

No. 40Aer Lingus-Téoranta DC-3 landed in a field  
at Sperrall, Warwickshire, on 1 January 1953Circumstances

At 0936 hours on the 1 January 1953, the DC-3 aircraft took off from Dublin Airport en route for Birmingham. The aircraft was manned by a crew of three and carried 22 passengers. The take-off weight of the aircraft was 11 433 kg. as against an authorized maximum take-off weight of 12 227 kg.

The route chosen was by way of Point Lynas, Wallasey, Whitegate and Lichfield to Birmingham. The flight was without incident as far as Lichfield, which was reached at 1056 hours.

Shortly after Lichfield both engines lost power when flying at a height of about 5 000 feet and the aircraft made a forced landing in a field at Sperrall, Warwickshire, 14-1/2 miles SSW of Elmdon Airport. The aircraft was extensively damaged, but all passengers and the crew with the exception of the co-pilot escaped without serious injury.

Investigation and Evidence

The calculated fuel required for the flight was 105 Imperial gallons plus 10 Imperial gallons for taxiing, run-up and take-off, a total of 115 Imperial gallons. A further 50 Imperial gallons was calculated as required for diversion to an alternate airfield leaving a reserve of 135 Imperial gallons. The total available fuel quantity of 300 Imperial gallons was considered more than sufficient for the flight.

The Captain and the First Officer went through the pre-starting check-list, the First Officer reading out the items and the Captain checking them. In the case of the fuel quantity check, the First Officer turned the selector switch while the Captain watched the gauge.

The check of the cockpit fuel selectors was read out by the First Officer, who himself moved the starboard selector to the right main position. The Captain states that he then moved the port selector to left main and checked the starboard selector in the Right Main position by putting his hand across and feeling it.

The aircraft was then taxied out to the runway, where the run-up and pre-take-off check was completed, and, after receiving its clearance, the aircraft took off at 0936 hours.

Shortly after take-off the First Officer made out the technical log which was completed at 0946 hours and, according to the evidence of the Captain, then checked the fuel quantity.

After passing the mid-channel position clearance was obtained from Preston Control to proceed under Instrument Flight Rules at a cruising altitude of 5 500 feet, the aircraft ascending to this altitude under Visual Flight Rules.

At this stage the flight conditions were as forecast with broken cloud mainly below the aircraft. The aircraft position was checked on several occasions and the record kept on the flight log.

The Captain stated that he checked the fuel quantity when approaching the Wallasey Fan Marker while the First Officer was out of his seat, obtaining a Gee fix.

In the vicinity of Whitegate the cloud increased as the meteorological forecast had indicated and the aircraft was flying almost continuously in stratified cloud. Both pilots gave evidence that only slight rime ice was encountered at any time during the flight. No carburettor hot-air was applied.

The Lichfield radio beacon was passed to port at 1056 hours still flying at an altitude of 5 500 feet. This was reported to Preston Control who cleared the aircraft to descend to 4 500 feet and to change frequency to Birmingham approach on 126.9 Mc/s.

Until the Lichfield beacon was passed the aircraft and its engines functioned normally and without any indication of trouble.

At 1057 hours the First Officer established contact with Birmingham approach, making his position report. This was acknowledged by Birmingham who instructed the aircraft to call overhead at 4 500 feet and gave the actual weather report of Elmdon of 1055 hours:- Surface wind 360°/14 knots, visibility 3 000 yards, cloud 8/8 at 800 feet, 7/8 at 600 feet, QFE (aerodrome barometric pressure) 998.2 mbs.

Some time between 1059 hours and 1100 hours the starboard engine cut suddenly without any previous indication or rough-running. Almost immediately (the Captain's estimate being 6 to 7 or perhaps 10 seconds) after the loss of power on the starboard engine, the port engine cut in the same way. The altitude at that time was approximately 5 000 feet.

At about 1101 hours, the aircraft sent the following message:- "Emergency, both engines giving trouble, may I commence immediate descent". Birmingham approved an immediate descent to 2 500 feet. At 1105 hours Birmingham requested the aircraft's altitude to which the aircraft replied:- "Now at 2 000 feet, will call you overhead". A little later Birmingham was called:- "Now 1 500 feet both engines out" and requested a QDM (magnetic course to steer to the station in zero wind conditions) to which Birmingham Homer, which had started taking bearings as soon as the aircraft had established radio contact, answered "QDM 030". The aircraft continued giving the altitude until just about on the ground.

At the time of the complete loss of power the aircraft was quite near the Elmdon Airport and at some stage of the descent passed close to the Inner Marker beacon of the SBA. As the cloud base was given at 600 feet and the Captain was aware of the proximity of HT cables and other obstructions near the aerodrome, he decided, when left without power, to fly away from Birmingham on a southerly heading, and the Inquiry accepts, in view of his knowledge and experience of the locality, that this decision was justified. The ultimate landing of the aircraft demonstrated that he had chosen one of the few places - if not the only one, apart from the airport - where he could hope to land with any degree of safety.

The aircraft descended rapidly through cloud at about 90 knots and came into the clear at approximately 600 feet. The Captain then saw a wood on a small hill, which he left to port, and to starboard three small fields with trees and rising ground beyond. He put the aircraft down in the first of these at a speed of about 80 knots, wheels and flaps retracted.

