the direct vision panel, the pilot-in-command was busy flying on instruments. The windscreen wipers were ineffective in clearing the heavy rain off the windows. After passing the range station, the aircraft flew approximately 75 to 80 seconds, descending to 500 ft at a heading of 240°. At that moment, the co-pilot saw the runway lights to the right and ahead and reported this to the pilot-in-command; however, the pilot-in-command did not see the lights and called out overshoot procedure - full power, flaps up to 20° and gear up. The tower asked the pilot-in-command his intentions and whether he would try a VFR landing or not.

Upon request of the pilot-in-command, the aircraft was cleared to the range for a second descent. When the aircraft crossed the range station outbound at 2 000 ft for the second descent, VHF communication was lost because of a power failure in the tower transmitter and did not come back until the procedure turn. The descent, after the procedure turn, developed normally and the range station was passed at 1 500 ft; the gear was extended and the flaps set to 40°. The aircraft continued descending at a rate of 500 to 700 ft/min. During the descent, lightning and heavy turbulence were experienced.

At the last stage of the descent to 500 ft, heading 248°, the co-pilot saw the runway lights and reported to the tower that the aircraft was on final; at the same time the pilot-in-command saw the runway lights, made a slight right correction to line up the aircraft and ordered full flap and a power reduction to 20" boost. His order was carried out by the flight engineer.

Upon feeling the aircraft sinking quickly, when the clearway, short of the runway, was seen, the pilot-in-command ordered more power. A power increase could not be obtained because at that moment the left main gear struck the ground in line with the runway and 72 m short of the threshold. The right central wing hit the upper bar of the ILS screen followed by the two port engines hitting the ground. The aircraft, without changing direction, made a second touchdown with the right main gear and nose wheel after bouncing 14 m from the first impact point. At this time the blades from the left propellers were broken and thrown off. The left main gear was broken off and the nose wheel collapsed. First the port engines and later the left wing disintegrated. The fuselage skidded along a heading of 235°, 260 m down the runway, slightly to the left and came to rest. Fire started and developed on the broken left wing and in the damaged right fuel tanks. The accident occurred at 0450 hours.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal			
Non-fatal		1	
None	8	88	

1.3 Damage to aircraft

The aircraft was destroyed by impact and fire.

1.4 Other damage

The ILS screen was demolished.

1.5 Crew information

The pilot-in-command, aged 39, held an airline transport pilot's licence with an instrument rating and a rating for DC-7C aircraft. He had flown a total of 9 530 hours, including 227 hours flown during the last 90 days.

The co-pilot, aged 46, held a commercial pilot's licence with an instrument rating for DC-7C aircraft. He had flown 1 811 hours, including 311 hours during the last 90 days.

The flight engineer, aged 37, held a flight engineer's licence and a DC-7C rating. He had flown a total of 6 896 hours, including 245 hours during the last 90 days. All flight crew members had valid medical certificates.

Information concerning the other five crew members aboard was not included in the report.

1.6 Aircraft information

The aircraft had a certificate of airworthiness valid until 6 January 1965, and a certificate of maintenance valid until 1 November 1964.

It had flown a total of 20 668 hours, including 1 901 hours since its last overhaul. The inspection of the log-book showed that the periodic checks and maintenance had been performed properly in accordance with the approved maintenance schedule.

The aircraft's weight at the time of the accident was 46 117 kg approximately and its centre of gravity was within limits.

The type of fuel being used was not stated in the report.

1.7 Meteorological information

At the time of the accident the weather was as follows:

clouds: 4/8 fractostratus 600 ft, 6/8 stratocumulus 2 500 ft,
3/8 cumulonimbus 3 000 ft, 8/8 altostratus 8 000 ft
visibility: 2 km
wind speed: 210/10 kt
temperature: 16°C
weather: thunderstorm and heavy rain

This weather observation was reported to the pilot.

1.8 Aids to navigation

Tekirdag NDB/VOR and Istanbul RNG were used. Inspection of the relevant log-books indicated that these facilities had been flight-checked, pertinent NOTAM had been issued within sufficient time and the aids were operating normally.

Aids aboard the aircraft were as follows: ADF equipment, ILS/VOR equipment, marker receiver, airborne search radar, radar altimeter and Loran. The navigational aids of the aircraft were in good condition and were operating normally before the accident.

1.9 Communications

The communications equipment in the aircraft was operating normally and route and approach communication was conducted properly.

Before the second approach to Yesilkoy/Istanbul Airport was commenced, the tower VHF transmitter was unserviceable for 3 to 4 minutes due to an electrical power failure. Communication between the aircraft and the tower was restored when the emergency generators were connected and remained normal until the time of the accident.

1.10 Aerodrome and ground facilities

The concrete runway 24 was 7 546 ft long and 197 ft wide. The clearway from the threshold extends 68 m with a 2.30% slope without obstruction. The remaining part has a rather steeper slope.