After touching down the aircraft slid along towards a gap in the far hedge when the Captain noticed a large tree ahead. He put on some right rudder and skidded the aeroplane through the gap in the hedge, across a road into the next field where it came to rest with the nose across a ditch. In the skid that followed this manoeuvre the tail hit the tree, the fuselage sustaining severe damage.

Having considered the symptoms of the failure:- absence of rough-running or other previous indication, in each case the sudden and complete loss of power, the drop of the fuel pressure on the only occasion when the fuel pressure gauge was observed after the first engine lost power, and the power surges after the booster pumps were put on, the Inquiry was quite satisfied that the cause of the failure of each engine was due to a complete and immediate cessation of fuel supply to the fuel pumps.

There was no suggestion that the failure was due to carburettor icing and the Captain himself was satisfied that the engine loss of power did not result from this condition.

The only contentions put forward for the cessation of fuel supply were:-

a) By the Captain, First Officer and Airline Pilots' Association: the possibility of water in the fuel resulting in either blocking the fuel supply by freezing or starving the engine of fuel by displacement of the fuel.

b) By the Company: a tank or tanks becoming exhausted through mis-selection by the crew so that both engines were running off the same tank.

Contention a) involved examination of the refuelling system at Dublin Airport and the refuelling of the aircraft prior to the flight in question.

The Inquiry was satisfied that the aircraft was, on the morning of the 1 January, properly refuelled with petrol of the required grade and free from water contamination. The submission

was made that water formed by condensation in the aircraft's tanks prior to her last refuelling, while the aircraft's tanks were much depleted during the period, could have caused water contamination. The Inquiry accepted evidence that at between 2200 and 2300 hours a half-pint of liquid from each of the three tank sumps was drained off and that no abnormal quantity of water was found on this check. (The certificate signed by this witness for check 2 shows that he also ran off the fuel filter sumps and this check was formally proved by him in evidence.) The possibility of water contamination could only arise from condensation taking place after 2200 hours on the night of the 31 December.

Having regard to the absence of any significant quantity of water, the stage of the flight at which the power failure occurred, the air temperatures prevailing at the time of failure, and the absence of water in the carburettors or filters, the Inquiry was satisfied that all possibility of loss of power due to water contamination of the fuel system must be ruled out. Again the symptoms observed at the time power was lost were not characteristic of contamination of fuel by water or restriction of the fuel supply by water.

The only possibility of fuel starvation resulting from exhaustion of a tank or tanks was mis-selection of the fuel selector valves in such a way that both engines were running throughout the flight on the same tank. This involved the finding that the crew took off from Dublin with engines drawing from the same tank, that tank being the right main tank.

The Captain's evidence did not show that he clearly recollects actually seeing the port cockpit selector on the left main tank position: it went no further than that he moved the selector lever and no doubt believed, he had moved it to that position. The evidence in regard to the fuel contents gauge reading at or about Wallasey was unconvincing. The Captain was clearly not sure of what tank dials he read and it appeared to the Inquiry as having been no more than a rapid glance as he switched over the gauge selector. The Captain could not afterwards state positively any reading and it is clear from his evidence that he did not take a reading but merely contented himself with the needle movement which indicated to him at the time that he had what he took to be a normal quantity of fuel for that stage of the flight in whatever tank or tanks were represented by the pointer. The Inquiry was unable to determine whether the Captain at this stage actually observed the dial in relation to one tank, two tanks, or all tanks. The Inquiry had to take into consideration that in a rapid switching movement and reading by the Captain from his position in the left seat and the flicking of the needle, the "upright position" of the pointer which he mentions could be anywhere between 90 and 130. The Captain said that it was a quick check. This check cannot be relied upon for more than an indication that the tanks checked contained fuel.

The fuel contents gauge check made by the Captain on the first engine cutting gave him the impression that whatever tank was then showing on the dial contained about 50 Imperial gallons or thereabouts. Again the evidence cannot be relied upon as giving the quantity of fuel in that tank. In the first place the Captain did not know and did not ascertain whether the gauge selector was turned to the tank supplying the starboard engine. In the second place it was no more than a glance at a time when the Captain was glancing around at every instrument.

Calculation based on the actual conditions of the flight and the time from departure to when the port engine cut, shows that the fuel consumed totals 115 Imperial gallons. This was the amount in fact carried in the right main tank, so that two engines drawing throughout on that tank would exhaust its fuel at the time when the first engine cut.

Reference may here again be made to the fact that both engines cut practically simultaneously.

The Inquiry had evidence of two tests carried out by the Company in which DC-3 aircraft were flown with two engines selected to the right main tank until fuel supply failed. There was no material difference in either test between the nature and symptoms of the engine cuts and those experienced on the occasion of the accident.

#### Probable Cause

The primary cause of the accident was loss of engine power due to fuel starvation. The Inquiry found that this was caused by selecting the port engine to the right main tank to which the starboard engine was also selected.

The loss of engine power alone was the sole cause of the accident, which could have been avoided had the crew diagnosed the cause of the trouble and changed the fuel feed to another tank.

The failure to diagnose fuel starvation was probably due to the circumstances: i.e. first, the lack of co-ordinated effort by the Captain and First Officer after the engines cut; second, the knowledge of the crew that ample fuel for the flight was on board and their belief that the engines were drawing from their respective main tanks.

The actual forced landing of the aircraft in conditions of low cloud, poor forward visibility and unfavourable terrain was skilfully executed and resulted in the passengers escaping unharmed.