1.11 Flight recorders

Not mentioned in the report.

1.12 Wreckage

From the point of first impact the aircraft started to disintegrate within an area approximately 60 by 300 m. The starboard engines and wing remained attached to the fuselage.

1.13 Fire

The port wing became detached and caught fire on the first impact and came to rest on the runway 170 m further on. The fuselage skidded along the runway with the starboard wing and engines still attached. The fire developed mostly on the starboard central wing. The fire was started when fuel spilled on the hot engine exhaust pipes after the first impact when both inboard fuel tanks were torn open.

Airport fire-fighting personnel and equipment

Personnel

1 chief
3 chiefs of team
35 firemen
15 drivers

Equipment

2 Ford rescue trucks (300 lb dry chemical)
2 Thames tankers (4 000 litres water)
2 Cordox rescue and fire-fighting trucks
(600 gallons water and 42 gallons foam)
1 GMC tanker (2 000 litres water)
2 ambulances

All these vehicles were equipped with two-way radio and were used for fire-fighting and rescue operations.

Number of personnel on duty at the time of the accident

1 team chief
1 assistant to the team chief
2 fire-fighting sergeants
1 fire-fighting corporal
6 fire-fighting soldiers
9 fire-fighting drivers

1.14 Survival aspects

Immediately after the evacuation order was given by the pilot-in-command, the front crew door and a rear cabin emergency exit were opened and evacuation commenced. During this period the fire-fighting service of the airport arrived and, while getting the fire under control, helped the passengers to evacuate the burning aircraft.

1.15 Tests and research

The investigation team was of the opinion that laboratory tests or any other special examination of any part were not necessary.

2. - Analysis and Conclusions

2.1 Analysis

The examination of the wreckage showed that there was no malfunctioning or failure of the airframe, engines, propellers, wings and accessories prior to the accident. At the time of the accident the engines were developing power.

The aircraft hit the ground with its left main landing gear at a point 72 m before the threshold and 2.5 m below the runway surface level. The mark from the left main gear was 7.5 m long and fairly deep. The mark from the right main gear started 4 m after the commencement of the mark from the left gear and continued for 12 m.

There were four propeller slashes starting 1.5 m after the end of the left main gear marks, paralleling each other and 60 cm apart, and 3.5 m to the left of these slashes were four other propeller slashes (55 cm between the first two and 70 cm between the last two slashes).

A trace from the nose wheel started 30 m before the threshold. This was followed, 4 m further on, by the start of another trace from the right main landing gear. These traces, parallel to the centre line of the runway, continued to the threshold and became deeper.

There was also a deep cut from a propeller blade on the ILS detector box which was perpendicular to the landing gear trace. The ILS detector box is located 1.5 m after the start of the right main landing gear trace, and its height is 60 cm.

On the runway a metal trace from the nose wheel rim was seen, without interruption, from the threshold to the point where the aircraft came to rest. No other trace appeared on the runway or on the terrain.

2.2 Conclusions

Findings

The crew was properly licensed and authorized to carry out the flight.

The aircraft had a valid certificate of airworthiness. Its maintenance and inspection had been properly performed.

The weight and centre of gravity of the aircraft were within the specified limits.

No mechanical malfunctioning or abnormality of any kind had been reported during the flight up to the time of the accident.

All ground equipment and navigational aids were operating normally.

The air-ground communications recorded showed that they had been conducted normally in accordance with the regulations. Upon hearing the report of the cloud base of 1 000 ft from the British Eagle aircraft, the pilot-in-command decided to make an attempt to land.

After the first approach the aircraft overshot. Due to heavy rain, the runway lights could not be seen by the pilot-in-command and the aircraft was to the left of the runway centre line.

On the second approach, the aircraft was slightly to the left. The pilot-in-command made a correction and decided to land.

Due to the heavy rain the visibility was poor. Possibly, the pilot-in-command could not control his height; it is also possible that distortion caused by water on the windscreen gave him a feeling of being too high and he called for full flap and 20" boost. Immediately before the impact, the pilot-in-command ordered full power to prevent under-shooting.

The aircraft struck the ground in a slight left bank attitude, 72 m before the runway with the left main gear.

Cause or
Probable cause(s)

The probable causes of this accident are:

- (a) During the last approach, the pilot was too early in selecting full flap and reducing the power.
- (b) Due to heavy rain and poor visibility, the height could not be controlled precisely.
- (c) The order for full power was given too late; this created the undershoot condition.

Contributory factors

Probably the rain formed a layer of water on the windshield which refracted the light and caused the threshold to be seen nearer than it was; additionally, the rain was so heavy that the wipers, which were operating normally, could not satisfactorily wipe the windshield for clear vision.

3. - Recommendations

None were contained in the report.
